Canadian Centre for Agri-Food Research in Health and Medicine

CCARM

Centre canadien de recherches agroalimentaires en santé et médecine

3rd International Trainee Symposium in Agri-Food, Nutrition and Health

October 15th to 17th, 2025

St. Boniface Hospital Albrechtsen Research Centre
351 Taché Avenue, Winnipeg, Canada

Hôpital St-Boniface Hospital FONDATION • FOUNDATION

University of Manitoba

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

meetccarm.ca

WELCOME MESSAGE

Greetings and welcome to the International Trainee Symposium in Agri-Food, Nutrition, and Health. This symposium is hosted by the Canadian Centre for Agri-Food Research in Health and Medicine (CCARM), a partnership between St. Boniface Hospital, Agriculture and Agri-Food Canada, the University of Manitoba, and the University of Winnipeg.

CCARM's vision is to enhance the value of agricultural commodities and finished products through pioneering research in functional foods and nutraceuticals. Our research program is dedicated to translating promising findings from basic laboratory science into safe and effective dietary supplements and food products that can improve health and wellness. From laboratory studies to human trials, CCARM conducts clinical research on functional foods and nutraceuticals identified in our labs as having potential benefits for diseases of significant clinical and economic impact globally.

At CCARM, we are dedicated to trainee career development. The promotion of trainees is critical to develop the next generation of research scientists and there is a strong need to develop greater capacity in this area. This symposium is an opportunity for graduate students and postdoctoral fellows to showcase their research and achievements and provide them with the opportunity to network and engage in discussions with other researchers and trainees.

On behalf of CCARM, we sincerely appreciate your interest and hope the program provides you with both inspiration and enjoyment.

Dr. Thomas Netticadan
Chair
Research Scientist, AAFC & Team Leader, CCARM

We would like to thank
St. Boniface Hospital and Agriculture & Agri-Food Canada
for financial support towards organizing the conference.

ORGANIZING COMMITTEE

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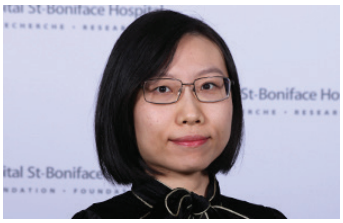

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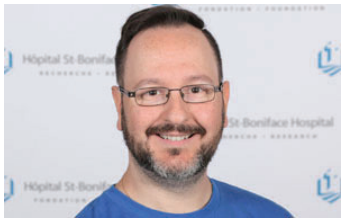

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PROGRAM SCHEDULE

DAY ONE

8:00 am - 9:00 am	**Registration**
9:00 am - 9:20 am	**Opening Remarks/Welcome Message** Dr. Thomas Netticadan, Research Scientist, Agriculture and Agri-Food Canada, and Team Leader, CCARM Dr. Tony Savard, Director, Agriculture and Agri-Food Canada Karen Fowler, President and CEO, St. Boniface Hospital Foundation
9:20 am - 10:00 am	**Plenary Lecture** Dr. Alfredo Franco-Obregon, Professor, Institute for Health Innovation & Technology, National University of Singapore, Singapore *"Cellular BIOREACTORS! Scalable Magnetic Field Platform 'to Enhance Cell-Based Serum-Free Meat Production"*
10:00 am - 10:20 am	**Coffee Break**
10:20 am - 12:20 pm	**Session I:** **Innovations in Plant-Based Foods: Functionality, Palability, and Beyond** (Moderator: Mayuri Bane)

Ruth Boachie, University of Manitoba, Canada
Plant-Based Meat Analogues on the Canadian Market: Effect of Processing on their Digestibility

Vittoria Latrofa, University of Bari Aldo Moro, Italy
Micro and Macrostructure of Gelatin-Free Jelly Candies Formulated with Dry-Fractionated Pea and Corn Starches

Beverly Too, University of Manitoba, Canada
Characterization of Phenolic Compounds in Wild Rice Noodles Fortified with Purple Carrot

Judicaël Boris Nafack Tsazeu, University of Antananarivo, Madagascar
Formulation of a Plantain-Based Supplementary Food Combined with Maize, Groundnut and Mung bean to Prevent Protein-Energy Malnutrition in Children Aged 6-24 Months in Madagascar

Marica Troilo, University of Bari Aldo Moro, Italy
High-Protein Bread Formulated with Semi-Whole Wheat Semolina and Yellow Lentil Dry-Fractionated Protein

Jaspreet Kaur, University of Manitoba, Canada
Evaluating Protein Quality and Chlorogenic Acid Content in Diverse Sunflower Seed Varieties for Sustainable Food Applications

Gianfilippo Nigro, University of Bari Aldo Moro, Italy
Development of Sea Fennel Enriched Lasagna Sheets: Impacts on Nutritional and Physicochemical Aspects

PROGRAM SCHEDULE

DAY ONE

10:20 am - 12:20 pm

Ifeoluwa David-Oluwole, Federal University of Technology, Nigeria
Fatty Acid Profile and Storage Stability of Bread from Mushroom Supplemented Composite Blends of Wheat/Plantain and Cinnamon Powder

Aria Haiying Huang, McGill University, Canada
Evaluation of Quinoa-Wheat Composite Flour for Bread and Pasta Production using Quebec-Grown and Bolivian Cultivars

Angela Pamela Pezuk, Reference Center for Lactobacilli (CERELA-CONICET-FML-FECIC), Argentina
Effect of Enzymatic Treatments on the Quality of Low Carb Bread made with Yellow Pea Protein Concentrate

Harshani Nadeeshani Vidana Hewage, University of Manitoba, Canada
High-Voltage Cold Plasma for Developing White Lupin (Lupinus Albus) Protein Ingredients with Improved Functionality and Protein Quality

Ravinder Singh, University of Manitoba, Canada
Changes in Protein Structure and Nutritional Quality During Extrusion Cooking of Faba Bean Protein-Based Meat Alternatives

Sunita Karki, University of Manitoba, Canada
Hydrocolloids Coating Effects of Resveratrol on Pasting and Dough Rheology of White and Whole Wheat Flours

Zainab Olaide, University of Ibadan, Nigeria
Potential Role of Walnuts (Juglans Regia) as a Supplemental Dietary Approach in the Management of Sickle Cell Disease in Nigerian Children

12:20 pm - 1:10 pm

Lunch Break

1:10 pm - 3:10 pm

Session II:
Enhancing Community Health through Agroeconomic Innovations
(Moderator: Breanne Semenko)

Eunice Amponsah, Kwame Nkrumah University of Science and Technology, Ghana
Influence of Genetic and Biochemical Diversity of Food Crops on Climate Resilience, Sustainability, and Nutrition

Amos Anim, Kwame Nkrumah University of Science and Technology, Ghana
The Impact of Agricultural Practices on Food Composition – A Systematic Review

Olubunmi Adebola Olanipekun, Ekiti State University, Nigeria
Climate Change, Poverty, and Food Security: The Role of Adult Education in Promoting Home Gardens and Small Holder Adaption in Ekiti State

Shashika Yapa, University of Manitoba, Canada
Impact of Cultivar Mixtures on Spot Blotch Disease Resistance, Grain Yield, and Quality in Barley

PROGRAM SCHEDULE

DAY ONE

1:10 pm - 3:10 pm

Thomas Croci, University of Milan, Italy
Impact of Regenerative Agriculture on Gluten Aggregation Properties of Wheat

Iqtidar Hussain, Gomal University, Pakistan
Phytotoxicity and Stimulatory Behavior of Some Common Weeds on Maize Germination and its Growth

Krishna Priya Kannan, ICAR-Indian Agricultural Research Institute, India
Decoding Light–Hormone Synergies to Enhance Carotenoid Biosynthesis in Mung Bean Sprouts

Inês Sousa, University of Lisbon, Portugal
UV-C LED Irradiation Inhibits Development of Sitophilus spp. in Early Life Stages

Fernando Viacava, University of Manitoba, Canada
High Hydrostatic Pressure (HHP) as Postharvest Abiotic Stress to Elicit Bioactive Compounds Biosynthesis in Carrots

Maqbool Zainab, Lahore College for Women University, Pakistan
Tomato Disease Combat and Yield Optimization Using Selenium Nanoparticles: A Sustainable Nano-Agriculture Approach

Mohamed Alfalah, University of Mohammed VI Polytechnic, Morocco
Phosphorus-Drought Interaction Modulates Growth Dynamics and Essential Oil Biosynthesis in Rosmarinus officinalis

Yanchen Gao, University of Manitoba, Canada
Spatiotemporal Monitoring of Northeast China Black Soil Layer Dynamics and Erosion Susceptibility in the Context of National Food Security

Tawanda Jeke, University of Manitoba, Canada
Characterization of Phenolic Compounds and Antioxidant Properties in Sorghum Grains Cultivated in Canada

Md Muzammel Hossain, Jiangsu University, China
Potential Toxic Elements in Cosmos Plants and the Public Health Risks in Prettification Cities

3:10 pm - 3:30 pm

Coffee Break

3:30 pm - 5:30 pm

Session III:
Food Structure and Matrix: Linking Texture, Palatability, and Nutrition
(Moderator: Dr. Mariela Rodriguez)

Alexander Ayodele, University of Ibadan, Nigeria
Structural Characteristics and Antioxidant Potential of Horse Gram Protein for Functional Food Applications

Nwagbo Comfort Chinenye, Chukwuemeka Odumegwu Ojukwu University, Nigeria
Nutritional and Phytochemical Composition and Glycaemic Response of Selected Edible Nigerian Leaves

PROGRAM SCHEDULE

DAY ONE

3:30 pm - 5:30 pm

Manpreet Kaur, University of Manitoba, Canada
Plasma-Powered Modulation of Hemp Proteins: From Structure to Superior Functionality

Fabrice Herve Njike Ngamga, University of Dschang, Cameroon
Exploring the Physicochemical Properties, Fatty Acids Composition, and Nutritional Quality Indices of Oil Derived from Chrysichthys Nigrodigitatus (Jaw) of Different Sizes: Impact of Processing

Michela Pia Totaro, University of Bari Aldo Moro, Italy
Optimization and Application of Inulin-Based Gels with Different Degrees of Polymerization as Fat Substitutes in Low-Fat Hamburger Formulations

Nicola Gasparre, University of Manitoba, Canada
I*nfluence of Corn Arabinoxylans on Morphometric Profiles and Textural Stability of Starch Gels during Storage*

Eniola Jayeola, University of Ibadan, Nigeria
Production and Quality Evaluation of Spreads Enriched with Edible Insect Larvae

Jiao Jia, Dalian Polytechnic University, China
Effect of Ultrasonic Pretreatment on the Structure and Gel Properties of Protein Isolates from Large Yellow Croaker (Pseudosciaenca crocea) Roe

Tolulope Jayeola, University of Ibadan, Nigeria
Nutritional Quality, Environment Impact and Affordability of Alternative Proteins using a Meta-Analysis Approach

Daniel Zogona, University of Manitoba, Canada
Wild Rice-Wheat Noodles Fortified with Purple Sweet Potato Mitigate AAPH-Induced Oxidative Damage in Caco-2 Cells

Oluwatimilehin Ayanniyi, University of Ibadan, Nigeria
Antioxidant Properties of Probiotic-Fermented and Enzymatically Hydrolysed Milk Alternative from Vigna Unguiculata L. (White - Black Eyed Cowpea)

Olayinka Babatunde, University of Ibadan, Nigeria
Evaluation of Insect-Based Ready-to-Use Therapeutic Food (RUTF) Formulated with African Palm Weevil Larvae

PROGRAM SCHEDULE

DAY TWO

8:00 am - 10:00 am

Session IV:
Innovations in Food Components/Ingredients: From Extraction to Functionality
(Moderator: Dr. Daniel Zogona)

Mayuri Bane, University of Manitoba, Canada
Sustainable Protein Extraction from Canadian Dry Beans: Structural and Functional Insights

Muskan Beura, ICAR-Indian Agricultural Research Institute, India
Optimized Extraction and Genotypic Screening of Ergosterol and Eritadenine in Indian Shiitake: A Dual Bioactive Approach for Nutraceutical Development

Elsa Solefack Nguepi, University of Dschang, Cameroon
Comparative Study of the Optimization of Soy Cheese Processing Technology using Commercial White Vinegar and Diluted Acetic Acid

Chandima Kulathilaka, University of Peradeniya, Sri Lanka
Ultrasound-Assisted Extraction Enhances Yield and Functional Properties of Mung Bean Protein Isolates

Hylenne Bojorges, Institute of Agricultural Chemistry and Food Technology (IATA-CSIC), Spain
Protein Recovery and Bioactive Potential from Brown Seaweed Residues

Kofi Oduro, University of Manitoba, Canada
Plasma Activated Water as a Sustainable Pretreatment to Enhance Protein Extraction from Chickpea

Julio G. Cisneros Medrano, University of Guelph, Canada
Exploring Hemp Seed Processing Fractions for Improved Food Attributes

Mildreth Cecilia Cordero Herrera, University of Córdoba, Columbia
Physicochemical and Functional Characterization of Moringa oleifera Seed Extract with Potential Use in the Food Industry

Sodiq Olaleye, University of Ibadan, Nigeria
Effects of Extraction Methods on the Structural Characterisation of Pigeon Pea Protein Isolate

Mariela Rodriguez, University of Manitoba, Canada
Non-Thermal-Processing of Lentil Proteins via Cold Plasma for High-Value Food Ingredients

Thanuranga Tharushi Samarasinghe, University of Manitoba, Canada
Optimization of Green Protein Extraction from Cold-Pressed Canola Meal using a Natural Deep Eutectic Solvent (NDES) of Choline Chloride (ChCl) and Citric Acid (CA)

PROGRAM SCHEDULE

DAY TWO

8:00 am - 10:00 am

Ruth Sanusi, University of Ibadan, Nigeria
Antioxidant Properties of the Polyphenolic Extracts of ASA Encapsulated and Co-Incorporated with Lacticaseibacillus rhamnosusGG in Ogi

Davide Falotico, University of Bari Aldo Moro, Italy
Alcalase Hydrolysis to Enhance Techno-functional Properties of Dry-fractionated Yellow Pea Protein

Kemashalini Kirusnaruban, University of Manitoba, Canada
Microwave-Assisted Aqueous Extraction of Phenolic Compounds from Wheat

10:00 am - 10:20 am

Coffee Break

10:20 am - 12:20 pm

Session V:
Advancing Food Processing: Novel Strategies for Quality and Preservation
(Moderator: Dr. Cristina Chairez Jimenez)

Mariana Miccolis, University of Bari Aldo Moro, Italy
Extending the Shelf-Life of Fresh Pasta with Free and Microencapsulated Olive Pomace Extracts

Mawande Hugh Shinga, University of Johannesburg, South Africa
Effect of Edible Coating on Volatile Profile of Banana Pulp Under Retail Conditions

Sherwin Santiano, University of Manitoba, Canada
Effects of Temperature on Moisture Uptake During the Malting Process

Maria Garofalo, University of Manitoba, Canada
Impact of Probe Geometry on the Oral Processing Simulation

Cristina Jimenez, University of Manitoba, Canada
Impact of Thermal and Non-Thermal Processing on the Structure and Functional Properties of Canola Proteins Obtained by Different Extraction Methods

Lia Mansueto, University of Bari Aldo Moro, Italy
Bakery Products Enriched with Artichoke By-Products: Development of Functional Foods with Evaluation of Antioxidant and Nutritional Potential

Santiago Rivera, University of Manitoba, Canada
Preliminary Assessment of Malting Quality Parameters in Winter Wheat: Implications for Functional and Health-Oriented Malt Products

Flavia Adais Rocha dos Santos, University of Manitoba, Canada
Solvent-Free Enzymatic Epoxidation of Oleic Acid for Development of Sustainable Lipid–Protein Nanodelivery Systems

PROGRAM SCHEDULE

DAY TWO

10:20 am - 12:20 pm

Katlego P P Makale, Botswana International University of Science and Technology, Botswana
Analysis of the Antibacterial Activities of Potential Antibiotic-Producing Bacteria and Native Plants from Botswana: An Exploratory Study in the Search for New Antimicrobial Agents

Husnain, Muhammad, The University of Lahore, Pakistan
Development and Evaluation of Low-Caloric Jaman and Falsa Fruit Leather

Camila Velez, Research and Development Center in Food Science and Technology, Argentina
Phytotoxic Effects of Residues from Intensive Poultry Farming on Chicory (Cichorium intybus)

Anjali M.K, Dairy Science College, India
Development and Characterization of Synbiotic Yoghurt Enriched with Murraya Koenigii Leaf Extract as a Natural Prebiotic

Sipho Tonisi, University of Johannesburg, South Africa
Characterizing Freeze-Dried Powders from Different Parts of Opuntia Ficus IndicaCladodes: Proximate, Amino acids, and Mineral Composition for Animal Nutrition

12:20 pm - 1:10 pm

Lunch Break

1:10 pm - 3:10 pm

Session VI:
Nutritional Strategies in Health and Disease: From Prevention to Clinical Care
(Moderator: Drupat Sharma)

Rabia Basri, Riphah International University, Pakistan
Association of Ultra-Processed Food with Obesity among University Students

Noor Ul Huda, University of Ottawa, Canada
Barriers to Affordable Healthy Eating Experienced by Individuals Living with Cognitive Disabilities

Abubakar Isyaku Ismail, Northwest University, Nigeria
The Role of Nutrition in Enhancing Health Outcomes: A Review of Current Evidence

Kingsley Jacob, Adventist University of the Philippines, Philippines
Promoting Public Health Nutrition to Prevent Diet-Related Diseases in Nigeria: A Systematic Review

Uju Onuorah, Liverpool School of Tropical Medicine, United Kingdom
School Meal Programs and Nutrition Equity: Global Trends and Health Implications (2019–2024)

Fadi Ramadan, University of Manitoba, Canada
Differential Effects of Dietary Protein Sources on Metabolic and Histological Outcomes in Metabolic Dysfunction-associated Fatty Liver Disease (MAFLD)

PROGRAM SCHEDULE

DAY TWO

1:10 pm - 3:10 pm

Srabonti Saha, University of Chittagong, Bangladesh
Anti-Diabetic Effects of C. chinense Jacq.: In vitro and In vivo Evidence

Shanella Senadhiraja, University of Manitoba, Canada
Prenatal Alcohol Exposure (PAE) Alters Maternal and Fetal Liver Lipid Metabolism and Increases Inflammation in Rats

Rashmi Siribaddanage, University of Manitoba, Canada
Broccoli Microgreens Improve Hepatic Vitamin A Levels and Reduce Adiposity in a Rodent Model of Diet-Induced Obesity

Ruzzell Flores, University of Manitoba, Canada
Circadian Disruption Exacerbates High-Fat Diet Induced Heart Failure with Preserved Ejection Fraction

Amir Hossein Hassani, Shiraz University of Medical Sciences, Iran
Cornelian Cherry Reverses Gastric Intestinal Metaplasia: A New Hope in the Prevention of Gastric Cancer

Shiqi Huang, University of Manitoba, Canada
Transcriptomics Reveals that Growth State and Concentration Determine how Docosahexaenoic Acid Affects Endothelial Cells

Molly Crandall, University of Manitoba, Canada
Loss of Circadian Period Gene Increases Cyp7A1 and Bile Acid Mediated Cardiac Cell Death Following Ischemia-Reperfusion in Cardiac Myocytes

3:10 pm - 3:30 pm

Coffee Break

3:30 pm - 4:45 pm

Session VII:
Innovating Traditional and Cultural Foods: Modern Approaches for Health and Wellness
(Moderator: Shanella Senadhiraja)

Portia Adams, Kwame Nkrumah University of Science and Technology (KNUST), Ghana
Traditional and Indigenous Foods as Pathways to Improved Nutrition: Recipe Documentation and Standardization in Northern Ghana

Elizabeth Alagbe, Mohammed VI Polytechnic University, Morocco
Nutritional Properties of Low-Lactose Laban (Yogurt) made from Camel Milk

Nayra Luz Alvarino-Molina, University of Córdoba, Columbia
"Suero Costeño": Gastronomic Heritage of the Colombian Caribbean and its Nutritional and Functional Value

PROGRAM SCHEDULE

DAY TWO

3:30 pm - 4:45 pm

Esther Kilanko, University of Ibadan, Nigeria
Nutritional Composition of Gluten-free Pasta from Provitamin A Cassava (Manihot esculenta Crantz) and Bambara Nut (Vigna subterranean) Flour Blends

Colleen Rogers, University of Manitoba, Canada
Exploring the Role of Spirituality in Type 1 Diabetes: A Grounded Theory Study

Drupat Sharma, University of Manitoba, Canada
Safety and Tolerability of Daily Wild Rice Consumption in Healthy Young Adults

Francesca Vurro, University of Bari Aldo Moro, Italy
Acorn: From Famine Food to a Functional Option

Tadesse Fenta Yehuala, Bahir Dar University, Ethiopia
Fermentation Kinetics and Effects on Antinutrients in Pearl Millet-Based Dough Recipes used to Prepare Injera

4:45 pm - 5:25 pm

Plenary Lecture
Dr. Charles Brennan, Chief Scientific Director - Food & Nutrition Innovation Hub, Royal Melbourne Institute of Technology, Australia
The Use of Mushroom Bioactive Ingredients Obtained from Valorised and Non-Valorised Food Products: Regenerative Innovation

DAY THREE

8:00 am - 10:15 am

Session VIII:
Pathways to Health: Bioaccessibility and Metabolism of Nutrients and Bioactives
(Moderator: Shiqi Huang)

Chandrika Chaturvedi, Dalhousie University, Canada
Antioxidant Capacity and Anti-Elastase Activity of Glucosinolate and Sulforaphane-Rich Broccoli Extract

Ishika Mittal, University of Manitoba, Canada
Association of Fontan Circulation with Gut Microbiome Derived Straight and Branched Short Chain Fatty Acids

Anwar Rovik, Gadjah Mada University, Indonesia
New Brews for Prevention: Exploring the In Silico-Predicted Chemopreventive Effects of Tea Catechins on Colon Adenocarcinoma

Carla Navarro Molina, University of Manitoba, Canada
High-Protein Functional Crackers with Rhodiola rosea: Impact on the Microstructure and Bioaccessibility of Bioactive Compounds

PROGRAM SCHEDULE

DAY THREE

8:00 am - 10:15 am

Hrishikesh Patil, University of Guelph, Canada
Bibliometric and Systematic Analysis of Protein-Polysaccharide Complexes for Bioactive Food Delivery

Giusy Rita Caponio, University of Bari Aldo Moro, Italy
Functional Bakery Products with Enhanced Fiber and Antioxidant Activity: A Novel Approach to Healthy Snacking

Valeria Valderrama Sanchez, Research and Development Center in Food Science and Technology, Argentina
Evaluation of the Hypocholesterolemic Activity of Soluble and Insoluble Fiber from Amaranth Cookies through Bile Salts Binding Assays

Xiaohang Zou, University of Manitoba, Canada
Comparative Evaluation of Dough Rheology, Bread Characteristics, and In vitro Starch Digestibility in Common and Purple Wheat Bread

Jordan Charney, University of Manitoba, Canada
Contribution of Arachidonate Lipoxygenases (ALOX) to Biological Actions of Dietary Polyunsaturated Fatty Acids (PUFA)

Mohammed Salman C K, ICAR-Indian Agricultural Research Institute, India
Synergistic MXene–Metal Oxide Nanohybrids and Machine Learning for Predictive Nutritional Modeling of Glycemic Index

Dinushi Gamage, Dalhousie University, Canada
Microencapsulated Fermented Wild Blueberries Attenuate Diet-Induced Lipid Dysmetabolism

Bertha Nametso Tema, Botswana International University of Science & Technology, Botswana
In Vitro Micropropagation and Effect of Silver Nanoparticle Elicitation on Yield of Specialized Metabolites in A. Afra

Jiaxuan Li, Dalian Polytechnic University, China
Construction of Fucoxanthin Stabilizing System and its Precise Nutritional Intervention of Lipid Metabolism

10:15 am - 10:35 am

Coffee Break

PROGRAM SCHEDULE

DAY THREE

10:35 am - 12:50 pm

Session IX:
Ensuring Food Integrity: Advanced Tools for Safety, Quality, and Authentication
(Moderator: Chamali Kodikara)

Chamali Kodikara, University of Manitoba, Canada
Comparison of ELISA, UHPLC-MS/MS, and Development of UHPLC-HRMS Method for Ergot Alkaloid Quantification in Wheat

Oakantse Dineo, Botswana International University of Science and Technology, Botswana
Impacts of Heavy Metal Contamination from the BCL Mine on Soil Quality, Crop Production, and Associated Health Risks

Eric Tetteh Mensah, Kwame Nkrumah University of Science and Technology, Ghana
Non-Destructive Authentication of Functional and Traditional Powdered Food Ingredients Using Near Infrared Spectroscopy

Giuseppe Natrella, University of Bari Aldo Moro, Italy
Biochemical Markers and Safety Implications of Using Stored Curd in Mozzarella Production

Leire Cantero-Ruiz de Eguino, University of the Basque Country, Spain
Identifying Sensory Drivers in Gluten-Free Bread: a Proposal of a Quality Evaluation Tool

Sarra Rafai, University of Valencia, Spain
In Vitro Evaluation of Aflatoxin B1 Detoxification by Lactobacillus, Pediococcus and Bacillus Strains

Hariniha Selvarajan, University of Manitoba, Canada
Determining the Connection Between Barley-Produced Polyamines and Fusarium graminearum Pathogenesis and DON Production

Helena Rodrigues, University of Porto, Portugal
Veterinary Drug Residues and Mycotoxins in Honey and Api-Products: Occurence, Risks, and Food Safety Implications

Devsankar Sunilkumar, National Institute of Agrarian and Veterinary Research, India
Veterinary Drug Residues and Antimicrobial Resistance: Exposure Pathways and Consequences for Bee Health

PROGRAM SCHEDULE

DAY THREE

10:35 am - 12:50 pm

Davide De Angelis, University of Bari Aldo Moro, Italy
Identification and Quantification of Honey Adulteration Using NIR and Fluorescence Spectroscopy Approaches

Lekhraj Dhakal, Tribhuvan University, Nepal
Status of Aflatoxin B1 Contamination in Rice and Rice Products from Eastern Region of Nepal

Isanka Gimhani, University of Manitoba, Canada
Non-Destructive Characterization of Germinated Wheat Kernels using X-ray Micro-Computed Tomography

Íris João Fidalgo, University Institute of Health Sciences, Portugal
Grayanotoxins in Honey as Emerging Natural Food Contaminants with Clinical Human Poisoning Cases and Online Market Availability

Sachini Senarathna, University of Manitoba, Canada
Variation in Celiac Antigenicity Among Diverse Oat Cultivars Determined by Liquid Chromatography Tandem Mass Spectrometry

12:50 pm - 1:10 pm

Snack/Refreshment Break

1:10 pm - 3:25 pm

Session X:
Circular Economy, Upcycling & Waste Valorization for Sustainable Food
(Moderator: Sunita Karki)

Vidheesha Abeysinghe, University of Manitoba, Canada
Functional Evaluation of Extrusion-Moulded Canola Protein Films for Eco-Friendly Packaging

Alexandra-Mihaela Ailoaiei, University of Bari Aldo Moro, Italy
Gluten-Free Fresh Pasta from Acorn Flour: Valorisation of Marginal Land Resources

Laura Giselle Alonso, Research and Development Center in Food Science and Technology, Argentina
Dehydrated Water Dispersible Cellulose Nanocrystals Produced from a Residue of Kombucha Beverage Industry

Claudia Antonino, University of Bari Aldo Moro, Italy
Reuses of UHT Milk Close to Expiring and Almond Okara in the Production of Fresh Cheese

Josep Biosca-Mico, Institute of Agrochemistry and Food Technology (IATA-CSIC), Spain
In vitro Protein Digestibility in Phaeodactylum tricornutum: From Raw Biomass to a Protein-Rich Concentrate Derived from Industrial By-Product

Mariana Pereira, University of Minho, Portugal
Carbon Source Utilization by Aspergillus niger for Mycoprotein Production: Implications for Food Waste Valorisation

Tafadzwa Kaseke, University of Johannesburg, South Africa
Exploring the Potential of Opuntia ficus Indica Cladodes as Novel and Sustainable Animal Feed Supplement

PROGRAM SCHEDULE

DAY THREE

1:10 pm - 3:25 pm

Ana Maria Quiros, University of Manitoba, Canada
Purple Corn Cob as a Sustainable Feed for Tenebrio molitor: Enhancing Nutritional Quality, Bioactivity, and Protein Digestibility for Human Consumption

Emanuele Tomassini, University of Sassari, Italy
Technological and Nutritional Impact of Canola Leaf Powder Incorporation in Wheat Bread

Liliana Espírito Santo, University of Porto, Portugal
Tannins Content of Vine Leaves from Pruning: Possible Applications in Food Processing and Health

Huijuan Zhang, China Agricultural University, China
Utilizing Fish Waste as a Sustainable Nitrogen Source for Enhancing Growth and Metabolism Regulation in Bifidobacterium animalis ssp. lactis BB-12

Victoria Fernandez-Tucci, University of the Basque Country, Spain
Circular and Clean-Label Gluten-Free Bread Compared to Industrial and Artisan Alternatives in Terms of Composition and Sensory Features

Gaia Gadaleta-Caldarola, University of Bari Aldo Moro, Italy
Valorization of Nuts Processing Waste in the Formulation of Innovative Bakery Products

Paula García Abril, Aerofybers Technologies SL, Spain
Innovative Packaging from Vine Shoots: a Circular Economy Solution Based on Cellulosic Aerogels for the Wine Industry using PLA as Reinforcement

Zainab Husain, University of Manitoba, Canada
Sunflower Proteins Redefined: Valorization of Sunflower Meal through Sustainable and Novel Extraction Technologies

Balikis Mustapha, University of Ibadan, Nigeria
Boosting Nutrition with Edible Insects: Proximate and Mineral Composition of Cookies Fortified with African Palm Weevil Larvae

Kavindya Samarakoon, Dalhousie University, Canada
Microbial Biotransformation of Grape Seed Polyphenols for Functional Food Development

3:25 pm - 5:30 pm

Closing Remarks and Banquet

Dr. Eric Liu, Director, Agriculture & Agri-Food Canada
Dr. Michael Czubryt, Executive Director of Research, St. Boniface Hospital
Dr. Cristina Rosell, Head, Department of Food & Human Nutritional Sciences, University of Manitoba

Ruth Boachie

Title: Plant-Based Meat Analogues on the Canadian Market: Effect of Processing on their Digestibility

Organization: Postdoctoral Fellow, University of Manitoba
Country: Canada
Email: ruth.boachie@umanitoba.ca

Abstract:
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Proteins from plant sources have gained attention as a more sustainable protein and thus, used in food products such as plant-based meat analogues (PBMAs). Food processing methods can alter the native structure of proteins and improve techno-functional properties of plant proteins. Resulting structural change can affect protein digestibility and bioactive properties of the peptides released from digestion. In this study, we investigated how food processing alters digestibility of plant proteins in plant-based meat analogues on the Canadian market. Two commercial traditional and novo PBMAs on the Canadian market were obtained. Pea and soybean protein concentrates were used as controls. The particle size distribution, surface hydrophobicity, structure, and in vitro protein digestibility of the products were evaluated. The particle size distribution of novo products was more heterogenous than those of traditional products and the controls. A differential effect of heat treatment on particle size distribution and surface hydrophobicity was observed. In vitro protein digestibility increased significantly after heat treatment. This study shows that PBMA processing conditions alter the surface properties and in vitro protein digestibility. Consequently, the study provides insights into the effect of post-production heat treatment on protein digestibility, peptides released, and bioactivity of plant proteins and their products.

Keywords: sustainable proteins, meat analogues, protein digestibility

Vittoria Latrofa

Title: Micro and Macrostructure of Gelatin-Free Jelly Candies Formulated with Dry-Fractionated Pea and Corn Starches

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Abstract:
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Keywords: plant-based alternatives, sustainability, dry fractionation.

Introduction
The confectionery market is expected to grow in the coming years, driving the demand for gelling agents. Dry-fractionated (DF) starches are obtained through physical separation from proteins and considered a co-product of protein production. In comparison to isolated starches which are derived from chemical extraction, DF starch represents a sustainable option in food innovation. Therefore, the aim was to characterize DF pea starch in comparison with conventional corn starch to formulate gelatin-free jelly candies.

Methodology
To decide the formulations, least gelling concentration (LGC) was performed, and each jelly candies was prepared starting from 16% for DF pea starch, 12% for corn starch, and 6% for gelatin. The latter was used as a control. Based on these values, three jelly candy formulations were produced by increasing the starch content by 4% and 8% above the respective LGC. Microscale structural behaviors were evaluated using rheological tests whereas macroscale properties were assessed through texture profile analysis (TPA).

Results
All jelly candies revealed a solid-like structure, as stated by a predominance of storage modulus (G') over loss modulus (G''). DF pea-based jelly candies had a significantly higher consistency index compared to the formulations prepared with corn starch indicating a fragile gel network, a remark also supported by texture map and TPA.

Conclusion and limitation
Although DF pea starch presents some structural limitations that may require further optimization, it holds strong potential as a plant-based gelling agent.

Food and Nutrition-related implications
The formulations produced were nutritionally different from the control, but plant-based and gelatin-free.

Acknowledgments
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Beverly Too

Title: Characterization of Phenolic Compounds in Wild Rice Noodles Fortified with Purple Carrot

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Abstract:
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Introduction: This study examined the phenolic composition and antioxidant activity of wild rice (WR) noodles fortified with purple carrot (Daucus carota L.) powder from five cultivars, deep purple (DP), purple sun hybrid (PSH), purple haze (PH), cosmic purple (CP), and vistaric sky blue (VSB). Fortification levels of 10%, 20%, and 30% were tested. The goal was to enhance the antioxidant activity of WR noodles and promote the consumption of this nutrient-rich cereal through bioactive enrichment.

Methods: High-performance liquid chromatography (HPLC) coupled with mass spectrometry (MS) was used to identify and quantify phenolic compounds, including anthocyanins, and both free and bound phenolic acids.

Results: HPLC-MS analysis identified five cyanidin-3-galactoside derivatives in purple carrot cultivars DP, PSH, and PH, and two in CP, while no anthocyanins were detected in VSB and WR flour. These anthocyanins were retained in WR noodles post-fortification, with concentrations increasing proportionally from 10% to 30%. In WR flour, gallic acid and trans-cinnamic acid were the predominant free phenolic acids, while ferulic acid dominated the bound fraction. In carrot powders, chlorogenic acid and o-coumaric acid were the major free phenolics, with ferulic acid again most abundant among bound phenolics. Fortification significantly enhanced phenolic acid profiles in WR noodles. Notably, 30% DP fortification resulted in a twofold increase in ferulic acid content, suggesting a synergistic interaction. Significant increases in trans-cinnamic and p-coumaric acid were also observed.

Conclusion: Fortifying WR noodles with purple carrot powders improved phenolic content and antioxidant activity, enhancing functionality. Food and Nutrition-related implications Phenolic enhancement through fortification offers health benefits, boosts consumer appeal, and supports dietary diversity.

Keywords: Wild rice, purple carrots, phenolic compounds

Judicaël Boris Nafack Tsazeu

Title: Formulation of a Plantain-Based Supplementary Food Combined with Maize, Groundnut and Mung Bean to Prevent Protein-Energy Malnutrition in Children Aged 6 - 24 Months in Madagascar

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Abstract:
Malnutrition remains a major public health problem in the world in general, and in Madagascar in particular. The quality of infant formula used during the weaning period is of great importance. The objective of this study is to develop a formulation of a plantain-based complementary food, combined with maize, groundnut and mung bean. For this purpose, the variable proportions of the ingredients of two formulations were obtained by the linear programming method. The biochemical and organoleptic characteristics of these formulations were determined according to standard methods. The results of the biochemical analyses reveal that the water, ash, protein, fat, carbohydrate and energy content of formulation 1 (F1) are 9.74 %; 1.52 %; 12.66 %; 11.32 %; 64.59 % and 409.24 kcal respectively, and those of formulation 2 (F2) are 9.94 %; 2.26 %; 12.43 %; 11.92 %; 62.46 % and 409.52 kcal respectively. The porridges prepared from both formulations were enjoyed by the children. However, there were no significant differences in colour, taste, smell, texture, consistency and overall appreciation. These blended flours could then be recommended for children aged 6-24 months, thus helping to reduce the rate of child malnutrition.

Keys words: Complementary food, plantain, protein-energy malnutrition

Marica Troilo

Title: High-Protein Bread Formulated with Semi-Whole Wheat Semolina and Yellow Lentil Dry-Fractionated Protein

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Abstract:
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Semolina bread is a widely consumed food but is characterized by a low protein and fiber content. To improve its nutritional value, this study explored the use of semi-whole wheat semolina (SWWS) and yellow lentil dry-fractionated protein (YLFP), evaluating their impact on bread properties. Innovative products were formulated by replacing 10-40% (w/w) of wheat flour with YLFP and SWWS. Sourdough fermentation was also applied to improve functional properties. The resulting samples were evaluated for nutritional composition, antioxidant compounds (total phenolic content, carotenoids, ABTS assay), in vitro glycemic response, protein digestibility and amino acids content. Moreover, textural and sensorial parameters were also assessed. The inclusion of SWWS enabled the “source of fiber” nutritional claim, while YLFP increased the protein content, allowing “source of protein” and “high protein” labelling in accordance with EC Regulation 1924/2006. All enriched samples – especially at the higher replacement levels – showed increased total phenols, carotenoids, antioxidant activity, and improved amino acid profile, along with a modulation of the in vitro glycemic response and protein digestibility. From a technological perspective, higher levels of dry-fractionated weakened gluten network, reducing gas retention and specific volume, and leading to a compact crumb. On the other hand, hardness and chewiness were affected, as well as the overall sensory profile, which showed increased legume and acidic notes, and a higher perception of astringency and bitterness as the inclusion level increased. Overall, the synergistic use of SWWS and YLFP represents a promising strategy to develop nutritionally enriched bread, in line with dietary guidelines.

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Keywords: Dry-fractionated protein; functional bread; nutritional enhancement

Jaspreet Kaur

Title: Evaluating Protein Quality and Chlorogenic Acid Content in Diverse Sunflower Seed Varieties for Sustainable Food Applications

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Abstract:
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Background: The rising demand for sustainable protein sources has driven the need to explore plant-based food alternatives. Sunflower seed meal, a byproduct of oilseed extraction, stands out as a promising option of protein source. However, its utilization remains limited due to the presence of anti-nutritional factors and chlorogenic acid-protein interaction, which leads to changes in its functionality as well as sensory characteristics. Thus, a deeper understanding of geographical variations is essential for optimizing the nutritional quality of sunflower seed meal. Objectives: In this study, we evaluated the protein, fat, amino acid and chlorogenic acid content across 75 different sunflower seed varietals obtained from five geographical regions of Manitoba to identify high quality protein sources.

Methods: The protein and fat content were assessed using standard AOAC methods, while chlorogenic acid content was determined using high-performance liquid chromatography.

Results: Results revealed that the protein content varied significantly across varietals, ranging from 37.55% to 57.97%, suggesting the potential of high-protein varietals (particularly Carberry and Melita) for food applications. Fat content exhibited minimal variation, ranging between 50.34% and 61.67%. Elm Creek varietal with the highest fat content, was considered most suitable for oil extraction. The average chlorogenic acid content across all sunflower varietals was found to be 15.20 mg/g, with values ranging from 10.82 mg/g to 20.01 mg/g. The chlorogenic acid results suggested that sunflower seed meal hold strong antioxidant potential, but may present challenges due to chlorogenic acid's reactivity during processing. It will require optimized processing to mitigate sensory issues associated with phenolic acid-protein interactions.

Conclusions: Therefore, the findings of this study support the utilization of sunflower seed meal as a high-quality protein source, while taking into account the environmental and ethical concerns related to animal agriculture.

Funding sources: This research is being supported by funding received from the Manitoba Crop Alliance, Canada.

Keywords: Sunflower seed meal, plant-based protein, chlorogenic acid, protein quality, geographical variation, sustainability

Gianfilippo Nigro

Title: Development of Sea Fennel Enriched Lasagna Sheets: Impacts on Nutritional and Physicochemical Aspects

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Abstract:
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Crop production in the Mediterranean basin will deal with critical challenges due to climate change effects such as water scarcity and soil salinization. These conditions could reduce biodiversity and increase the water demand. While research focuses on adapting traditional crops, the use of spontaneous minor crops, such as halophytes plants naturally adapted to saline environments, traditionally consumed as herbs or condiments, is becoming widespread. Among these, sea fennel (Crithmum maritimum L.) stands out for its richness in minerals, vitamins, phenolic, pigments and essential oils that provide flavor, color and potential functional properties. This is the first practical application of cultivated sea fennel (SF) as novel ingredient in pasta formulation. Lasagna sheets were prepared using water and semolina flour (control) and two substitution levels (2.5% and 5.0%) of SF powder obtained by freeze-drying (FD) or microwave drying (MD).

Bioactive components and nutritional characteristics have been analyzed. SF inclusion increased the fiber, ashes and phenolic content respect to the control and MD samples had higher pigments than FD ones. After boiling a decrease in pigments and phenols was observed. Furthermore, the predicted glycemic index (pGI) was significantly reduced by SF inclusion compared to the control pasta, proportionally to level of substitution. Finally, pasta physicochemical characteristics such as color, volatile composition and texture were affected by the drying methods and the SF substitution level.

Although further optimization studies are needed, SF pasta appears to be a promising alternative contributing to dietary and functional food innovation in climate-resilient food systems.

This study was conducted within the Agritech National Research Center founded by European Union Next-GenerationEU (PNRR–Mission 4 Component 2, Investment 1.4—D.D. 1032 17/06/2022, CN00000022). This manuscript reflects only the authors' views and opinions; neither the European Union nor the European Commission can be held responsible.

Keywords: Sea Fennel, Pasta, Antioxidants, Predicted glycemic index, Texture.

Ifeoluwa David-Oluwole

Title: Fatty Acid Profile and Storage Stability of Bread from Mushroom Supplemented Composite Blends of Wheat/Plantain and Cinnamon Powder

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Abstract:
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The study assessed the fatty acid profile and storage stability of bread from a composite blend of wheat, plantain, oyster mushroom (Pleurotus ostreatus), and cinnamon powder in varying ratios. The functional properties of the composite flour were also determined. The plantain and mushroom were processed, milled, and blended with commercial all-purpose flour to create four unique formulations alongside a control sample. The flour blends were created, combining all-purpose flour, plantain flour, mushroom, and cinnamon powder in ratios 100:0:0:0 (Z5A), 70:30:0:0 (Y2B), 70:25:5:0 (C3X), 65:20:10:5 (W2D), and 65:15:15:5 (V1E), respectively. Significant ($p<0.05$) differences were observed in the flour blends' functional properties except for bulk density. Fatty acid analysis revealed linoleic acid (18:2) as the most abundant, with concentrations ranging from 35.74 mg/g to 49.81 mg/g. The moisture content of the bread samples throughout storage ranged between 28.8% and 38.4 %. The peroxide values increased with the inclusion of cinnamon and mushroom into the bread; however, C3X maintained a stable value during storage. The findings suggest that bread supplemented with a plantain-mushroom-cinnamon flour ratio of 20%-10%-5% (W2D), respectively, presents a viable, nutritionally enhanced alternative to conventional bread.

Keywords: Functional properties, Oyster Mushroom, fatty acid profile.

Aria Haiying Huang

Title: Evaluation of Quinoa-Wheat Composite Flour for Bread and Pasta Production using Quebec-Grown and Bolivian Cultivars

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Abstract:
Quinoa (Chenopodium quinoa Willd.) originates from South America. The nutritional value and versatility of quinoa in food applications have enhanced its global popularity. In Canada, this pseudocereal is cultivated to improve crop diversity and promote agricultural resilience. Despite the northern growing conditions in Quebec, farmers have successfully cultivated quinoa with nutritional profiles comparable to South American varieties. This study aimed to evaluate food processing applications of quinoa in cereal-based products. 25% (w/w) of quinoa flour substituted into wheat was investigated for bread and pasta production using Cereals & Grains Association (AACC) official methods. Samples included control (100% wheat), Quebec (SQB) and Bolivian (BRW) quinoa. One-way ANOVA and Tukey's test were performed. For bread, results showed that water absorption (%) was significantly higher for BRW (64.3±0.6) compared to control (62.5±0.5) and SQB (62.0±0.0), but no significant difference ($p=0.0698$) in specific volumes (cm^3/g). For pasta, results showed that both diameter and density of SQB and BRW, compared to control, were not significantly different when fresh, but were statistically lower when dried (diameter: 2.34±0.01 and 2.37±0.02 vs 2.40±0.01mm; density: 1.419±0.001 and 1.411±0.005 vs 1.435±0.004g/cm^3, respectively). SQB and BRW had significant lower cooking time (~21min) and higher cooking loss (~7%) compared to control (24.4±0.2min and 4.87±0.02%). Overall, quinoa-wheat composite flour at 25% (w/w) substitution level is feasible for bread and pasta production despite some alterations to processing parameters. Sensory quality and consumer acceptability requires further investigation. Developing nutritious northern quinoa cultivars and their food applications will support economic growth and improve Canadian agricultural resilience.

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Keywords: pseudocereal, composite flour, food processing

Funding source: Project funded by Nova Quinoa (QC, Canada) through Agriculture and Agri-Food Canada.

Angela Pamela Pezuk

Title: Effect of Enzymatic Treatments on the Quality of Low Carb Bread Made with Yellow Pea Protein Concentrate

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Abstract:
As consumers increasingly seek low carbohydrate breads to manage blood glucose and support weight loss, yellow pea protein concentrate (PPC) offers a promising novel ingredient. Its high protein content and gluten absence make the breadmaking process challenging. This study evaluated the impact of two structure enhancing enzymes, glucose oxidase (GOX, 0.1%) and transglutaminase (TGM, 0.25% and 0.5%) on the texture, color (L*, a*, b*), and structure (2D image area) of low carb bread made with 100% of PPC. Four formulations were tested: control (no enzyme), GOX, TGM 0.25%, and TGM 0.5%. Both TGM concentrations reduced hardness (3428 g and 3553 g) compared to the control (5462 g), while GOX showed no significant effect. Springiness and cohesiveness were also improved in TGM 0.25% and 0.5% (0.91 and 0.90; 0.77 and 0.71) compared to the control (0.80 and 0.65). L* values decreased with GOX (42.89) and TGM 0.5% (41.83) versus control (48.64); a* increased with GOX and TGM 0.25%, and b* decreased in all treatments, with the lowest value in GOX (45.52 vs. 51.79 in control). The largest 2D loaf areas were observed in breads with TGM 0.25% and 0.5% (16.55 cm^2 and 16.53 cm^2), significantly higher than the control (14.33 cm^2). Enzyme treatments influenced bread quality parameters such as texture, structure and color, showing distinct effects depending on type and concentration. These results highlight the potential of TGM, particularly at 0.5%, to improve the quality and appearance of low carb breads made with PPC, offering a clean label strategy for plant-based alternatives.

Keywords: pea protein, enzymatic treatment, bread structure

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Harshani Nadeeshani Vidana Hewage

Title: High-Voltage Cold Plasma for Developing White Lupin (Lupinus Albus) Protein Ingredients with Improved Functionality and Protein Quality

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Abstract:
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High-voltage cold plasma for developing white lupin (Lupinus albus) protein ingredients with improved functionality and protein quality High-voltage cold plasma (HVCP) is an emerging and promising non-thermal technology for protein modification. Reactions with cold plasma reactive species introduce new interactions and fragmentations in protein backbones and amino acid side chains, which are hypothesized to alter the properties of protein ingredients. The effects of the HVCP jet treatment on the physicochemical properties, techno functionality, and protein quality of deep eutectic solvent-extracted (DES-LPI) and alkaline-extracted lupin protein isolates (ALK-LPI) were elucidated. Argon gas (3 L/min) was used for generating HVCP (20 kV), and 2% (w/v) LPI was subjected to HVCP for 5–10 min. Total carbonyl content was increased with the HVCP treatment time ($p < 0.05$). The surface hydrophobicity was increased for DES-LPI and decreased for ALK-LPI after the HVCP exposure, which explained the decreased oil holding capacity ($p < 0.05$). Water holding capacity was increased when 10 min HVCP treatment was applied, while foaming capacities and solubility were initially increased when 5 min treatment was implemented, followed by a subsequent decrease with increasing treatment time ($p < 0.05$). The gelation properties were increased even after 5 min HVCP treatment. HVCP treatment increased α-helix content in both protein isolates, suggesting increased functionality, stability, and interactions with other molecules. In vitro protein digestibility (IVPD) and in vitro protein digestibility-corrected amino acid score (IVPDCAAS) were significantly increased after the HVCP treatment ($p < 0.05$). HVCP can be utilized as a promising protein modification technology for the sustainable production of protein ingredients from white lupin, resulting in improved functionality and protein quality.

Keywords: High-voltage cold plasma, white lupin, deep eutectic solvent

Ravinder Singh

Title: Changes in Protein Structure and Nutritional Quality during Extrusion Cooking of Faba Bean Protein-Based Meat Alternative

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Abstract:
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Plant-based meat alternatives (PBMAs) are commonly produced via extrusion cooking, a process that induces several structural changes in proteins, including denaturation, alignment, and crosslinking. However, the implications of these structural transitions on protein nutritional quality remain largely underexplored. This study aimed to investigate the effects of barrel temperature (BT) and feed moisture content (FMC) on protein-protein interactions, secondary structure, amino acid score (AAS), in vitro protein digestibility (IVPD), and the in vitro protein digestibility-corrected amino acid score (IVPDCAAS) of PBMAs produced from faba bean protein (FBP). A full-factorial extrusion design was used, testing three levels of BT (125, 135, and 145 °C at the die) and three levels of FMC (50%, 54%, and 58%). Extrusion promoted intermolecular β-sheet formation at the expense of intramolecular β-sheets, indicating aggregation of protein molecules. The protein-protein interactions analysis revealed the formation of new covalent (disulfide) and non-covalent (hydrogen and hydrophobic) interactions, which led to a significant ($p<0.05$) reduction in protein solubility. Higher BT (145 °C) combined with lower FMC (50% and 54%) significantly ($p < 0.05$) reduced IVPDCAAS, coinciding with a significant loss of cysteine possibly due to irreversible advanced oxidation reactions. Increasing FMC to 58% mitigated this loss and helped preserve protein quality. These findings suggest that elevating FMC during high-temperature extrusion is an effective strategy to maintain protein nutritional quality. This research provides mechanistic insight into protein structural transitions during extrusion cooking. It offers practical guidance for developing next-generation PBMAs with improved protein nutritional quality from emerging ingredients such as FBP.

Keywords: Plant proteins, protein digestibility, food processing

Sunita Karki

Title: Hydrocolloids Coating Effects of Resveratrol on Pasting and Dough Rheology of White and Whole Wheat Flours

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Abstract:
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Keywords: resveratrol, dough rheology, hydrocolloids

Background: Resveratrol (RSV) is a polyphenol with proven health benefits including anti-diabetic effects. Coatings are often applied to preserve its properties in food applications. Although a few studies have proposed its incorporation in bakery products, there is no information about the RSV impact on the bread dough. The aim of the study is to understand the impact of RSV on the mixing and baking of wheat flour (WF) and whole wheat flour (WWF). For this purpose, we examined the effect of uncoated resveratrol (RSV) and resveratrol coated with different hydrocolloid on the pasting and dough rheological properties of WF and WWF.

Methods: RSV were coated with four hydrocolloids gels (corn starch, pea starch, xanthan gum and locust bean gum) and freeze dried. WF and WWF samples containing uncoated or coated RSV (0.5%) were analyzed using Mixolab for recording dough rheology during mixing and Rapid Visco Analyzer (RVA) for pasting properties during heating and cooling.

Results: Impact of RSV was dependent on the type of flour (WF or WWF) and the hydrocolloid used as RSV coating. In fact, RSV coated with locust bean gum increased dough stability of WF (14.31 min) compared to the non-coated RSV (9.3 min). In WWF, xanthan gum (8.94 min) and corn starch (8.07 min), RSV coatings significantly improved ($p<0.05$) dough stability compared to control (5.93 min). RVA data showed reduced peak viscosity in all RSV samples compared to the control (WF: 1330 cP and WWF: 1570 cP), with the greatest decrease for locust bean gum-coated RSV (WF:1134 cP and WWF: 987 cP). RSV coated with hydrocolloids significantly ($p<0.05$) lowered setback and final viscosity, indicating reduced retrogradation.

Conclusion: Hydrocolloid coatings overall enhanced thermal-mechanical stability, reduced retrogradation, and preserved dough strength in both WF and WWF doughs, although the extent of those effects was hydrocolloid dependent. This work highlights the potential of starch-hydrocolloid coatings to improve the quality in functional bread for metabolic health.

Zainab Olaide

Title: Potential Role of Walnuts (Juglans regia) as a Supplemental Dietary Approach in the Management of Sickle Cell Disease in Nigerian Children

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Abstract:
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Introduction/Purpose: Sickle cell disease (SCD) affects about 75% of the paediatric SCD population in Nigeria, leading to repeated pain crises, anaemia, and increased susceptibility to infections. Pharmacological interventions are frequently expensive and generally unattainable in resource-limited environments. The study assesses the viability of walnuts (Juglans regia) as a functional food to enhance current SCD management approaches.

Methodology: A narrative review of biochemical, preclinical, and limited clinical research was performed employing databases such as PubMed, Scopus, and Google Scholar, concentrating on omega-3 fatty acids, polyphenols, and the antioxidant properties of walnuts pertinent to the pathophysiology of SCD.
Result: Walnuts are abundant in alpha-linolenic acid and polyphenolic chemicals, which possess antioxidant and anti-inflammatory properties. Evidence indicates possible advantages in enhancing vascular function, regulating inflammation, and diminishing oxidative stress associated with SCD problems. However, no extensive controlled trials have been performed in populations with SCD, and current results are derived mainly from other chronic illnesses.

Conclusion: Walnuts demonstrate potential as a readily available and culturally acceptable complement to pharmacological therapies for SCD, especially in Nigerian settings where cost and accessibility are paramount. Comprehensive clinical trials in paediatric patients with SCD are crucial to confirming efficacy, safety, and the optimal dose.
Food and Nutrition Implications: Incorporating locally sourced, nutrient-rich foods, like walnuts, into dietary guidelines may provide a cost-effective, sustainable approach to enhancing health outcomes in Nigerian children with SCD while diminishing reliance on costly imported treatments.

Keywords: sickle cell disease (SCD), oxidative stress, omega-3 fatty acids, and polyphenols

Eunice Amponsah

Title: Influence of Genetic and Biochemical Diversity of Food Crops on Climate Resilience, Sustainability, and Nutrition

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Abstract:
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Background and objectives
Climate change significantly threatens global food security, underscoring the need for resilient, nutrient-dense crops within sustainable agriculture. Food crops, which are well-adapted to challenging environmental conditions, hold considerable promise for enhancing food security. Maintaining food security in low and middle-income countries like Ghana is very crucial because they are likely to suffer the most from exposure to climate shocks to unsustainable food systems. It is essential to identify indigenous crops that are climate-resilient and have good nutritional quality to enhance food quality, sustainability, and human health. This study aims to explore the genetic and biochemical diversity of selected indigenous crops, identifying traits that promote sustainability.

Methods
This study focuses on three key food crops in Ghana: cassava, tomato, and Bambara groundnut. Samples were collected from local farms to analyze their genetic and biochemical diversity. Utilizing molecular markers and targeted sequencing, the genetic profiles of these crops were, emphasizing traits related to yield, morphology, and environmental resilience. Moreover, biochemical profiling— including metabolomics, ionomics, and lipidomics—assessed their nutrient composition and bioactive compounds.

Results
The outcomes will inform breeding programs aimed at enhancing crop resilience and nutritional quality, thereby advancing sustainable agriculture and food security.

Conclusions
In conclusion, leveraging the genetic and biochemical strengths of indigenous crops represents a promising approach to addressing the challenges posed by climate change and nutritional deficiencies, fostering a sustainable agricultural future.

Keywords: Genetic Make-up, Biochemical Diversity, Indigenous Food Crops

Amos Anim

Title: The Impact of Agricultural Practices on Food Composition – A Systematic Review

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Abstract:
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Introduction / Purpose
Agricultural practices play a vital role in shaping food composition, directly impacting nutritional quality and the ability of crops to address food and health issues. This review aimed to assess the effects of agricultural interventions on crop composition, following PRISMA guidelines.

Methodology
A systematic search was conducted in Scopus, Taylor & Francis, and CABI Direct databases, identifying a total of 2,271 articles. After screening titles, abstracts, and full texts, 190 studies met the inclusion criteria. Data were synthesized to evaluate the impact of different agricultural interventions on crop nutrient composition and quality.

Results
Fertilizer application was the most commonly reported, followed by bio-stimulants, harvesting timing, and irrigation strategies. Organic amendments and deficit irrigation increased phenolics and other bioactive compounds in fruits and vegetables. Macro- and micronutrient fertilizers improved protein, mineral, and antioxidant levels; however, improper dosages or timing often caused nutrient dilution, antagonism, or reduced accumulation of beneficial compounds. Foliar and soil amendments were effective biofortification strategies for increasing zinc, iron, and selenium in grains. Amino acid applications reduced heavy metal uptake in cereals grown in contaminated soils, thereby minimizing toxic exposure.

Conclusion
Modern agricultural practices hold significant potential to enhance crop nutrition and reduce nutrient deficiencies. However, these practices must be carefully managed to avoid unintended trade-offs that may compromise food quality.
Food and Nutrition-related Implications
Optimized agricultural interventions can serve as effective strategies to improve the nutrient density of staple crops, addressing micronutrient deficiencies and supporting healthier diets. Poorly managed practices, however, risk undermining these benefits, hence the need for precision and sustainability in agriculture.

Keywords: Agriculture, food composition, tradeoffs,

Olubunmi Adebola Olanipekun

Title: Climate Change, Poverty, and Food Security: The Role of Adult Education in Promoting Home Gardens and Smallholder Adaptation in Ekiti State

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Abstract:
This study investigated the role of adult education in promoting home gardens and enhancing smallholder adaptation to climate change as strategies for improving food security and reducing poverty in Ekiti State, Nigeria. Specifically, it examined stakeholders' perceptions of adult education's role in home gardening, its effectiveness in supporting smallholder farmers' climate change adaptation, and the perceived capacity of rural households to reduce poverty through these practices. A descriptive survey design was employed, with a purposive sample of 87 adult education stakeholders drawn from tertiary institutions, ministries, and adult education agencies. Data were collected using a structured questionnaire divided into four sections and analysed using descriptive statistics via SPSS version 28. The instrument's reliability coefficient, obtained through Cronbach's Alpha, was 0.829. Findings revealed that all items across the three objectives recorded mean scores above the cut-off value of 2.50, indicating general agreement on the positive impact of adult education in the study context. Stakeholders perceived adult education as vital in equipping communities with skills, knowledge, and resource-based approaches for sustainable home gardening and climate-resilient farming. Respondents also agreed that these practices substantially enhance household food security, economic independence, and poverty reduction potential. However, lower scores in climate-smart gardening practices and curriculum integration suggest areas for targeted improvement. The study concludes that adult education is pivotal to sustainable rural development in Ekiti State and recommends curriculum enrichment, hands-on training, and resource support to optimise outcomes.

Keywords: Adult education, home gardening, smallholder adaptation, food security, climate change, poverty reduction

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Shashika Yapa

Title: Impact of Cultivar Mixtures on Spot Blotch Disease Resistance, Grain Yield, and Quality in Barley

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Abstract:
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Barley (*Hordeum vulgare* ssp*. vulgare L*.), a globally important cereal, faces significant threats from diseases like spot blotch, caused by the hemi-biotrophic fungal pathogen *Bipolaris sorokiniana*. This pathogen can lead to substantial yield losses and reduced grain quality. Many producers apply fungicides for disease management, however public concern for residues in food and the environment is on the rise. To develop a sustainable disease management strategy, a field experiment was conducted at the Agriculture and Agri-Food Canada (AAFC) Brandon Research and Development Centre to evaluate the effectiveness of cultivar mixtures. The study utilized five treatments included monocultures of a resistant cultivar (AAC Synergy) and a susceptible cultivar (Sirish), and three mixtures (75:25, 50:50, and 25:75 of AAC Synergy: Sirish).Five treatments were tested such as monocultures of a resistant cultivar (AAC Synergy) and a susceptible cultivar (Sirish), along with three mixtures (75:25, 50:50, and 25:75 AAC Synergy:Sirish). A highly significant effect of the cultivar mixture was observed of spot blotch disease severity ($p < 0.0001$). The Sirish monoculture showed the highest disease severity (33.81%), while the AAC Synergy monoculture and the 75 AAC Synergy:25 Sirish mixture had the lowest (6.06% and 9.03%, respectively). The yield and grain quality parameters were also assessed using standard field and laboratory protocols. The experiment showed that increasing the proportion of AAC Synergy in mixtures reduced disease severity and helped maintain yield, while Sirish was more vulnerable under disease pressure. Mixtures tended to have intermediate grain quality values, with protein levels closer to malting requirements. These findings suggest that cultivar mixtures can play a role in integrated disease management, offering a potential strategy to reduce fungicide reliance and balance disease resistance, yield, and quality, especially in environments where susceptible cultivars are widely grown.

Key words: cultivar mixtures, susceptible, resistant

Thomas Croci

Title: Impact of Regenerative Agriculture on Gluten Aggregation Properties of Wheat

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Abstract:
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The use of regenerative agriculture strategies, like minimum tillage and cover crops, may offer a solution for agriculture to mitigate the adverse effects of climate change, by increasing soil carbon stock, and improve resilience of cropping systems. However, limited research has explored how these practices affect wheat technological quality, which is the aim of the present study.

For cover crop experiment, a high protein soft wheat was grown in 2024 under five soil cover treatments during the intercropping period (bare soil, sorghum, niger, cowpea, and infested soil) and three fertilization rates (0, 90, 150 kg N/ha). For soil tillage experiment, a high yield breadmaking wheat was grown in 2024 by comparing conventional ploughing and minimum tillage by disk harrowing and the use of a synthetic fungicide at flowering. In both trials, agronomic (grain yield) and qualitative features of kernels (test weight and protein content) and flours (gluten aggregation properties by GlutoPeak) were investigated.

Cover crops affected yield and protein content. Gluten aggregation properties were influenced by both fertilization rates and cover crops. On the other hand, minimum tillage negatively affected kernels quality traits, also weakening the gluten network, but fungicide application mitigated these effects.

In conclusion, cover crops and minimum tillage are promising strategies for climate change mitigation, but, within a correct re-design of cereal cropping systems, require optimal fertilization and fungicide use to ensure effective implementation and minimize the potential negative effect in wheat quality.

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Keywords: wheat quality, regenerative agriculture, gluten aggregation properties

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Iqtidar Hussain

Title: Phytotoxicity and Stimulatory Behavior of some Common Weeds on Maize Germination and its Growth.

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Many weeds, along with their leftover parts, can stop crops from growing by releasing harmful chemicals into the soil. This study tested how ten different weeds affect maize (corn) growth. The experiment was done in a lab at Gomal University's Agronomy Department in Pakistan. Researchers used pots in a controlled setup, mixing fresh and dried weed material (100 grams each) with clean soil to see their effects on maize seeds and young plants.

The results showed that all weeds—whether fresh or dried—reduced maize seed sprouting, shoot length, and root growth. However, one weed, Senji (Melilotus indica), actually helped maize shoots and roots grow better compared to the others. Other weeds like Pohli, Aak, Jangli palak, Bhathu, Lehli, Gajarbooti, Deela grass, Jangli jai, and Billi booti had harmful effects on maize germination and early growth. In conclusion, most weeds hurt maize seed sprouting, but after breaking down, Senji improved maize seedling growth.

Krishna Priya Kannan

Title: Decoding Light–Hormone Synergies to Enhance Carotenoid Biosynthesis in Mung Bean Sprouts Using Predictive Modelling

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Abstract:
Vitamin A deficiency (VAD) affects over 250 million children globally, including a large share in India, where mung beans (Vigna radiata) are widely consumed but underutilized for their nutritional potential. This study pioneers a non-transgenic, precision biofortification platform using light–hormone synergies to sustainably enhance provitamin A carotenoids in mung bean sprouts—a fast-growing, resource-efficient food system suitable for both terrestrial and space-based agriculture.

Twelve treatment combinations of light quality (Blue, Red, White, Dark) and hormonal elicitors (MeJA, MeSA, Water) were applied during sprout growth. Metabolite profiling (UPLC) revealed that Blue+MeJA maximized β-carotene (164.3 µg/g), while White+MeSA enriched lutein (340.3 µg/g). Gene expression (10 carotenogenic genes) via qRT-PCR confirmed treatment-specific regulatory dynamics.

Advanced modelling techniques, including Linear Mixed Models and Structural Equation Modelling, identified pathway-specific gene–metabolite interactions, with CRTISO, CHY_B, LCY_E, and ZEP acting as regulatory hubs. WGCNA revealed co-expression modules ME1 and ME2 tightly associated with β-carotene and lutein, respectively. Predictive modelling using LASSO and Random Forest yielded equations explaining over 80% of metabolite variance, providing a decision-support framework to simulate optimal treatment outcomes using only gene expression data.

This scalable, non-GMO platform transforms mung bean sprouts into precision-fortified functional foods. Their rapid lifecycle, minimal resource demand, and responsiveness to light–hormone cues position them as a model for next-generation agriculture, including Controlled Environment Agriculture (CEA) and microgravity farming. With India recently achieving the first successful germination of cowpea in space (ISRO, 2025), this mung sprout system offers a realistic, nutritionally impactful candidate for space-based nutrition and terrestrial food security alike.

Keywords: carotenoid biofortification, mung bean sprouts, qRT-PCR, machine learning, controlled environment agriculture, space farming

Inês Sousa

Title: UV-C LED Irradiation Inhibits Development of Sitophilus spp. in Early Life Stages

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Abstract:
Controlling Sitophilus spp. in stored rice is essential to mitigate post-harvest losses and preserve grain quality. One of the main obstacles to the effectiveness of traditional methods is the presence of hidden infestations, resulting from oviposition in the field and the subsequent development of insects during storage. Despite the widespread use of chemical disinfectants, concerns about their environmental impacts and risks to human health have driven research into sustainable alternatives, such as ultraviolet (UV-C) light.

This study investigated the impact of 280 nm UV-C LED exposure on the larval and pupal stages of Sitophilus spp. Using 3 replicates of 10 larvae/pupae each, treatments were applied for 0 (control group), 1, 5, 7, 10 and 15 minutes. These exposure times were converted into corresponding UV fluence values (46.4, 231.9, 324.7, 463.8 and 695.7 mJ/cm2, respectively). Following treatment, larvae and pupae were placed in 20g of untreated milled rice and kept under optimal development conditions. Observations were conducted to assess whether UV-C exposure affected their progression.

Larvae exposed to UV-C, regardless of exposure duration, did not progress beyond the larval stage. In pupal assays, development to the adult stage occurred, but all emerged weevils were dead within 2–4 days after UV-C treatment (1 or 5 minutes exposure). Experiments involving the pupal stage are ongoing to further assess the effects of UV-C treatment on later developmental stages. These findings suggest that UV-C light is a promising and environmentally safe approach to suppressing the development of Sitophilus spp. in stored grains. Further research is recommended to assess any impacts on rice quality and to refine exposure parameters for commercial-scale application.

Keywords: insect control, rice storage, post-harvest protection

Fernando Viacava

Title: High Hydrostatic Pressure (HHP) as Postharvest Abiotic Stress to Elicit Bioactive Compounds Biosynthesis in Carrots

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Abstract:
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Application of postharvest abiotic stresses have proved to be a feasible low-cost strategy to significantly increase the content of bioactive compounds in Agri-Food products. Among them, the effect of HHP represents and innovative option that has not been explored. Fresh carrots were selected and sanitized. Two levels of HHP were tested (60 and 100 MPa) with 4 different combinations of pulse cycles [CUT (come-up-time), 2, 3, 4 pulses of CUT in sequence] and 5 min of sustained HHP. Thereafter, samples were frozen and stored at 15°C for 48 h. The immediate effect of HHP on carotenes was primarily detrimental, the 2P/100 MPa (2 pulses at 100 MPa) induced the lowest value [α- (27.60%) and B-carotene (23.42%)]. However, B-carotene increased when 3P/60 MPa (10.26%) and 3P/100 MPa (20.27%) were applied. Phenolic compounds showed higher content immediately after all HHP treatments. The biosynthesis of phenolics was induced during incubation. Chlorogenic acid [5-O-Caffeoylquinic acid (5-O-CQA)] was the predominant one with 87.78% of increase under 4P/60 MPa-treatment. The 4-O-CQA (31.53%) and the isocoumarin (65.84%) incremented their content after the application of 3P/100 MPa and 2P/100 MPa. Results indicate that the use of more than one CUT cycle of HHP was the strategy that induced the accumulation of health-related compounds in carrots not only increasing extractability but also promoting the stress-response of carrots. HHP has shown promising effects as an elicitor of bioactive compounds on carrots, widening its application as a non-thermal food processing technology and opening the possibility of a new generation of nutritionally-improved Agri-Food products with high bioactive compounds content.

Funding sources: this study is based upon research supported by Tecnologico de Monterrey-Molecular and Systems Bioengineering Research Group and the National Council of Science and Technology (CONACYT).

Keywords: High-Hydrostatic Pressure (HHP), abiotic stress, phenolic compounds

Maqbool Zainab

Title: Tomato Disease Combat and Yield Optimization Using Selenium Nanoparticles: A Sustainable Nano-Agriculture Approach

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Abstract:
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Tomatoes are a crucial component of the global food system but are susceptible to pests and diseases, such as leaf miner (Tuta absoluta), fungal, and bacterial infections, especially in Pakistan. Synthetic pesticides pose risks to the environment and human health. This study aimed to explore the effectiveness of selenium nanoparticles (SeNPs) in combating these devastating pathogens. SeNPs were synthesized using citrus fruit peel essential oil extracted through hydro-distillation and characterized through X-ray diffraction (XRD) and UV–visible spectrometry. The optimal dosage of SeNPs was determined through bioactivities like antioxidant, antimicrobial, anti-inflammatory, and pesticidal activity before seed priming. UV–visible spectroscopy revealed a surface plasmon resonance at 265 nm. XRD analysis confirmed a crystalline size of 6.4 nm for SeNPs. FTIR analysis confirmed the presence of potential functional groups in the essential oils mediated SeNPs, including alkanes, alkenes, alkyl halides, amines, aromatic compounds, isothiocyanate, alcohols, and carboxylic acids. The synthesized SeNPs demonstrated antimicrobial efficacy against common tomato-infecting pathogens like Fusarium oxysporum, Aspergillus niger, Pseudomonas syringae, and Xanthomonas campestris. Against both bacterial and fungal strains, 10 ppm SeNPs showed a significant diameter of the zone of inhibition, i.e., 39.3 and 28.1 mm against P. syringae and X. campestris, and 26.3 and 39 mm against A. niger and F. oxysporum. SeNPs also exhibited significant pesticidal potential against Tuta absoluta. SeNPs enhanced seed germination percentage up to 94.8%, chlorophyll stability index (84.6%), membrane stabilization index (94%), and reduced root ion leakage (0.183%) at $p < 0.001$. The present study optimizes the dosage of SeNPs, which shows potential for antimicrobial and pesticidal efficacy, as well as improving seed germination rate, seedling vigor index, chlorophyll stability index, membrane stabilization index, and reducing root ion leakage. These findings offer new insights for sustainable crop management.

Mohamed Alfalah

Title: Phosphorus-Drought Interaction Modulates Growth Dynamics and Essential Oil Biosynthesis in *Rosmarinus officinalis*

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Abstract:
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Rosemary (Rosmarinus officinalis L.) is a widely cultivated aromatic plant valued for its essential oil, which contains bioactive compounds with antimicrobial and antioxidant properties. While the impact of drought stress on essential oil production is well-documented, the role of phosphorus (P) in modulating these effects remains unclear. In this context, this study aims to investigate the interactive effects of drought stress and phosphorus fertilization on rosemary's growth, physiology, and essential oil composition. A greenhouse experiment was conducted using a split-plot design with three irrigation levels (80%, 50%, and 30% field capacity) and three phosphorus doses (10, 25, and 50 kg/ha).

Results show that severe drought (30% FC) significantly reduces leaf area, biomass, and chlorophyll. However, moderate phosphorus application (25 kg/ha) under moderate drought (50% FC) enhances the accumulation of key monoterpenes, including dehydrosabinene, verbenone, linalool, and terpineol. Conversely, β-pinene and α-thujene show higher concentrations under low phosphorus (10 kg/ha) and well-watered conditions, while o-cymene peaks under severe drought with moderate phosphorus application.

These findings suggest that optimizing phosphorus application under moderate drought conditions can improve essential oil quality while reducing excessive fertilizer use. This study provides practical insights for enhancing rosemary production in water-limited environments through the adoption of sustainable fertilization practices, contributing to a more resilient production system.

Keywords: Rosemary, Rosmarinus officinalis L., Drought, Phosphorus.

Yanchen Gao

Title: Spatiotemporal Monitoring of Northeast China Black Soil Layer Dynamics and Erosion Susceptibility in the Context of National Food Security

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Abstract:
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Black soil, known as the "Panda of Arable Land," is vital for food security, ecological stability, and long-term soil health in the Northeast Black Soil Region (NBSR) of China (~1.07×10^6 km^2). As one of the nation's major grain production bases, the NBSR directly underpins national food supply and nutritional security. Yet, global climate change and intensive cultivation have driven continuous thinning, fertility decline, and structural deterioration, threatening not only key soil health functions—such as nutrient cycling, aggregate stability, and biological activity—but also the productivity and quality of staple crops.

To capture these dynamics, we applied SBAS-InSAR (Small Baseline Subset Synthetic Aperture Radar Interferometry) integrated with Geodetector, Wavelet analysis, and Random Forest modeling to investigate spatiotemporal variations and driving mechanisms of black soil layer thickness. Results revealed a dominant trend of thinning and subsidence (−73.33 to 45.32 mm yr^{-1}) with strong spatial heterogeneity. Severe erosion occurred on slopes and bare land, while forested areas remained relatively stable. The western Inner Mongolia region showed the most pronounced thinning (~94.4% of land losing 15–30 mm yr^{-1}), whereas the Songhua River Basin displayed upstream erosion but downstream deposition.

Climate was the leading driver: summer rainfall accelerated runoff erosion, and freeze–thaw cycles weakened soil structure during late winter to early spring. Temperature acted synergistically with precipitation to amplify soil dynamics in colder seasons. Topography and vegetation shaped spatial patterns—steep slopes and high elevations were erosion-prone, valleys encouraged deposition, and vegetation mitigated soil loss while supporting organic matter retention. Intensive tillage and unsustainable land use further exacerbated erosion and soil degradation.

By explicitly linking black soil thinning to both soil health degradation and risks to food production capacity, our research highlights the critical role of soil conservation in safeguarding grain yield, crop nutritional quality, and regional food security. These insights provide a scientific foundation for conservation practices, erosion control, and soil health restoration, thereby supporting sustainable agricultural management and climate-resilient land-use planning in the NBSR.

Tawanda Jeke

Title: Characterization of Phenolic Compounds and Antioxidant Properties in Sorghum Grains Cultivated in Canada

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Abstract:
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Sorghum is a resilient, nutritious, and versatile crop, making it an ideal choice for economic development. However, the food applications of sorghum grown in colder climates are limited, primarily due to agronomic challenges. This study examined the antioxidant properties and phenolic characterization of two Canadian sorghum varieties (CGSH28, red, and CSSH45 white-brown). The evaluation involved quantifying free and bound phenolic compounds in sorghum varieties using HPLC analysis. Additionally, the total phenolic, anthocyanin, and flavonoid contents (TPC, TAC, and TFC, respectively) and antioxidant capacity assays were assessed. These varieties showed distinct phenolic compounds such as gallic acid, ferulic acid, and trans ferulic acid, as well as elevated antioxidant activities. CGSH28 exhibited higher TPC, 2-fold higher in free phenolics compared to the CSSH45 variety. Moreover, bound phenolics consistently dominated in both varieties, exhibiting 50–56% higher than free phenolics, as well as stronger antioxidant capacity across most assays. Different seed fractions revealed that the parts most often removed during food processing (hulls) were three times richer in TPC and exhibited higher antioxidant activity than polished seeds across all assays, with about 25% more. These findings confirm that dark-colored sorghum seeds are generally richer in phytochemicals than pale varieties, underscoring the significance of careful variety selection in food processing. Furthermore, the results highlight a paradox in conventional practices, where nutrient-dense hulls are often discarded, reducing the overall nutritional and functional value of products. This emphasizes the need to reconsider processing strategies and explore the revalorization of agrifood byproducts as functional ingredients to enhance food quality and sustainability.

Keywords: Sorghum bicolor, phenolics, food processing

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Title: Potential Toxic Elements in Cosmos Plants and the Public Health Risks in Prettification Cities

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Abstract:
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Wild aesthetic plants, such as Cosmos spp., (C. bipinnatus and D. cosmos) are widely appreciated for their ornamental value and ecological significance. However, their capacity to accumulate Potential Toxic Elements (PTEs) poses potential health risks to humans through direct contact or via the food chain. This study aims to evaluate the concentration and distribution of key PTEs—including lead (Pb), cadmium (Cd), chromium (Cr), and nickel (Ni)—in wild Cosmos populations across diverse geographic regions. Samples were systematically collected from sites, and PTE concentrations were quantified using ICP-MS. The spatial distribution patterns were analyzed. The concentrations of PTEs followed a decreasing order: Mn (flowers) > Zn (flowers) > Cu (flowers) > Cr (roots) > Ni (roots) > Cd (roots) > Pb (shoots) > As (roots). Human health risk assessments were conducted employing hazard quotient (HQ) and carcinogenic risk models to evaluate potential adverse effects from ingestion.

Results indicated variable PTE accumulation levels, with certain plant parts and sites exhibiting concentrations exceeding safety thresholds. The findings underscore the importance of monitoring wild aesthetic plants for PTE contamination and highlight potential health risks associated with their exposure.

This study provides critical insights for environmental management, urban planning, and public health policies aimed at minimizing human exposure to environmental toxins through ornamental plant species.

Alexander Ayodele

Title: Structural Characteristics and Antioxidant Potential of Horse Gram Protein for Functional Food Applications

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Abstract:
Protein-energy malnutrition remains a major public health challenge in developing countries. Horse gram (Macrotyloma uniflorum), an underutilized legume, is protein-rich but limited by antinutritional factors and low digestibility. This study aimed to characterize the structural and antioxidant properties of horse gram protein isolate and hydrolysates for potential functional food applications. Horse gram seeds were processed into flour, defatted and divided into non-pretreated (A) and ultrasound-pretreated groups (B; 40°C, 25 kHz, 5 min). Protein isolates (HPA, HPB) were obtained using alkaline extraction–isoelectric precipitation and freeze-dried. The isolates were hydrolyzed with Alcalase for 1–4 h to generate hydrolysates (HHA1–HHA4, HHB1–HHB4). Structural characteristics were analyzed using Fourier Transform Infrared Spectroscopy (FTIR), while antioxidant activity was determined by the DPPH radical scavenging assay. FTIR spectra revealed characteristic amide I (1630–1635 cm^{-1}), amide II (1538 cm^{-1}), and amide III (1236–1239 cm^{-1}) bands, with ultrasound-pretreated isolates (HPB) showing stronger β-sheet features and improved stability. Hydrolysates exhibited band shifts in amide I and II regions and new hydroxyl/carboxyl groups (3200–3400 cm^{-1}; 1700–1725 cm^{-1}), confirming peptide bond cleavage. In the DPPH assay, HPB displayed higher scavenging activity (33.47% at 400 µg/ml) than HPA (29.30%). Among hydrolysates, HHA2 showed the strongest activity (37.80% at 4000 µg/ml), while HHB1 and HHB4 also outperformed untreated controls. In conclusion, ultrasound pretreatment enhanced protein purity and stability, while enzymatic hydrolysis improved structural unfolding and antioxidant potential. Valorization of horse gram offers a sustainable, low-cost protein source for functional food development.

Keywords: Horse gram protein; FTIR spectroscopy; DPPH Antioxidant activity

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Nwagbo Comfort Chinenye

Title: Nutritional and Phytochemical Composition and Glycaemic Response of Selected Edible Nigerian Leaves

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Abstract:
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Metabolic diseases such as diabetes can be managed using certain functional foods. The proximate, mineral, phytochemical, and glycaemic response of three selected edible indigenous Nigerian leaves (Persea americana (avocado), Azadirachta indica (neem), and Ocimum gratissimum (scent leaves)) were studied to determine their potential health benefits. Proximate analysis showed that scent leaves contained the highest protein (10.65 mg/100g) and crude fiber (32.78 mg/100g), while avocado leaves were the richest in carbohydrates (55.76 mg/100g). Mineral composition showed neem leaves to be superior in calcium (2767.60 g/100g), magnesium (1661.00 mg/100g), zinc (6.24 mg/100g), and iron (6.24 mg/100g), while scent leaves were richest in potassium (1617.00 mg/100g) and chromium (7.13 µg/10g). Phytochemical analysis indicated that scent leaves had the highest phenolic content (1379.00 mGAE/g), while avocado leaves contained the most alkaloids (3.80%). Functional assays demonstrated that neem and scent leaves significantly reduced α-amylase and α-glucosidase activities (63.4 and 62.9% respectively) compared to avocado leaves (5.6%), suggesting a stronger hyperglycemic potential. Antioxidant evaluation further confirmed that scent leaves exhibited the highest radical-scavenging capacity. The findings indicate that these edible leaves are valuable sources of nutrients and bioactive compounds, with neem and scent leaves particularly promising for functional food development and diabetes management.

Keywords: Antioxidant activity; Glucose regulation; Functional foods

Manpreet Kaur

Title: Plasma-Powered Modulation of Hemp Proteins: From Structure to Superior Functionality

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Abstract:
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Purpose: Hemp seeds are a rich source of complete plant-based proteins, offering all essential amino acids. However, their limited functional properties restrict broader food applications. This study explores High Voltage Atmospheric Cold Plasma (HVACP), a sustainable nonthermal technology, to enhance hemp protein functionality.

Methodology: Proteins extracted via deep eutectic solvent (DES), alkaline, and divalent salt (DS) methods were treated with HVACP under varying voltages (10, 20, 25 kV) and times (5, 10, 20 min) using jet plasma (JP) and dielectric barrier discharge (DBD) with argon gas. Functional properties, including solubility, carbonyl content, secondary structure, gelation, emulsifying activity (EAI), and stability (ESI), were evaluated.

Results: HVACP significantly improved protein solubility across all extraction methods. DES-proteins exhibited a 49.85% solubility increase under DBD at 25kV-10min, whereas alkaline proteins showed the highest enhancement (56.89%) but with increased oxidation. DS-proteins achieved an optimal balance of solubility (44.62%) and minimal carbonyl content. Secondary structure analysis revealed α-helix reduction and increased unordered structures, indicating protein unfolding. Gelation improved, with DBD outperforming JP. Both treatments enhanced EAI and ESI, reaching maxima of 15.41 m^2/g and 26.37 min, respectively, in DS-proteins at pH 9 and 3.

Conclusion: HVACP represents a green, nonthermal approach to tailor hemp protein functionality, improving solubility, structural properties, and emulsifying performance with controlled oxidation.
Food and Nutrition Implications: Enhanced hemp proteins via HVACP offer promising applications as functional ingredients in plant-based foods, supporting the development of sustainable, nutrient-rich, and high-performance formulations.

Fabrice Herve Njike Ngamga

Title: Exploring the Physicochemical Properties, Fatty Acids Composition, and Nutritional Quality Indices of Oil Derived from Chrysichthys Nigrodigitatus (jaw) of Different Sizes: Impact of Processing

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Abstract:
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This work aims to identify the best size and culinary treatment that would best preserve the nutritional quality of Chrysichthys nigrodigitatus oil. The collected mackerel was divided into large (26.1 cm) and small (12.0 cm) sizes. The samples underwent cooking treatments (smoking (115 ºC ± 10 ºC/ 5 to 6 hours), boiling in water (95 °C ± 5 °C / 14 and 17 min) and embers (120 °C ± 10 ºC / 31 and 34 min). The oils were extracted and their qualities were evaluated through quality indices, infrared spectroscopy (FTIR) and gas chromatography which was connected to a flame ionization detector (GC-FID). Large fish contained more lipids (5.74 g/100 g) than small fish (2.67 g/100 g). Boiling treatment compared to embers and smoking improved the iodine value (44.80 ± 1.56 g I2/ 100 g) and resulted in a significant decrease in the peroxide value (7.40 ± 0.38 meq O2/ kg) and total oxidation values approximately two times lower (36.42 ± 3.21) in the oils of large fish compared to those of small fish. Large fish produced more oils. Healthy fish with a higher concentration of polyunsaturated fatty acids (26.40%) than small fish (21.87%). The size-independent boiling treatment, regardless of fish size, better preserves the quality and nutritional properties of jawbone oils compared to smoking and embers treatments. Understanding the relationship between fish size and processing methods is crucial to preserving the health benefits of fish oil.

Keywords: Physicochemical properties, size of Chrysichthys nigrodigitatus, culinary treatments

Michela Pia Totaro

Title: Optimization and Application of Inulin-Based Gels with Different Degrees of Polymerization as Fat Substitutes in Low-Fat Hamburger Formulations

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Abstract:
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The growing consumer awareness of the impact of diet on health has driven the development of reformulation strategies for high-fat foods, such as meat products, with the aim of improving their nutritional profile. However, animal fat plays a crucial role in defining the rheological, structural, and sensory properties of these products. Its partial or total replacement must be carefully balanced with fat-replacing substances. This study focused on the use of inulin-based gels as fat replacers in the formulation of low-fat hamburgers. Using a combined mixture design and a three-level factorial design, two types of gels were developed employing inulin with low (LDP) and high (HDP) degree of polymerization, in combination with water and guar gum. The aim was to obtain gels with rheological properties comparable to those of animal fat, assessed through viscosity (η) and consistency index (K). The optimal formulations were as follows: 51.52% inulin, 48.48% water, 1.30% guar gum for the LDP gel; and 39.12% inulin, 60.88% water, 1.60% guar gum for the HDP gel. These gels were used to produce low-fat hamburger prototypes, which were compared to conventional hamburgers. The results of the analytical evaluations showed that the low-fat prototypes showed good performance in terms of yield and structure and had an improved nutritional profile compared to conventional hamburgers. In fact, besides the reduction in fat content and increase in dietary fiber, a significant reduction in lipid oxidation and a lower formation of heterocyclic aromatic amines – compounds classified as probable/possible human carcinogens – were observed during cooking.

Keywords: fat replacement; inulin; rheological properties.

Nicola Gasparre

Title: Influence of Corn Arabinoxylans on Morphometric Profiles and Textural Stability of Starch Gels during Storage

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Abstract:
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Arabinoxylans are non-starch polysaccharides found in cereal cell walls, valued for their health benefits and functional roles in food systems. While wheat and barley arabinoxylans are well-studied, corn-derived arabinoxylans (CAX) remain unexplored despite their abundance in milling by-products. Understanding how CAX affect starch gel texture and morphology during storage is essential to improve product quality and acceptance. This study investigates CAX's impact on microstructural and textural characteristics of starch gels.

Corn starch gels containing increasing CAX levels (1-9 g/100 g) were prepared, freeze-dried, and analyzed by SEM. Porosity, matrix coverage and pore number distribution were quantified using ImageJ. Hardness, chewiness, and resilience were measured at 0 and 48 h of storage (4°C) using a Texture Analyzer.

CAX significantly affected starch gel microstructure and texture in a concentration-dependent manner. Low CAX levels (1-3 g/100 g) increased porosity (from 43% in the control to 51%) and promoted a more open network, while higher levels (6-9 g/100 g) produced denser matrices, with matrix coverage increasing from 47% (control) to 57%. At 9 g/100 g (CAX-9), hardness, chewiness, and resilience reached 395 g, 160 g, and 0.41, respectively, versus 144 g, 102 g, and 0.21 in the control. CAX-9 exhibited ~6% less hardening than the control after 48 h storage at 4°C. Medium-sized pores (1,000-10,000 μm^2) in the gel structure correlated strongly with all texture parameters.

These findings provide a foundation for designing starch-fiber systems with targeted texture and reduced hardening, emphasizing gel's morphology and texture as critical markers of quality and functionality in starch-based formulations.

Keywords: hydrocolloids; microstructure; retrogradation.

Eniola Jayeola

Title: Production and Quality Evaluation of Spreads Enriched with Edible Insect Larvae

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Abstract:
This study developed and evaluated cocoa- and date seed-based spreads enriched with African palm weevil (Rhynchophorus phoenicis) and coconut rhinoceros beetle (Oryctes rhinoceros) larvae as sustainable, nutrient-dense alternatives to conventional spreads. Date seeds were cleaned, oven-dried, milled, and sieved; insect larvae were blanched, oven-dried, milled, and sieved to 250 µm. Four formulations—cocoa–palm weevil (CPW), cocoa–coconut beetle (CCB), date seed–palm weevil (DPW), and date seed–coconut beetle (DCB)—were analysed for proximate composition, minerals, colour, viscosity, rheology, spreadability, oil separation, oxidative stability, sensory quality, and microbial safety.

Protein content ranged from 8.06% (DCB) to 13.40% (control), with higher fat in cocoa–insect variants and higher carbohydrate and ash in date seed-based spreads. CCB recorded the highest potassium (0.513%), iron (28.40 mg/kg), zinc (16.50 mg/kg), and manganese (7.40 mg/kg), while DCB contained the highest calcium (0.917%). All spreads exhibited near-neutral pH (6.32–6.47) and low water activity (0.27–0.41), supporting microbial stability. Oil separation remained low (5.52–8.17%) and peroxide values were negligible, indicating excellent oxidative stability. Sensory evaluation showed CPW was statistically comparable to the control in appearance, colour, and overall acceptability, while date seed variants scored lower, reflecting texture and flavour unfamiliarity.

Conclusion
Incorporating edible insect larvae and date seed flour into spreads enhances mineral fortification, diversifies protein sources, and supports sustainable food systems while maintaining acceptable quality.

Food and nutrition implications
These functional spreads valorise underutilised resources, reduce food waste, and offer nutrient-rich, shelf-stable products suitable for diverse diets.

Keywords: edible insects, functional spread, date seed powder.

Jiao Jia

Title: Effect of Ultrasonic Pretreatment on the Structure and Gel Properties of Protein Isolates from Large Yellow Croaker *(Pseudosciaenca crocea)* Roe

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Abstract:
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In this study, the effects of ultrasonication time on the gel properties of large yellow croaker (Pseudosciaena crocea) roe protein isolate (pcRPI) was investigated. The results revealed that solubility, free sulfhydryl content, and surface hydrophobicity of pcRPI initially increased then decreased with ultrasonication time (0-60 min), reaching the maximum at 30 min. Compared to untreated samples, 30 min of ultrasonic treatment increased protein solubility, free sulfhydryl content, and surface hydrophobicity by 21.2%, 35.9%, and 88.5%, respectively.

Meanwhile, particle size decreased from 141.53 nm (0 min) to 103.37 nm after 30 min of ultrasonication. The visual appearance of the heated pcRPI solution achieved a transition from liquid to solid as the ultrasonication time increased. Additionally, after 30 min ultrasonication, the G' value of pcRPI increased from 0.003 Pa to 31.4 Pa at 1 Hz, with the minimum LF-NMR relaxation time value of 432.63 ms. The microstructure of pcRPI gels was denser after 30 min of ultrasonication, while excessive treatment caused re-aggregation and increased particle size. Therefore, this study highlights the potential of ultrasonication to improve the functional properties of pcRPI, thereby broadening its applications in the food industry.

Tolulope Jayeola

Title: Nutritional Quality, Environment Impact and Affordability of Alternative Proteins using a Meta-Analysis Approach

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Abstract:
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The overdependence on animal-based protein production raises issues of environmental sustainability, health, and economic feasibility. Meat, poultry, and dairy proteins are leading contributors to greenhouse gas emissions, deforestation, and high-water use. These concerns have driven interest in alternative proteins—plant-based proteins, cultured meat, and edible insects promoted as sustainable, healthy, and accessible foods. However, comprehensive assessments of their nutritional value, environmental performance, and economic viability remain limited.

This study compares the nutritional quality, environmental impact, and affordability of alternative proteins with conventional animal proteins. A meta-analysis of studies published between 2015 and 2025, using JASP 0.18.30 and random-effects models under PRISMA guidelines, included forty-five studies. Heterogeneity was tested using I^2 statistics, and effect sizes were pooled. Results show that alternative proteins generally offer comparable protein content, with insect proteins highest and plant-based slightly lower. However, they tend to have lower Protein Digestibility Corrected Amino Acid Scores and Digestible Indispensable Amino Acid Scores, requiring further processing to improve digestibility.

Environmentally, alternative proteins significantly reduce land and water use, with no clear difference in greenhouse gas emissions. Affordability remains a challenge: they are generally more expensive, with cultured meat the costliest and plant-based proteins potentially cheaper depending on scale. Accessibility favors plant proteins. Overcoming affordability, accessibility, and technological barriers is critical to integrating alternative proteins into sustainable food systems worldwide.

Daniel Zogona

Title: Wild rice-wheat noodles fortified with purple sweet potato mitigate AAPH-induced oxidative damage in Caco-2 cells

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Abstract:
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Noodles, generally made from wheat flour, exhibit low levels of phenolic compounds due to the removal of the grain's outer layers during milling. Incorporating ingredients rich in phytochemicals may enhance their functional properties. Wild rice (WR) and purple sweet potato (PSP) are nutrient-dense foods known for their high phenolics content along with their associated health benefits. In this study, noodles were produced using three formulations: 100% wheat noodles (WH), 50:50 wheat-WR flours blend (WR-WH), and WR-WH noodles enriched with 20% PSP powder. Their physicochemical and antioxidant properties were evaluated. Texture analysis revealed that WR–WH noodles exhibited the highest hardness (2104 ± 53.95 g*Force), followed by 20% PSP-enriched noodles (1379.09 ± 25.10 g*Force) and WH noodles (1022.69 ± 43.47 g*Force). The adhesiveness was lowest in 20%PSP noodles, suggesting a smoother and less sticky texture. Total phenolic content (TPC) increased in WR-WH noodles (0.95 ± 0.02 mg gallic acid equivalent (GAE)/g and 20%PSP noodles (0.85 ± 0.01 mg GAE/g) compared to WH noodles (0.52 ± 0.04 mg GAE/g). Antioxidant activities across all assays (ABTS, DPPH, and FRAP) were enhanced in WR-WH and PSP-enriched noodles compared to WH noodles. Furthermore, cell experiments demonstrated that extracts from WR-WH and 20%PSP noodles exerted protective effects, as determined by MTT assay and intracellular antioxidant activity, against AAPH-induced toxicity in Caco-2 cells. Overall, incorporation WR flour and PSP powder at 20% significantly enhanced the physicochemical and antioxidant properties of wheat noodles. This study suggests that fortifying wheat-based products with phenolic-rich ingredients, such as WR and PSP, could be a promising strategy for developing functional foods with added health benefits.

Keywords: Noodles, antioxidant, purple sweet potato, wild rice, Caco-2 cells

Oluwatimilehin Ayanniyi

Title: Antioxidant Properties of Probiotic-Fermented and Enzymatically Hydrolysed milk alternative from Vigna unguiculata L. (White - Black Eyed Cowpea)

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Abstract:
Vigna unguiculata L. (White-Black Eyed Cowpea) is a legume known for its potential health-beneficial compounds and medicinal use. This study aims to evaluate the effects of probiotic fermentation or enzymatic hydrolysis on the antioxidant properties of White Black-Eyed Cowpea milk alternative. The beans slurry was divided into two parts. One was subjected to probiotic fermentation with Lactocaseibacillus rhamnosus GG for 12, 24, and 36 hours while the other part was subjected to enzymatic hydrolysis with Alcalase for 1, 2, and 4 hours, alongside an unprocessed control to make a sum of seven samples. Ethanolic extracts of each sample were analyzed spectrophotometrically for DPPH radical scavenging activity, total phenolic content (TPC), total flavonoid content (TFC), and total antioxidant capacity (TAC). The 12h probiotic sample exhibited the strongest DPPH activity (41.41%). The 4-hours hydrolysed sample exhibited the highest flavonoids (0.63± 0.01 mg QE/g) and total phenolic compound (0.23± 0.00 mg GAE/g). The control sample has the highest total antioxidant capacity (0.16± 0.00 mg TE/g). This shows that both probiotic fermentation and enzymatic hydrolysis can influence the antioxidant profile. Moderate probiotic fermentation (12 hours) enhanced free radical scavenging capacity. Highest TFC and TPC values in the prolonged 4-hours hydrolysed sample suggest greater concentration of phenolic and flavonoid compounds. Total antioxidant capacity (TAC) was the greatest in the control sample, suggesting that processing should be perfected to enhance the full range of antioxidant compounds. These findings highlight the need for targeted processing techniques to develop functional beverages with maximized antioxidant potential.

Keywords: White-Eyed Black Cowpea, antioxidant activity (DPPH), total phenolic content

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Olayinka Babatunde

Title: Evaluation of Insect-Based Ready-to-Use Therapeutic Food (RUTF) Formulated with African Palm Weevil Larvae

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Abstract:
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Introduction: Protein–energy malnutrition remains a major concern in low-resource settings. While Ready-to-Use Therapeutic Food (RUTF) has proven effective, its availability is limited by high production costs and dependence on imported milk powder. Indigenous, protein-rich alternatives such as the African palm weevil (Rhynchophorus phoenicis) larvae, an edible insect, offer a sustainable and culturally acceptable option. This study aimed to develop and evaluate insect-based RUTF as a protein source for malnutrition management.

Methodology: Milk powder in standard RUTF was replaced with African palm weevil larvae powder at 20%, 40%, 60%, 80%, and 100% inclusion levels, alongside a milk-only control. Proximate composition (moisture, protein, ash, fat, crude fibre, carbohydrate) was determined using AOAC methods and mineral such as calcium and phosphorus were evaluated. Data were analyzed by ANOVA with significance at $p < 0.05$.

Results: Protein content increased significantly ($p < 0.05$) from 18.96% in the control to 20.05% at 40% inclusion, declined to 17.78% at 60%, and peaked at 20.91% for 100% inclusion. Calcium content in the control was 492.52 mg/100 g, while insect-based formulations ranged from 267.32 to 428.04 mg/100 g. Phosphorus levels in all formulations met World Health Organization specifications for RUTF.

Conclusion: African palm weevil larvae powder can enhance protein quality in RUTF while reducing reliance on expensive imported milk. This approach provides a cost-effective, sustainable solution to combat protein–energy malnutrition in low resource setting.

Keywords: African palm weevil larvae, malnutrition, Ready-to-Use Therapeutic Food

Mayuri Bane

Title: Sustainable Protein Extraction from Canadian Dry Beans: Structural and Functional Insights

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Abstract:
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The ever-growing demand for sustainable, plant-based proteins requires innovative and advanced processing of dry beans. Despite Canada exporting 4,092 tonnes of dry beans in 2023 their use in value-added applications remains untapped. This study compares conventional alkaline and salt extraction with eco-friendly deep-eutectic solvent (DES) techniques for navy, pinto, and kidney beans, evaluating protein isolate quality and functionality. Data was analyzed using ANOVA followed by Tukey's test ($P < 0.05$). DES-extraction achieved protein content of 78.13%, 78.35%, and 78.86% for navy, pinto, and kidney beans, respectively. Alkaline-extracted yielded higher values of 83.9%, 83.71%, and 84.26%. Secondary structure analysis in navy beans revealed DES-extracted protein isolates had higher α-helix content (12.63%) than alkaline-extracted (6.62%). Pinto and kidney beans showed greater α-helix in salt-extracted proteins (12.69% and 9.36%) than alkaline (11.22% and 9.20%). Differential Scanning Colorimetry showed salt-extracted proteins had highest denaturation enthalpy. DES-extracted proteins had smaller particle size, with 90% of particles measuring <40 µm in navy, <51 µm in pinto, and <63 µm in kidney beans. At pH 5, salt-extracted proteins exhibited higher emulsification activity, while DES-extracted proteins demonstrated superior emulsion stability. At pH 5 and 7, DES and salt-extracted proteins exhibited higher solubility, foaming capacity, and stability. Salt-extracted proteins exhibited higher water holding capacity in pinto (248%) and kidney (264%) beans. Alkaline-extracted proteins showed lowest oil-holding capacity across all beans. These findings highlight the potential of DES as an eco-friendly extraction method that enhances protein functionality, enabling plant-based protein production from dry beans to meet future sustainable protein demand.

Keywords: Bean protein isolates, structure-function properties, sustainable protein extraction

Muskan Beura

Title: Optimized Extraction and Genotypic Screening of Ergosterol and Eritadenine in Indian Shiitake: A Dual Bioactive Approach for Nutraceutical Development

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Abstract:
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Shiitake mushroom (Lentinula edodes) is a well-renowned medicinal mushroom enriched with bioactive compounds. Ergosterol, a precursor of vitamin D_2, and eritadenine are recognized for cholesterol-lowering properties. Natural sources of these compounds are increasingly preferred over synthetic alternatives due to their higher bioactivity and fewer side effects. Ergosterol-derived vitamin D_2 offers a plant-based solution to address vitamin D deficiency, especially for vegetarians and vegans, while eritadenine provides a natural alternative to statins, which are often associated with myopathy and digestive complications. This study aimed to optimize extraction protocols for ergosterol and eritadenine to improve recovery and ensure commercial applicability. Key process parameters: solvent type, extraction temperature, time, and solid-to-solvent ratio were systematically evaluated. Hexane proved most effective for ergosterol extraction, while ethanol yielded higher levels of eritadenine. Using Response Surface Methodology (RSM), optimal conditions were identified: ergosterol extraction at 85 °C for 60 min with a 1:50 solid-to-solvent ratio, and eritadenine extraction at 36 °C for approximately 23 min with an 85-fold dilution. 25 Indian shiitake genotypes from Northeast India (Manipur) were screened. UPLC-based quantification revealed significant genotypic variability: strain DMRO-328 showed the highest ergosterol content (1.0897 ± 0.0016 mg/g), while UYEN-2 recorded the maximum eritadenine accumulation (68.21 ± 0.891 mg/g). These findings underline the potential of shiitake as a sustainable source of dual bioactives for functional foods and nutraceutical formulations. Coupled optimized extraction and genotype screening provided a pathway to develop next-generation nutraceuticals and functional foods. The findings position shiitake not only as a dietary ingredient but also as a strategic resource for the nutraceutical industry, linking scientific innovation with global health needs.

Keywords: Shiitake, Ergosterol, Eritadenine

Elsa Solefack Nguepi

Title: Comparative study of the Optimization of Soy Cheese Processing Technology using Commercial White Vinegar and Diluted Acetic Acid

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Abstract:
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Introduction: soy cheese in Cameroon is generally consumed as a ready-to-eat food in the form of soy cheese skewer, locally known as “soyabean soya”. It is an important source of protein for the population, but the complexity and diversity in the production technology has led to variability in the final products proposed to consumers. The objective was to determine the optimum conditions necessary to obtain standard quality soy cheese using different coagulants.

Methodology: A Central Composite Design (CCD) of the Response Surface Methodology (RSM) evaluated the effect of soaking time, soybean-to-water ratio, volume of coagulant and coagulation time on the protein content, yield and water content, produced using commercial white vinegar (CWV) and diluted acetic acid (DAA).

Results: The highest protein content (66.58%) and yield (122.49%) where obtained using CWV while the highest moisture content (80.78%) was obtained using DAA. The coefficients of determination (R2) where above 75%, the ADMA between 0.00 to 0.30 and the Bf 0.75-1.25 showing that the model is valid. The optimum processing conditions using CWV included soaking time 7h, soybean-to-water ratio 6.64l, volume of coagulant 8.56% and coagulation time 7.74mins; with DAA: soaking time 7.10h, soybean-to-water ratio 8.80l, volume of coagulant 8.01% and coagulation time 16.43mins.

Conclusion: Results revealed significant differences in responses evaluated using CWV and DAA. The application of optimum conditions is improved the nutritional quality.

Food and Nutrition-related implications: the optimization of soy cheese processing improves its nutritional quality by providing consumers with healthier foods.
Funding source: This was did not receive any funding and was completely funded by the authiors

Keywords: Optimization, Soy Cheese, processing conditions.

Chandima Kulathilaka

Title: Ultrasound-Assisted Extraction Enhances Yield and Functional Properties of Mung Bean Protein Isolates

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Abstract:
Introduction/Purpose:
There is growing interest in sustainable plant-based proteins as functional food ingredients. This study evaluates the impact of ultrasound-assisted extraction (UAE) on protein yield and techno-functional properties of mung bean (Vigna radiata) proteins compared to conventional extraction methods.

Methodology:
Mung bean flour was defatted and subjected to UAE under optimized parameters (200W, 20 minutes, 1:10 w/v water). Proteins were isolated via isoelectric precipitation and freeze-dried. Functional properties—solubility, emulsifying activity index (EAI), and foaming capacity—were evaluated using standard analytical methods. Spectroscopic analysis (FTIR) assessed structural integrity.

Results:
UAE significantly improved protein yield (22.4%) versus traditional extraction (16.8%). Solubility increased by 31%, EAI by 28%, and foaming capacity by 35%. FTIR spectra indicated minimal denaturation, preserving secondary structure. The improved performance was attributed to the cavitation effect of ultrasound, which enhances cell disruption and protein release.

Conclusion:
UAE is a promising green technology that enhances the recovery and quality of plant-based proteins without compromising their structure. It offers an efficient alternative for producing high-value protein ingredients.

Food and Nutrition-related Implications:
This study supports the integration of UAE in food processing to obtain functional plant proteins suitable for clean-label, sustainable, and nutritious food applications. Mung bean protein extracted by UAE could be valuable in formulating dairy alternatives, meat analogs, and protein-enriched functional foods.

Keywords:
Ultrasound-assisted extraction, mung bean protein, functional food ingredients

Hylenne Bojorges

Title: Protein Recovery and Bioactive Potential from Brown Seaweed Residues

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Abstract:
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The blue bioeconomy draws increasing attention as societies search for sustainable protein sources beyond land-based agriculture. Brown seaweeds, already harvested at scale for alginate, generate large residual biomass streams that remain underexploited. Here, we investigated the valorization of residues from Ascophyllum nodosum and Saccharina latissima after alginate extraction, focusing on protein recovery and functional potential. Using sequential extraction strategies (acid/alkali, enzymatic, ultrasound, and pH-shift), we achieved up to 29.5% recovery of total protein. The resulting fractions demonstrated strong techno-functional properties (water/oil retention, emulsification, foaming) and bioactivity, including antioxidant capacity and ACE inhibition. These findings highlight brown seaweed residues as an untapped reservoir of alternative protein and bioactive compounds, offering new opportunities for functional foods to address cardiovascular health and oxidative stress.

Kofi Oduro

Title: Plasma Activated Water as a Sustainable Pretreatment to Enhance Protein Extraction from Chickpea

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Abstract:
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The shift towards plant-based proteins is crucial to building a sustainable food system. However, their large scale utilization is often limited by complex seed matrices, hindering protein extractability and yield. Traditional thermal treatments, while effective, lead to extensive protein denaturation, impairing its functional and nutritional quality. Consequently, non-thermal processing technologies, particularly cold plasma applications, have gained attention due to their low energy requirements, scalability and eco-friendly operation. While cold plasma has been widely applied in protein modification, emerging studies explore its role in enhancing protein extraction efficiency. This study focused on plasma activated water (PAW), a highly reactive and easily prepared medium that integrates seamlessly into conventional wet extraction workflows without additional chemical inputs. We optimized PAW generation parameters specifically voltage (10-25 kV) and treatment time (5-20 min) using a dielectric barrier discharge (DBD) system. The resulting changes in PAW's physicochemical properties (conductivity, oxidation-reduction potential (ORP), and pH) were evaluated, alongside their impact on the chickpea protein yield. Optimal PAW generated at 20 kV for 5 min achieved the highest protein yield (173±6.26 mg/g) and a composite desirability of 0.79, significantly higher than yields from untreated water (152.8±11.05 mg/g). Statistical analysis revealed inverse correlations between protein yield and PAW conductivity (r=-0.308) and ORP (-0.320), while pH showed a positive relationship (r=0.338). These findings suggest that moderate PAW reactivity optimizes matrix disruption without excessive protein oxidation. This work highlights PAW as a scalable, sustainable pretreatment strategy to enhance plant protein recovery for varied industrial applications, ultimately supporting the development of nutritious, plant-based foods for sustainable diets.

Keywords: Plasma Activated Water (PAW), Chickpea Protein, Sustainable protein Extraction

Julio G. Cisneros Medrano

Title: Exploring Hemp Seed Processing Fractions for Improved Food Attributes

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Abstract:
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Keywords: industrial hemp; protein; phenolics.

Industrial hemp production (Cannabis sativa L.) has re-emerged in Canada since its relegalization in 1998, with cultivation expanding to over 15,000 Ha by 2023. Processing hemp for production of commodities like hemp hearts and oil generates by-products (seed hulls, press cakes, etc.) that are currently discarded contributing to food waste and resource inefficiency. This study evaluated hemp seed fractions—dehulled hearts, hulls, and press cakes—for their nutritional and bioactive properties to identify potential targets for novel ingredients and food development. Samples were analyzed for total protein content, antioxidant potential, in vitro protein digestibility, and complete amino acid (AA) profiles. Phenolics were characterized via high-performance liquid chromatography and gas chromatography-mass spectrometry. Hulled seeds had significantly higher protein content (37.07%) compared to seed cakes (35.79%) and hulls (14.73%) ($p < 0.05$). Lysine was the first limiting AA in all samples with AA scores of 0.57 in hulls to 0.59 in seed cakes. The in vitro protein digestibility of press cakes (97%) was significantly greater than hulls (93%), and dehulled hearts (90%) ($p < 0.0001$). Hulls showed the highest profile of phenolics (~5 mg GAE/g), flavonoids (~1.6 mg CE/g), and antioxidant activity (FRAP: ~32 µmol AAE/g; DPPH: ~25 µmol TE/g; ORAC: ~150 µmol TE/g) ($p < 0.0001$) compared to the other fractions tested. These findings demonstrate that hemp by-products have good protein quality and phenolic content, and support upcycling hemp by-products into functional food ingredients while promoting sustainability in hemp production.

Mildreth Cecilia Cordero Herrera

Title: Physicochemical and Functional Characterization of Moringa Oleifera Seed Extract with Potential Use in the Food Industry

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Abstract:
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Introduction: Moringa oleifera is a tree native to northern India. Its leaves, seeds, roots, and flowers are rich in nutrients and bioactive compounds with functional and antimicrobial properties.

Objectives: to characterize the extract obtained from M. oleifera seeds in terms of its physical, chemical, and functional properties. Materials and methods: M. oleifera seeds were extracted using 95% ethanol. The extract was concentrated by rotary evaporation, and physicochemical analyses (acidity, pH, total solids, density, and color) were performed. For the functional part, antioxidant and antimicrobial capacity (S. aureus, E. coli, P. fluoresence, Aspergillus spp., and Penicillium spp.), and phytochemical composition were evaluated.

Results: Moringa seed extract had an acidity of 3.17±0.15 %, pH of 4.52±0.02, total solids of 63.73±0.15 %, density of 1.03±0.03 g/ml, the color shows low brightness 21.10±0.26 and a tendency towards yellow 19.90±0.30. This extract is considered rich in bioactive compounds with the presence of phytochemicals such as flavonoids, glycosides, and saponins. The antioxidant capacity is 3387±217.1 µmol ascorbic acid and it exhibits antimicrobial activity against strains of S. aureus, E. coli, P. fluoresence, and Penicillium spp.

Conclusion: M. oleifera seed extract is rich in bioactive compounds that confer antioxidant and antimicrobial properties, making it a potential functional and antimicrobial additive for use in the food industry. However, further research is needed on the phytochemical compounds present and their effect on human health.

Keywords: Extract, antioxidant, and antimicrobial

Sodiq Olaleye

Title: Effects of Extraction Methods on the Structural Characterisation of Pigeon Pea Protein Isolate

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Abstract:
Pigeon pea (Cajanus cajan) is a legume with substantial protein fraction, but usually neglected due to its rigorous processing for consumption. However, the protein fraction can be particularly fractionated to enhance its applications. This study aimed to characterise the structure of pigeon pea protein isolated using three extraction methods. The pigeon pea was converted to flour, defatted and subjected to alkaline isoelectric precipitation, salt micellation and natural deep eutectic solvent extraction methods labelled as API, SPI and NPI, respectively. The structural characteristics of the isolates were evaluated using Fourier-transform infrared (FTIR) spectroscopy (400 – 4000 cm-1). All isolates exhibited characteristics absorption bands, including C – H stretching (2920.60 - 2962.70 cm^{-1}), N- H stretching (3202.46 - 3278.86 cm-1), amide I (~1600 cm-1), and amide II (1517.82-1532.97 cm-1). The amide I region revealed β-sheet structures (1627.76 - 1634.65 cm-1) as the major secondary structure, related to protein aggregation. (API) exhibited the highest β-sheet intensity and greatest absorbance in C – H and N- H regions, indicating protein unfolding at high pH of 9.5 – 10, increased surface hydrophobicity and aggregation potential. (SPI) had shaper peaks of amide I and II, suggesting better retention of protein native structure, while (NPI) had broader bands, indicating structural homogeneity due to hydrogen-bonding solvent interaction. These findings indicate that extraction methods significantly influenced the secondary structural constituents of the isolates. Therefore, this research supports the development of functional food ingredient from pigeon pea protein with potential applications in bakery formulations, emulsifiers and plant-based meats.

Keywords: Pigeon pea protein isolate, FTIR spectroscopy, Functional food ingredient

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Mariela Rodriguez

Title: Non-Thermal-Processing of Lentil Proteins via Cold Plasma for High-Value Food Ingredients

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Abstract:
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Canada plays a vital role in the global lentil supply chain, and emerging technologies like cold plasma offer a sustainable alternative to conventional thermal processing methods. High-voltage cold plasma (HVCP) treatments can enhance the techno-functional properties of lentil protein isolates (LPI), expanding their potential use in various food applications.

This study investigates the effects of dielectric barrier discharge (DBD) plasma treatment on four types of green lentil protein extracts—alkaline (ALK-LPI), monovalent salt-based (MS-LPI), divalent salt-based (DS-LPI), and deep eutectic solvent-extracted (DES-LPI)—using argon as the carrier gas. Three HVCP treatments _5 min /15 kV (515), 5 min/ 20 kV (520), and 10 min/ 20 kV (1020) _were chosen. The study analysed the composition, techno-functional properties, and structural changes in LPI after cold plasma treatment.

The solubility and WHC of most isolates remained at control levels, except for ALK-LPI, which showed significantly reduced properties under treatments 520 and 1020. ALK-LPI, however, showed increased OHC in all three treatments. The MS-LPI/515 treatment resulted in higher OHC, possibly due to a reduced proportion of random coils and increased β-sheet formation.

DBD plasma treatment showed promising effects, possibly enhancing structural stability through conformational changes induced by reactive species. This research underlines the significance of innovative processing technologies in enhancing the value of lentil products, thereby meeting market demands and improving economic returns.

keywords: Cold Plasma, lentil protein isolates, techno-functional properties

Thanuranga Tharushi Samarasinghe

Title: Optimization of Green Protein Extraction from Cold-Pressed Canola Meal using a Natural Deep Eutectic Solvent (NDES) of Choline Chloride (ChCl) and Citric Acid (CA)

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Abstract:
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The byproduct of Canada's most lucrative commercial oil crop is canola (Brassica napus L.) meal. It is considered a sustainable, high-quality protein (napins and cruciferins) source, with an anticipated production of 61.11 million metric tons by 2033. Green processing and utilization in high-value applications are therefore crucial for canola proteins in place of animal feed. In this study, seed oil was extracted by cold-pressing to minimize high-temperature damages that would otherwise be induced commercially. Then, to extract proteins, an NDES of ChCl and CA was optimized for three parameters: temperature, ChCl: CA molar ratio, and liquid: solid ratio, to generate maximum yield. 60 runs were carried out keeping the water content (40%) and extraction time (1 hour) constant, following the central composite design of the response surface methodology. The protein concentration was measured using the Bradford assay at 595 nm. Accordingly, the statistically optimized conditions were 90 °C, 1:6, and 26.2:1 ml/g, respectively, which provided 227.14 ± 8.47 mg/g of soluble proteins. Despite having a promising higher yield compared to other researched DESs, this system's enormous chemical requirement makes it industrially unfeasible. Hence, using contour plots, appropriate extraction conditions were selected and run with varying water contents to discover tolerable conditions with minimal compromise on the protein content, but the attempt was unfruitful. Therefore, next, with a different NDES system, the research will be continued to produce a high-value nanoemulsion for a model bioactive compound. This could reduce waste, environmental footprint, and poor protein functionality while meeting the demand for alternative proteins.

Ruth Sanusi

Title: Antioxidant Properties of the Polyphenolic Extracts of ASA Encapsulated and Co-incorporated with Lacticaseibacillus Rhamnosus GG in Ogi

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Abstract:
African Star Apple (Chrysophyllum albidum) peel (ASAP), rich in polyphenols with antioxidant properties, is usually discarded despite its potential health benefit in preventing the oxidative damage of free radicals. This study examined the effects of ultrasound-assisted extraction of ASAP phenolics and further encapsulation on the in vitro antioxidant properties. The effects of subsequent co-incorporation of encapsulated ASAP extracts with encapsulated probiotic Lacticaseibacillus rhamnosus GG in Ogi (maize gruel), were also evaluated.

ASAP powder was extracted with 70% methanol by cold maceration, either without (control; U0) or with ultrasonication at 25oC (U1) and 40oC (U2). The extracts were alginate-encapsulated and characterised in vitro for total phenolic content (TPC) and antioxidant (DPPH and FRAP) activities. The alginate-encapsulated extract and encapsulated L. rhamnosus GG were further incorporated in Ogi, and was also assessed. Data were analysed using ANOVA at $p < 0.05$.

Extract U0 exhibited the highest significant DPPH scavenging activity (51.19%) and FRAP (3.64 mg AAE/mL), whereas U1 exhibited the highest TPC (1.39±0.02 µg GAE/mL), with observable differences. When encapsulated extracts and L. rhamnosus GG were incorporated into Ogi, the extract U2 had the highest DPPH scavenging activity (47.73%). The Ogi with the extract U0 had the highest total phenolic content (0.18 µg GAE/mL), while the Ogi with the extract U2 recorded the lowest (0.16 µg GAE/mL).

These findings showed that low-temperature ultrasonication preserves phenolics, while cold maceration without ultrasonication maximises the antioxidant activities, and co-incorporating encapsulated ASAP extracts and encapsulated L. rhamnosus GG, transforms Ogi into phenolic-rich probiotic food.

Keywords: African star apple peel, ultrasonication, encapsulated functional food

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Davide Falotico

Title: Alcalase Hydrolysis to Enhance Techno-functional Properties of Dry-fractionated Yellow Pea Protein

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Abstract:
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Introduction/Purpose
Shifting toward plant-based diets represents a key approach on environmental footprint mitigation. Recently, dry-fractionation has gained attention as a sustainable method to obtain plant-based proteins. However, these ingredients often exhibit poor functionality in terms of solubility, and unpleasant sensory properties, which limit their application in plant-based product development. Enzymatic hydrolysis can be a strategy to address these challenges.

Methodology
This study investigated the impact of Alcalase hydrolysis on key techno-functional properties of dry-fractionated yellow pea protein. Protein suspensions were hydrolysed at 50°C and 60°C, with controls. Samples were collected at 15, 97.5, 140, and 180 minutes, then inactivated (95°C for 20 minutes), frozen and lyophilised. Water absorption capacity (WAC), oil absorption capacity (OAC), water absorption index (WAI), water solubility index (WSI), foaming capacity (FC) and foaming stability (FS) were measured .

Results
Hydrolysis reduced WAC (even after 15 min) and WAI at both temperatures, while sharply increasing the solubility, especially at 60°C. Conversely, OAC showed slight decline at 60°C. Lastly, FC slightly improved in samples treated at 50°C while FS decreased sharply, especially considering FS20. These results likely reflect the formation of smaller, more soluble peptides with reduced hydrophobic surface area.

Conclusion
In conclusion, Alcalase hydrolysis modified the functionality of dry-fractionated pea proteins, markedly improving solubility.

Food and Nutrition-related implications
This technology looks promising for food applications requiring high solubility, such as protein-based beverages, sauces, and supplements, offering a targeted approach to tailor plant protein functionality for specific food applications.

Keywords: plant-based proteins, enzymatic hydrolysis, techno-functional properties

Kemashalini Kirusnaruban

Title: Microwave-Assisted Aqueous Extraction of Phenolic Compounds from Wheat

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Abstract:
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Phenolic compounds (PCs) are bioactive molecules known for their antioxidant properties and play an important role in promoting human health. Wheat, a globally consumed staple grain, serves as a valuable dietary source of these compounds. Building on the development of a microwave-assisted extraction (MAE) method for phenolic compounds in wheat, this study aimed to validate the technique using four independent batches of Canada Western Red Spring wheat.

Wheat kernels and flour were obtained from four separate batches. MAE was carried out at 170°C for 15 minutes and 10 minutes using water as the solvent, from wheat kernel and flour respectively, based on previously optimized conditions. A solid-to-liquid ratio of 1:9 (kernels) and 1:99 (flour) was maintained. Total phenolic content (TPC) was measured using the Folin-Ciocalteu assay. High-performance liquid chromatography (HPLC) was used to assess individual phenolic acid profiles. Batch variability and matrix effects were statistically analyzed.

TPC was consistent across all four batches with minimal standard deviation, indicating high method reproducibility. Flour samples yielded higher TPC (average 4.96 ± 0.58 mg/g dm) than kernel samples (2.36 ± 0.12 mg/g dm), likely due to the increased surface area and disrupted cell structure. Gallic acid was the predominant phenolic acid in both flour and kernel extracts, with concentrations of 1.24 ± 0.06 mg/g dm in flour and 0.45 ± 0.06 mg/g dm in kernels. In flour samples, the next most abundant phenolics were vanillic acid (0.28 ± 0.07 mg/g dm) and hydroxycinnamic acid (0.23 ± 0.01 mg/g dm), whereas in kernel samples, salicylic acid (0.06 ± 0.00 mg/g dm) and hydroxybenzoic acid (0.06 ± 0.01 mg/g dm) followed gallic acid. No significant difference in extraction efficiency was observed among the batches ($P > 0.05$), validating the robustness of the MAE method.

MAE using water as a green solvent is a reproducible and efficient method for extracting phenolic compounds from wheat. Its validation across four different batches supports its scalability and consistency, making it suitable for quality control, ingredient development, and clean-label functional food applications. Validated MAE supports the development of sustainable, antioxidant-rich ingredients for health-conscious consumers. Its scalability and solvent-free nature align with current industry trends toward clean processing and eco-efficiency in food systems.

Keywords: Phenolic acids, Wheat Extracts, Green Extraction

Mariana Miccolis

Title: Extending the Shelf-Life of Fresh Pasta with Free and Microencapsulated Olive Pomace Extracts

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Abstract:
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Keywords: fresh pasta; olive pomace; shelf-life

The increasing consumer demand for more natural foods, with extended shelf life, has led researchers to explore the use of natural molecules with antioxidant and antimicrobial properties. From a sustainability perspective, the extraction of such compounds from agro-industrial by-products, such as olive pomace (OP), has gained significant interest. In this research, microencapsulated and freeze-dried OP extracts (M-OPE and F-OPE, respectively) were added to “cavatelli” fresh pasta samples aiming to extend the product shelf-life. The evolution of microbiological quality and chemical-physical parameters was assessed on samples stored at 4°C, from day 0 up to 120 days of storage. The results showed that after 120 days of storage, pasta samples still complied with Italian law, as regards moisture and aw. Notably, microencapsulation proved to be effective in protecting polyphenols during pasta production and storage, as samples with M-OPE exhibited higher total phenolic content and antioxidant activity compared to F-OPE samples. The addition of extracts reduced pH values of the fresh products, even though a gradual increase was observed over 120 days of storage. As regards color, OP extracts reduced L* values, whereas b* values showed a decreasing trend until end of storage time, starker for samples with F-OPE. Significantly, both extracts, especially M-OPE, limited microbial growth, as mesophilic aerobic, moulds and yeast registered a significant reduction ($p < 0.05$) of ca. 0.5–1 logarithmic cycle compared to the control, especially at 110 days of storage. Thus, the study highlighted the potential of upcycling a by-product as a functional ingredient.

Mawande Hugh Shinga

Title: Effect of Edible Coating on Volatile Profile of Banana Pulp Under Retail Conditions

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Abstract:
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This study investigated the dynamic changes in volatile organic compounds (VOCs) profile of pulp stored under retail conditions to assess the efficacy of optimized edible coating on postharvest preservation. The edible coating was formulated using mucilage extracted from prickly pear cladodes infused with pomegranate peel extract and further amended with optimised concentration celluloses nanofiber and glycerol to improve its functional properties. Gas chromatography-mass spectrometry (GC-MS) was used for volatile compounds (VOCs) analysis of bananas at different ripening stages over 10 d. The analysis revealed significant alterations in the volatile profile, with esters emerging as the dominant class, accounting for 64% of the total VOCs at the end of the experiment. Aldehydes and alcohols each contributed 9%, followed by ketones (4%) and others (14%). The study revealed that banana ripening is closely associated with the progressive accumulation of esters, which are key contributors to the fruit's characteristic aroma and flavour. Furthermore, the optimised edible coating effectively modulated VOC release, significantly delaying the degradation of key aromatic compounds. This controlled release mechanism contributed to maintaining a more desirable flavour profile while extending the fruit's freshness and enhancing consumer acceptability during storage. These findings underscore the potential of bio-based edible coatings as a sustainable postharvest intervention to improve banana quality, prolong shelf-life, and enhance marketability.

Keywords: Opuntia-ficus-indica coating, aromatic profile, sensory quality and marketability.

Sherwin Santiano

Title: Effects of Temperature on Moisture Uptake During the Malting Process

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Abstract:
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The malting process is an intensive operation that utilizes water, temperature and time to produce a functional product for brewers. Driven by rising energy costs, the need for alternative sustainable practices within the traditional malting process was explored. In this study, a range of temperature conditions (13°C, 15°C, and 18°C) and steep-out regimes (39%, 42%, 46%) was applied to CDC Copeland barley. Samples were subjected to a 96-hour germination step and a 21-hour kilning application (4-hour cure at 82°C) Finished malt quality (BG, FAN, DP, FAN, S/T ratio, fine extract, viscosity, friability and colour) was measured via ASBC methods of analysis. At 18°C, it was observed that samples were able to uptake water (3.15% increase) more readily despite having the same steep water additions as 13°C and 15°C runs. Consequently, wort beta-glucan decreased at higher temperatures (772 ppm, 583 ppm, 267 ppm at 13°C, 15°C, 18°C respectively). Consequently, friability values were increased with increasing temperatures (59.6%, 66.0%, 78.4% respectively). Alpha-amylase production was more developed at 18°C with activities reaching as high to a 34% increase compared to 13°C. Overall, higher temperatures indicated stronger modification levels likely due to the elevated moisture uptake. It is suggested that malting at 18°C can serve as a midpoint temperature balancing quicker modification while still preventing deleterious microbe growth. This temperature range will be a useful application allowing maltsters to reduce costs while maintaining adequate malt quality.

Maria Garofalo

Title: Impact of Probe Geometry on the Oral Processing Simulation

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Abstract:
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Keywords: oral simulation, texture probes, starch gels

The first stage of digestion occurs in the oral cavity, where mastication mechanically breaks food and mixes it with saliva to form a bolus. Texture analyzers, commonly used in food science, employ the texture profile analysis (TPA) to characterize food texture, but this fails to replicate the continuous deformation during mastication. Modified methods increase compression cycles to better replicate oral processing; however, probe designs play a role, making proper selection essential to accurately reproduce structural breakdown during mastication.

This study evaluated the effectiveness of different probes to detect textural changes in corn starch gels during simulated mastication. Gels were tested at 0 h and after 24 h storage at 4 °C, using a TA-XTPlus Texture Analyzer under standard TPA parameters but increasing compression cycles to 26. Four probes were tested: cylinder (18 mm), conical, and spherical (1/2 inch and 1 inch).

Force-compression cycle curves obtained with the cylinder probe showed unstable force patterns. In contrast, conical probes produced consistent curves reflecting starch gel breakdown and force reduction. Cylinder and conical probes were sensitive to retrogradation, as reflected in the increase in hardness after 24h (Ho =456.24±41.92g to Ho =526.12±28.78g for cylinder, and Ho =922.04±28.78g to Ho =1134.69±110.49g for conical). Spherical probes failed to capture breakdown patterns expected in these curves or storage effects. Conical probes best simulate mastication, enabling accurate assessment of structural changes. Optimizing probe selection and methodology can enhance oral digestion simulation, supporting future tests with saliva to evaluate how food fragmentation and enzymatic action in the oral phase influence digestion and guide the development of starchy products with better health benefits.

Funding:
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Cristina Jimenez

Title: Impact of Thermal and Non-Thermal Processing on the Structure and Functional Properties of Canola Proteins Obtained by Different Extraction Methods

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Abstract:
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Canola (Brassica napus) meal, a by-product of oil extraction, contains 35–40% protein and holds promise as a sustainable protein source for food and industrial applications. However, conventional thermal processing can denature proteins, reducing their functional properties. This study analyzes the structural and functional characteristics of protein isolates obtained from thermally processed (TH) and cold-pressed (non-thermal, NT) canola meals using different extraction methods.

The canola protein isolates were extracted and processed using alkaline solubilization with precipitation by isoelectric point (ALK), deep eutectic solvents (DES), and divalent salt (SAL) extraction. Isolates were evaluated for yield, protein recovery, composition, amino acid profile, and functional properties across pH 3, 5, 7, and 9. NT samples extracted with SAL and DES showed significantly higher protein purity (98.66% ± 0.41 and 98.52% ± 0.34). ALK-NT yielded the highest output (20.62% ± 1.07), while SAL-NT and ALK-NT demonstrated superior protein recovery (40.55% ± 1.5 and 38.96% ± 2.01).

Structural analysis using FTIR, XPS, SDS-PAGE, fluorescence spectroscopy, and size exclusion chromatography confirmed enhanced functionality in proteins extracted with DES and SAL. Overall, combining non-thermal processing with DES and SAL extraction methods significantly improves the structural and functional properties of canola protein.

Lia Mansueto

Title: Bakery Products Enriched with Artichoke By-Products: Development of Functional Foods with Evaluation of Antioxidant and Nutritional Potential

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Abstract:
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In recent years, the consumption of ready-to-eat foods has increased due to their convenience, ease of preparation, and extended shelf life. However, these products often exhibit an unbalanced nutritional profile, typically characterized by high levels of fats and sugars. Baked goods offer an opportunity to incorporate functional ingredients that enhance nutritional quality. In this context, plant-based ingredients may provide both technological and health benefits. The artichoke (Cynara scolymus), in addition to its culinary value, is rich in bioactive compounds (BCs) i.e., 3,5-di-O caffeoylquinic acid, 3,4-di-O-caffeoylquinic acid, apigenin-7-O-rutinoside, luteolin, inulin, fibers, minerals, known for their hypoglycemic and prebiotic properties. Industrial processing by-products, such as bracts and stems removed to produce frozen or preserved artichoke, retain a significant portion of these compounds.

This study aimed to obtain a food ingredient from artichoke bracts and stems and characterize the chemical and nutritional composition of the obtained artichoke powder (AP). Analyses were performed on AP to determine fiber content, total polyphenols, antioxidant capacity, and bioaccessibility of polyphenols. According to existing literature, the use of AP as a partial replacement for conventional flour could enable the development of savory snacks enriched with BCs, contributing to improve health-related features.

Preliminary results suggest that AP represent a promising source for the formulation of functional foods, potentially capable of delivering health benefits due to their content of BCs. The inclusion of AP in savory snacks may enhance dietary intake of fiber and antioxidants, support metabolic and gastrointestinal health, and promote sustainability through the valorization of food industry waste.

Keywords: bakery products, plant-based ingredients, dietary fiber, artichoke by-products.

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Santiago Rivera

Title: Preliminary Assessment of Malting Quality Parameters in Winter Wheat: Implications for Functional and Health-Oriented Malt Products

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Abstract:
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Winter wheat presents an opportunity to diversify malt production due to its local availability and favorable functional characteristics in terms of malt production. Malting, is a crucial process that activates endogenous enzymes, breaking down complex starches and proteins into simpler, more digestible components. This process enhances the bioavailability of nutrients, improves the overall flavour and texture of final products, making germinated grains highly valuable in diverse food applications. This study aimed to evaluate the malting characteristics of winter wheat cultivars and specific breeding lines, using a lab-scale micromalting procedure. This research was looked at parameters such as moisture loss, malt extract yield, and protein modifications, including the Kolbach Index, as preliminary quality indicators.

Preliminary results show a malt extract yield ranging from 66.81% to 74.8% on a dry basis and a wort °Plato from 7.35 to 8.11. The Kolbach Index ranged between 51.22% and 68.17%, suggesting moderate protein modification under the tested conditions. These findings demonstrate the feasibility of malting winter wheat for potential brewing applications. Considering winter wheat's protein content and potential higher dietary fiber, malting could enhance its digestibility and functional properties for health-oriented malt beverages and bakery applications. Future work will focus on varietal comparisons and enzyme activity assessments, to explore winter wheat's role in developing functional, malt-based products adding value to emerging crops in Manitoba.

Flavia Adais Rocha dos Santos

Title: Solvent-Free Enzymatic Epoxidation of Oleic Acid for Development of Sustainable Lipid–Protein Nanodelivery Systems

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Abstract:
Introduction/Purpose: Oleic acid, a major component of Canadian canola oil, offers a renewable resource for advanced protein-based nanoencapsulation platforms. Conventional chemical epoxidation relies on harsh reagents and generates substantial waste. This study evaluates a green, solvent-free, enzymatic epoxidation process to produce functionalized lipids for conjugation with food-grade proteins, promoting sustainable food innovations.

Methodology: Oleic acid was epoxidized using in situ–generated peroxycarboxylic acids from hydrogen peroxide and immobilized Candida antarctica lipase B (Novozyme 435) under solvent-free conditions. Enzyme concentration (1.5–6.0%) and temperature (30–60 °C) were varied over 6 h. Epoxy content and oxirane oxygen conversion were determined by titration. Data were analyzed via one-way ANOVA with Tukey's test ($p < 0.05$).

Results: Epoxy content increased rapidly within the first 2 h under all tested conditions. Optimal yields (~16% epoxy content; ~100% oxirane conversion) were achieved with 4.5–6.0% enzyme loading at 60 °C and prolonged reaction times slightly decreased efficiency, likely due to enzyme inactivation. Temperature significantly influenced reaction rate and yield, with 60 °C enabling high conversion in shorter durations.

Conclusion: This biocatalytic, solvent-free method provides an efficient and scalable route for oleic acid epoxidation under mild conditions. The resulting epoxidized lipids are suitable for integration into protein-based nanoencapsulation platforms, enabling the development of stable and effective delivery systems for nutrients and bioactives.

Food and nutrition-related implications: This eco-friendly strategy supports sustainable lipid modification, adds value to Canadian oilseeds, and advances functional food innovation targeting improved human health.

Keywords: enzymatic epoxidation, oleic acid, nanoencapsulation platforms

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Katlego P Makale

Title: Analysis of the Antibacterial Activities of Potential Antibiotic-Producing Bacteria and Native Plants from Botswana: An Exploratory Study in the Search for New Antimicrobial Agents

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Abstract:
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Antimicrobial resistance is a significant global health issue exacerbated by human activities, leading to longer hospital stays and higher mortality rates. Natural compounds from medicinal plants and bacteria are attractive alternatives for the development of novel antibiotics and ultimately combating antibiotic resistance. This study aimed to isolate and screen potential antibiotic-producing bacteria and indigenous plant extracts for antibacterial activities. Potential antibiotic-producing bacteria were isolated from soil and water, and four candidates, Paenibacillus elgii KM_B45, Brevibacillus laterosporus KM_C76, Paenibacillus oleatilyticus KM_D13, and Paenibacillus oleatilyticus KM_D46, were identified through Illumina shotgun sequencing. The four identified isolates exhibited 23 antibacterial biosynthetic gene clusters in their genomes, which are known to aid in antibiotic production. Medicinal plants Pterocarpus angolensis, Aloe zebrina, and Aloe littoralis were also screened for antibacterial properties. P. angolensis showed the broadest inhibition, while A. littoralis and A. zebrina exhibited the most significant inhibition with the lowest MIC of 0.075 mg/ml against S. aureus. Methanol and ethyl acetate crude plant extracts were generally more effective than water and n-hexane extracts. The results of this study represent a step forward in the search and development of new antibacterials. These findings not only highlight novel sources of antibacterial compounds but also suggest potential applications in food safety and preservation, where plant-derived and microbial-based antimicrobials could help reduce foodborne pathogens and extend shelf life while minimizing reliance on synthetic preservatives. Future experimental studies will investigate the characterization of secondary metabolites and their efficacy when used alone or in combination with existing antibiotics.

Keywords: Antimicrobial resistance, Antibiotic-producing bacteria, Medicinal plants, Natural products, Genomics, Drug discovery

Muhammad Husnain

Title: Development and Evaluation of Low-Caloric Jaman and Falsa Fruit Leather

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Abstract:
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The fruits are one of the greatest rewards of Allah. They are regarded as a complete combination of nutrients including antioxidants, microminerals, and microminerals. Jamun (Syzygium cumin) and Falsa (Grewia asiatica) are highly perishable fruits and are not widely consumed because of their limited shelf life. However, these fruits can be transformed into various value-added products to increase their shelf life and improve their availability during the off-season. Fruit leathers are thin, nutritious sheets of fruit pulp that have been dehydrated. Since consumers are moving towards low-calorie foods, adopting stevia as a sweetener will boost the market value of this low-caloric product as stevia is a natural sweetener. Five treatments were prepared by using different percentages of jamun and falsa pulp. The treatments were T1 (100% Jamun pulp), T2 (100% falsa pulp), T3, (50%Jamun pulp and 50% falsa pulp), T4. (75% jamun pulp and 25% Falsa pulp) and T5 (Jamun pulp 25% and 75% falsa pulp).

The primary goal of the current study is to develop low-calorie jamun and falsa blended fruit leather utilizing stevia instead of sugar and to test the storage stability of leather. It was kept at room temperature for 60 days. During the 60 days of storage, physicochemical, antioxidant, and sensory profiling were conducted. Low-calorie fruit leathers such jamun and falsa exhibited a decline in their phytochemical qualities, a drop in pH during storage from 3.50 to 3.12, and an increase in acidity from 0.49 to 0.61. With storage, the color values L*, b, and a* also decline. The highest color value was in T3. Total phenolic levels, FRAP, DPPH, TPC, and TFC were all measured, that are parts of the antioxidant profiling of jamun and falsa fruit leather and decreased throughout time of storage. The minerals value Fe and Ca also decreased during storage. The highest value of Fe and Ca were observed 6.75 and 16.55 of T5 and T2 respectively.

The results of the sensory research showed that among all the leather treatments, T3 was the most acceptable. During storage, the ratings for flavor, taste, and general acceptability dropped as well. The level of significance between treatment regimens was subsequently examined by statistical analysis of the data.

Camila Velez

Title: Phytotoxic Effects of Residues from Intensive Poultry Farming on Chicory (*Cichorium intybus*)

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Abstract:
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Poultry litter (PL), a residue generated by the poultry industry, is often used as an organic amendment in agricultural soils. However, it has been shown to contain antibiotics (ATB) that are not metabolized by the animals, posing environmental and human health risks, as they can accumulate in the soil and be absorbed by crops intended for human consumption. In this study, 23 ATBs were evaluated in PL using UPLC-MS/MS, and nine compounds were quantified. Enrofloxacin (ENR) was the predominant one, representing approximately 80% of the total. The efficiency of five stabilization treatments (combining cover and turning) was assessed for their ability to reduce ATB concentrations and their relationship with phytotoxicity in chicory (Cichorium intybus), through germination assays at different concentrations (10, 50, and 100 g/L). The results showed a significant reduction in ATB content after stabilization, with the uncovered pile with turning standing out, achieving an 85% removal. In the bioassays, raw PL negatively affected physiological parameters (root length, biomass, and stem development) at concentrations starting from 50 g/L, indicating phytotoxicity. In contrast, treatments with uncovered pile and turning significantly improved plant response, which correlated with lower ATB concentrations. Multivariate analysis confirmed this association between the presence of ATBs and physiological effects in the plant. It is concluded that proper treatment of PL before application as an agricultural amendment is essential to minimize the risks associated with the presence of antibiotics and optimize crop performance.

Keywords: Poultry litter, agriculture, antibiotics.

Anjali M.K

Title: Development and Characterization of Synbiotic Yoghurt Enriched with Murraya Koenigii Leaf Extract as a Natural Prebiotic

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Abstract:
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Introduction/Purpose: The increasing demand for health-enhancing dairy products has spurred the development of functional yoghurts enriched with bioactive compounds. This study investigates the potential of Murraya koenigii (curry leaf) extract as a prebiotic substrate in synbiotic yoghurt, incorporating the probiotic strains Lactobacillus acidophilus LA-5 and Bifidobacterium animalis ssp. lactis BB-12.

Methodology: Hot aqueous extract of Murraya koenigii was subjected to preliminary phytochemical screening and prebiotic potential evaluation using prebiotic activity score and prebiotic index. Identification and quantification of phenolic acids and flavonoids with prebiotic activity was done by LCMS/MS. The synbiotic yoghurt was prepared with different concentrations of the extract, and its sensory attributes, physicochemical properties, and shelf-life were analyzed. The antimicrobial and antioxidant activities of the extract were also assessed.

Results: Murraya koenigii leaf extract exhibited significant prebiotic activity with a prebiotic index of 12.5 for Lactobacillus acidophilus LA-5 and 1.3 for Bifidobacterium animalis ssp. lactis BB-12. The phenolic acid and flavonoid profile of curry leaves extract showed caffeic acid (9013.02 µg/g) and rutin (287.76 µg/g) respectively as the predominant compound. The extract showed strong resistance to acid (86.53%) and digestive enzymes (99.66%). Sensory evaluation indicated improved texture, reduced syneresis, and enhanced acceptability. Murraya koenigii leaf extract also enhanced water-holding capacity (70.5%), antioxidant activity (81.86% DPPH inhibition), and antimicrobial properties against Staphylococcus aureus and Salmonella sp. The developed synbiotic yoghurt exhibited a 21-days shelf-life at 5°C, maintaining probiotic viability above FAO/WHO and ISAPP thresholds, with no coliforms, yeast, or molds detected.

Conclusion: Murraya koenigii leaf extract is a promising prebiotic source, improving the functional properties of synbiotic yoghurt. Further in-vivo studies are required to confirm its benefits for gastrointestinal health.

Food and Nutrition-related Implications: Murraya koenigii leaf extract can contribute to the development of functional, health-promoting dairy products, offering antioxidant and antimicrobial benefits along with prebiotic effects.

Keywords: Prebiotics, Synbiotic Yoghurt, Murraya koenigii.

Sipho Tonisi

Title: Characterizing Freeze-Dried Powders from Different Parts of Opuntia Ficus Indica Cladodes: Proximate, Amino acids, and Mineral Composition for Animal Nutrition

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Abstract:
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Opuntia ficus indica cladodes are a valuable livestock feed source; however, their widespread use in animal feed is hindered by a lack of comprehensive nutritional and safety data. This study studied the proximate composition, amino acid profile, and mineral content of powdered Opuntia ficus-indica cladodes by independently analyzing freeze-dried peel, mucilage, and insoluble fiber fractions. Insoluble fiber exhibited the highest carbohydrate content (71.4%), exceeding both peel (70.23%) and mucilage (66.8%). The peel powder had the highest levels of crude protein (CP - 4.5%), crude fiber (CF - 12.2%), and fat (2%), followed by insoluble fiber. The peel exhibited high concentrations of several other amino acids, including arginine, serine, aspartic acid, threonine, glycine, tyrosine, proline, phenylalanine, leucine, histidine, and lysine, with alanine being the most abundant at 0.66g/100g. Meanwhile, mucilage powder was richer in minerals such as sodium (0.03g/kg), magnesium (19.5g/kg), phosphorus (5.51g/kg) and potassium (119.02g/kg) than the powders from the peel and fibre. The heavy metals concentration varied significantly by component (p40 mg/kg) in the peel and insoluble fiber. It can be concluded that the peel's favorable nutritional content and the mucilage's mineral composition suggest their potential as ideal feed ingredients, provided the high barium levels in the peel are managed.

Keywords: Opuntia ficus indica cladodes, amino acids, minerals

Rabia Basri

Title: Association of Ultra-Processed Food with Obesity among University Students

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Abstract:
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Background: Obesity is a growing public health concern worldwide, particularly among young adults.

Objective: This study aimed to evaluate the relationship between ultra-processed food (UPF) intake and obesity in university students in Lahore, Pakistan.

Methodology: A cross-sectional quantitative study was conducted over six months at Riphah International University. A total of 100 obese students aged 19–40 were selected through random sampling. Dietary intake was assessed using a Food Frequency Questionnaire (FFQ), and Body Mass Index (BMI) was calculated to classify obesity.

Results: The results revealed that 78% of participants were female, and 46% were either overweight or obese. A significant number of students reported frequent consumption of UPFs, including junk food and sugary beverages, at least two times per week. Findings suggest a positive association between high UPF intake and increased obesity risk.

Conclusion: In conclusion, excessive consumption of ultra-processed foods may contribute to the growing rates of obesity among university students. These results highlight the need for targeted nutrition education and interventions promoting healthier dietary choices within this age group.

Keywords: Obesity, Ultra-Processed Foods, BMI, Dietary Patterns, University Students

Noor Ul Huda

Title: Barriers to Affordable Healthy Eating Experienced by Individuals Living with Cognitive Disabilities

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Abstract:
Introduction: Approximately 2.4-5 million Canadians live with cognitive disabilities. These disabilities can create situations of disadvantage, making it difficult for individuals to independently select healthy foods and prepare nutritious meals. The goal of this study was to identify barriers to affordable healthy eating experienced by individuals living with cognitive disabilities.

Methodology: This community-based research study was conducted in partnership with the Open Collaboration for Cognitive Accessibility (Open). Two in-depth semi-structured interviews were conducted with eight of Open's accessibility testers to gain the community's insights about barriers to affordable healthy eating. Interviews were transcribed and analyzed using interpretative phenomenology, an approach that extracts meaning from a small sample.

Results: Participants reported difficulty in accessing nutritious ingredients due to cost, limited availability, and challenges navigating grocery stores and food banks. Existing nutritional tools such as recipes and websites were confusing or overwhelming, due to their complex language or lack of cognitive-friendly design. Additionally, participants reported that preparing meals independently was hindered by unclear instructions, time constraints, and limited support.

Conclusion: This project revealed recurring barriers that make affordable healthy eating within our current food system inaccessible to people with cognitive disabilities. Additional research is needed to investigate the accessibility of common healthy eating information and tools available to consumers.

Food and Nutrition-related Implications: To develop a more just and inclusive food system, adapting tools and environments can help make them more accessible to people living with cognitive disabilities. Examples include designing food-based websites, apps, and recipes for improved cognitive accessibility.

Funding: The project is funded by University of Ottawa's Community-Based Research Grant.

Keywords: Cognitive disabilities, healthy eating, accessible resources.

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Title: The Role of Nutrition in Enhancing Health Outcomes: A Review of Current Evidence

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Abstract:
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Nutrition plays a crucial role in maintaining optimal health and preventing chronic diseases. This review aims to summarize the current evidence on the relationship between nutrition and health outcomes, focusing on the impact of dietary patterns and nutrient intake on disease prevention and management. Our findings suggest that a balanced diet rich in whole foods, fruits, vegetables, and whole grains can help reduce the risk of chronic diseases such as heart disease, diabetes, and certain cancers.

Introduction:
Nutrition is a critical component of overall health, and a well-balanced diet can help prevent chronic diseases. With the increasing prevalence of diet-related diseases, it is essential to understand the relationship between nutrition and health outcomes. This review aims to summarize the current evidence on the impact of nutrition on health outcomes, focusing on dietary patterns and nutrient intake [1].

Methodology:
A comprehensive literature review was conducted using major databases such as PubMed, Scopus, and Web of Science. Studies published in English between 2015 and 2025 were included, focusing on the relationship between nutrition and health outcomes. The search terms used included "nutrition," "health outcomes," "dietary patterns," and "nutrient intake."

Results:
Our findings suggest that a balanced diet rich in whole foods, fruits, vegetables, and whole grains can help reduce the risk of chronic diseases. Specifically, the Mediterranean diet has been shown to have numerous health benefits, including reducing the risk of heart disease and certain cancers. Additionally, nutrient-dense foods such as omega-3 fatty acids, fiber, and antioxidants have been found to have beneficial effects on health outcomes [2].

Conclusion:
In conclusion, nutrition plays a vital role in maintaining optimal health and preventing chronic diseases. A balanced diet rich in whole foods, fruits, vegetables, and whole grains can help reduce the risk of chronic diseases. Healthcare professionals and policymakers should prioritize nutrition education and promotion to support healthy eating habits and improve health outcomes.

References:
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Nutricon 2025. (2025). 7th International Conference on Food, Nutrition, Health, and Lifestyle.
Some potential conferences to submit this paper to include [2] [3] [4]:
Nutricon 2025: 7th International Conference on Food, Nutrition, Health, and Lifestyle
Nutrition Society Conference 2025: Annual flagship conference of the Nutrition Society
Food Week 2025: World Summit on Food & Nutrition Technology

Kingsley Jacob

Title: Promoting Public Health Nutrition to Prevent Diet-Related Diseases in Nigeria: A Systematic Review

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Abstract:
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4th July, 2025

Introduction/Purpose:
The prevalence of diet-related diseases, especially cardiovascular diseases (CVDs), has become a major concern for the population's health in Nigeria and sub-Saharan Africa. Nutrition transition, characterized by increased nutritional concern, such as processed and energy-rich food intake, has added to the rise of non-communicable diseases. The above review paper will attempt to review the current literature regarding public health nutritional strategies, including dietary intervention, to prevent diet-related illnesses with a particular interest in Nigeria, given that the regional experience of other countries in sub-Saharan Africa will be included in the review.

Methodology:
A methodological investigation of peer-reviewed papers and the public health databases dated between 2019 and 2025 was carried out. The searched databases covered PubMed, Google Scholar, and institutional repositories. The inclusion criteria focused on identifying studies that use evidence-based approaches on the diet-related burden of the disease, plant-based diets, and nutrition-based interventions on public health. The most relevant ones are the CDC data and four empirical systematic reviews.

Results:
It has been evidenced that sub-Saharan Africa has experienced an increasing burden of CVDs, with poor dietary habits and lack of available nutrition education being the major contributors (Alhuneafat et al., 2024). Association with better cardiovascular profiles was found with plant-based diets (Lopes et al., 2022). In contrast, better health outcomes resulted from effective community-based and clinical interventions (Sanga et al., 2025). The CDC (2023) reiterates the need for reliable Public health policies that incorporate nutrition, physical activities, and obesity control.

Conclusion:
To reduce the steep increase in diet-related illnesses, there is an urgent morbid need to reinforce the plant-based dietary promotion and prevention education of the increasingly prevalent public health nutrition programs in Nigeria.

Food and Nutrition-Implications:
Major personalities combine nutrition-sensitive interventions, health system strengthening, and policy reforms that are essential in alleviating the disease burden and promoting a sustainable diet in Nigeria.

Keywords:
Public health nutrition, cardiovascular disease, Nigeria

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Uju Onuorah

Title: School Meal Programs and Nutrition Equity: Global Trends and Health Implications (2019–2024)

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Abstract:
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Introduction/Purpose:
School meal programs (SMPs) are among the world's largest social safety nets, vital for improving child nutrition, health, and educational outcomes. Yet, global disparities in coverage limit their potential to reduce undernutrition and health inequities. This study examined trends in SMP coverage across regions and income groups between 2019 and 2024, and explored policy and funding factors associated with program reach.

Methodology:
Secondary data from the Global Survey of School Meal Programmes (2019, 2021, 2024) covering 194 countries were analyzed. Variables included program availability, school enrollment, meal coverage across education levels, and funding sources. Descriptive statistics, chi-square tests, and Spearman correlations assessed disparities and relationships between SMP coverage, policy integration, and budget allocation.

Results:
Countries with active SMPs rose from 45.4% in 2019 to 65.5% in 2024. However, child-level coverage peaked at 29.2% in 2021 before declining to 15% in 2024, leaving fewer than one in five school-aged children consistently reached. Primary school students had the highest access, while preschool and secondary levels remained underserved. SMP coverage correlated positively with integration into national policies (r=0.501) and government budget allocation (r=0.416), but negatively with reliance on external funding (r=–0.375).

Conclusion:
Despite expansion, SMPs remain inequitable and insufficient to meet global child nutrition needs. Sustainable domestic financing and stronger policy integration are critical to scale coverage.

Food and Nutrition-related Implications:
Embedding SMPs in national nutrition and education systems can reduce child hunger, improve diet quality, and advance health equity, particularly for vulnerable populations in low- and middle-income countries.

Keywords: School feeding; Child nutrition; Health equity; Social protection; Global health policy

Fadi Ramadan

Title: Differential Effects of Dietary Protein Sources on Metabolic and Histological Outcomes in Metabolic Dysfunction-associated Fatty Liver Disease (MAFLD)

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Abstract:
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Introduction: Metabolic dysfunction-associated fatty liver disease (MAFLD) and insulin resistance are prevalent complications associated with obesity. While weight loss remains the primary strategy for managing MAFLD, high-protein (HP) diets may provide additional metabolic benefits by reducing hepatic fat and improving insulin sensitivity. This study evaluated the effects of HP diets from different animal and/or plant protein sources on hepatic steatosis, insulin dynamics, and related pathways in obese fa/fa Zucker rats.

Methods: Rats received HP diets (35% kcal from protein) containing egg white, plant (soy + pea protein, 1:1), mixed (egg white + soy + pea protein, 2:1:1), or casein (HPcasein) as the protein sources, or a normal-protein casein diet (NPcasein, 15% kcal) for 8 weeks. Liver samples were analyzed for triglyceride (TG) content, fibrosis, lipid droplet size, and metabolism-related proteins. Fasting blood glucose and insulin were analyzed, and pancreatic islet and adipocyte cell sizes were assessed.

Results: HPegg white, plant, or mixed diets reduced hepatic TG accumulation (2.1–3.6-fold) and liver-to-body weight ratio, despite greater weight gain. These effects were accompanied by decreased hepatic lipid droplet size, liver-fibrosis, and adipocyte size, while improving insulin sensitivity, reducing pancreatic islet size, and lowering fasting insulin. Hepatic CD36, ACC, and FAS levels increased, suggesting elevated TG synthesis, alongside upregulated ApoB-100 and MTP, indicating enhanced VLDL secretion.

Conclusions: HP diets containing egg white and/or plant-based proteins mitigate hepatic steatosis and improve insulin sensitivity through enhanced lipid export and reduced pancreatic stress, supporting dietary protein source selection as a strategy for MAFLD management.

Srabonti Saha

Title: Anti-Diabetic Effects of C. Chinense Jacq.: In Vitro and In Vivo Evidence

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Abstract:
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Introduction: The rising prevalence of type 2 diabetes worldwide highlights the importance of alternative medicine and functional foods in managing type 2 diabetes. Capsicum chinense Jacq., known for its phytochemicals, is explored for its potential antioxidant and antidiabetic effects.

Objective: This study aimed to evaluate the biochemical, histopathological, and genetic effects of C. chinense Jacq. extracts in in vivo (fructose-fed streptozotocin-induced diabetic rats) and in vitro models.

Methodology: Organic extracts (petroleum ether, ethyl acetate, and methanol) of C. chinense Jacq. were prepared and analyzed using GC-MS and LC-MS. The in vitro inhibitory activities of α-amylase and α-glucosidase were assessed, followed by in vivo experiments testing the effects of C. chinense Jacq. extracts on blood glucose, lipid profiles, liver and kidney function biomarkers, and gene expressions of antioxidative enzymes (CAT, SOD1, GPx, PFK1). Histopathological studies of pancreas, liver, and kidney tissues complemented the biochemical analyses, and network pharmacology was employed to predict compound-protein interactions.

Results: C. chinense Jacq. extracts showed a significant reduction in blood glucose levels compared to the diabetic control group (174.33 ± 6.65 vs 475.33 ± 6.65 mg/dL), improved liver and kidney function, restored tissue histoarchitecture, and increased SOD1, CAT, GPx, and PFK1 gene expressions by 45.7%, 27.01%, 20.02%, and 26.43%, respectively.

Conclusion: Overall, the findings highlight C. chinense as a promising candidate for developing functional foods to manage diabetes naturally. Thus, incorporating C. chinense into the daily diet may offer a natural and cost-effective strategy for preventing or managing type 2 diabetes and its complications.

Keywords: Capsicum chinense Jacq, Diabetes mellitus, Antioxidative genes.

Funding Source- University of Chittagong, Bangladesh.

Shanella Senadhiraja

Title: Prenatal Alcohol Exposure (PAE) Alters Maternal and Fetal Liver Lipid Metabolism and Increases Inflammation in Rats

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Abstract:
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Prenatal alcohol exposure (PAE) is a major public health concern due to its detrimental effects on fetal development and its association with fetal alcohol spectrum disorders (FASD). The liver, as a central organ for nutrient and alcohol metabolism, may play a pivotal role in mediating the effects of PAE. This study aimed to investigate the impact of alcohol consumption during pregnancy on maternal and fetal liver lipid metabolism. Pregnant Sprague Dawley rats were assigned to one of three groups: standard chow (n=11), chow with 20% ethanol (v/v, EtOH) (n=11), and chow pair-fed (n=9). On gestational day 20 (GD 20), maternal and fetal liver and plasma samples were collected for analysis of lipid metabolism and inflammatory markers. EtOH consumption increased triacylglycerol (TAG) levels in maternal livers without affecting fetal livers compared to the chow and pair-fed groups. The EtOH group showed a reduction in total phospholipids, particularly docosahexaenoic acid (DHA), in both maternal and fetal livers. Plasma levels of polyunsaturated fatty acids (PUFAs), including DHA, were also decreased in both dams and fetuses. Furthermore, inflammatory markers, TNF-α, KC/GRO, IL-6, and IL-10, were elevated in the EtOH group.
These findings demonstrate that PAE disrupts hepatic lipid metabolism and induces inflammation in both maternal and fetal livers, highlighting potential mechanisms underlying FASD and alcohol-related hepatic dysfunction. Further studies are warranted to investigate key proteins involved in hepatic DHA metabolism.

Keywords: Prenatal alcohol exposure, fetal alcohol spectrum disorder, hepatic DHA metabolism

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Rashmi Siribaddanage

Title: Broccoli Microgreens Improve Hepatic Vitamin A Levels and Reduce Adiposity in a Rodent Model of Diet-Induced Obesity

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Abstract:
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Carotenoids are plant-derived pigments and precursors of vitamin A that support vision, immune function, anti-inflammatory activity, and antioxidant defence. They also promote metabolic health by modulating adipose tissue function, reducing oxidative stress, and enhancing insulin sensitivity. The liver and adipose tissue serve as major storage sites for carotenoids and retinoids; however, their metabolism can be disrupted in metabolic disorders. Broccoli micro-greens, rich in carotenoids, glucosinolates, and sulforaphane, are nutrient-dense foods with potential to mitigate obesity-related complications. Nevertheless, their effects on vitamin A status under obesity conditions remain poorly understood.

This study investigated whether dietary broccoli micro-greens could modulate hepatic vitamin A (retinoids) levels in rodents under normal and obesogenic conditions. Male Wistar rats were randomly assigned to one of four diets: control, control + vegetables, High-fat, high-sucrose (HFHS), or HFHS + vegetables. Vegetable diets containing 10% (dry weight) air-fried microgreens (at 160 °C for 10 min). Body, liver, and adipose tissue weights were recorded, and hepatic retinyl palmitate concentrations were quantified using HPLC–DAD.

HFHS feeding significantly increased perirenal and epididymal white adipose tissue-to-body weight (BW) ratios, confirming successful obesity induction. Broccoli micro-green supplementation did not affect total BW but significantly reduced liver-to-BW and adipose tissue-to-BW ratios. Further, hepatic retinyl palmitate levels were elevated in both vegetable supplemented diet groups.

These preliminary findings suggest that incorporating broccoli micro-greens into the diet may help maintain vitamin A status and reduce adiposity, offering a practical dietary strategy to support metabolic health in obesity.

Key words: Broccoli Micro-greens, Carotenoids, Obesity, Retinyl Palmitate, Vitamin A

Ruzzell Flores

Title: Circadian Disruption Exacerbates High-Fat Diet Induced Heart Failure with Preserved Ejection Fraction

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Abstract:
Circadian Disruption Exacerbates High-Fat Diet Induced Heart Failure with Preserved Ejection Fraction
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Keywords: Circadian Rhythm, Circadian Disruption, High Fat Diet, Cardiometabolic Syndrome, Heart Failure with Preserved Ejection Fraction.

Introduction
Circadian rhythm regulates physiological processes in living organisms. Disruption of these rhythms, increases the risk for cardiometabolic syndrome (CMS). CMS is a condition characterized by insulin resistance, dyslipidemia, hypertension, and central adiposity. CMS can lead to the development of heart failure with preserved ejection fraction (HFpEF), which disproportionately affects women. This study aims to identify key genes linking circadian disruption to CMS – induced HFpEF in a sex specific manner.

Methods
C57BL/6J mice were fed high fat diet (HFD) and L – NAME for 5 weeks to induce CMS induced HFpEF, followed by 5 days of “shift work". Body weight, blood pressure and cardiac function were assessed. Hearts were collected for analysis of circadian gene expression and histological analysis. Blood samples were evaluated for glucose, insulin, lipids, cardiac biomarkers and inflammatory cytokines.

Results
Shift work exacerbated cardiovascular function in CMS induced HFpEF model When examining circadian gene levels, we found that CMS induced HFpEF mouse model had altered circadian gene expression, which was further exacerbated in response to shift work.

Food and Nutrition
The HFD used in this model mimics dietary patterns commonly observed in populations at risk of CMS and HFpEF. Consumption of HFD disrupt metabolic signaling and has been shown to disrupt circadian rhythms.

Conclusion
This study highlights the impact of circadian disruption on cardiometabolic dysfunction and its role in HFpEF development. By identifying regulatory genes affected by shift work, this research supports the development of novel therapeutic approaches to treat CMS induced HFpEF in a sex specific manner.

Amir Hossein Hassani

Title: Cornelian Cherry Reverses Gastric Intestinal Metaplasia: A New Hope in the Prevention of Gastric Cancer

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Abstract:
Amir Hossein Hassani, Seyed Mohammed Kazem Hosseini-Asl et al.

Background: Currently, there is no effective treatment for gastric intestinal metaplasia (GIM). Patients with GIM are at a higher risk of developing gastric cancer. Patients with GIM are recommended to undergo surveillance endoscopies to investigate lesion progression toward dysplasia and adenocarcinoma.

Methods: In this non-randomized clinical trial, 37 subjects with confirmed cases of GIM regardless of Helicobacter pylori infection were asked to consume 100 grams of cornelian cherries every day for two months. At the end of the study course, eight biopsies were taken from different parts of the stomach for histopathological examination. Eighteen subjects followed up after one year for endoscopy procedures and biopsy examinations.

Results: All thirty-seven patients (13 women and 24 men) completed the study. Daily consumption of cornelian cherries was tolerated well with no major side effects. Both endoscopy examinations and histological examinations revealed reversal of GIM in 82% of subjects (95%CI: 64.8%-92.0%%). Of the 18 subjects who underwent follow up endoscopy at 1 year, 15 (83%) remained GIM-free. Three patients showed persistent H. pylori infection despite receiving two courses of H. pylori eradication, one of whom responded well to Cornelian cherry and the other two showed recurrence of intestinal metaplasia.

Conclusion: Our observations suggest potential therapeutic efficacy of cornelian cherries against GIM. Additional larger randomized double blinded clinical trials are needed to better evaluate the effectiveness of cornelian cherries in the treatment of GIM and prevention of stomach cancer.

Food and Nutrition implications: this study provides a nutritional intervention that could potentially prevent gastric cancer.

Shiqi Huang

Title: Transcriptomics Reveals that Growth State and Concentration Determine how Docosahexaenoic Acid Affects Endothelial Cells

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Abstract:
Shiqi Huang, Peter Zahradka, Carla G. Taylor

The athero-protective effects of docosahexaenoic acid (DHA) remain contentious, especially after early termination of STRENGTHEN. We found DHA differentially activated endothelial nitric oxide synthase (eNOS), a feature of endothelial dysfunction, in growing versus quiescent endothelial cells. We hypothesized DHA could benefit healthy, but not dysfunctional, endothelial cells. Human EA.hy926 cells treated with DHA (0, 20 or 125 µM for 8 h) in the 2 distinct growth states were analyzed by RNA-seq. Differentially expressed genes (DEGs) related to the top 5 enriched pathways were validated by RT-qPCR and/or Western blotting. Cellular cholesterol and eNOS mRNA stability were tested. Transcriptomic profiles showed distinct groupings based on growth state and DHA concentration. Compared to control, DESeq2 identified 104 and 173 DEGs unique to growing and quiescent cells, respectively, at 20 µM DHA, and 2379 and 1651 DEGs, respectively, at 125 µM DHA. These DEGs were subjected to pathway analysis. The top 5 included steroid metabolism pathways, particularly cholesterol biosynthesis. HMGCR, SREBF2, and INSIG1 were downregulated in quiescent cells only by 20 µM DHA. DHA reduced cellular cholesterol, like atorvastatin. Moreover, Rho GTPase genes, downstream of HMG CoA reductase, were downregulated only in quiescent cells, translating to DHA-induced reductions in RhoB levels, but not RhoA or RhoC. Also, eNOS mRNA stability, affected by Rho, was enhanced by DHA. Our study reveals only quiescent endothelial cells respond positively to DHA. This novel perspective implies applications employing DHA should take subjects' endothelial health into consideration and further testing is needed to resolve DHA's athero-prevention-versus-treatment effects.

Keywords: DHA, endothelial cells, atherosclerosis

Molly Crandall

Title: Loss of Circadian Period Gene Increases Cyp7A1 and Bile Acid Mediated Cardiac Cell Death Following Ischemia-Reperfusion in Cardiac Myocytes

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Abstract:
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Keywords: circadian rhythm, bile acid metabolism, cardiovascular

Introduction: Circadian rhythm is a potent regulator of bile acid (BA) synthesis, controlling nutrient availability in a time-of-day dependent manner. Digestion and absorption of nutrients occurs via BAs whose synthesis occurs through the enzymatic oxidation of cholesterol via circadian-regulated rate limiting enzyme, cholesterol 7alpha-hydroxylase (CYP7A1). Circadian misalignment contributes to several pathologies including obesity and cardiovascular disease. Interestingly, loss of circadian negative regulators Period 1/2, causes abnormally high levels of CYP7A1. Elevated levels of specific BAs risk becoming cytotoxic, especially upon circulation to cardiac tissue. Therefore, individuals with disrupted circadian rhythms, namely shift workers, may have greater risk of cardiovascular disease from abnormal levels of CYP7A1.

Methods/Results: Germ-line double knockout of Period 1 and Period 2 in mice led to increased body weight and with post-ischemic reperfusion (I/R) injury, heart weight/body weight ratio was elevated. I/R injury and loss of Period genes promoted alterations in cardiac lipid storage, abnormal bile acid circulation, and increased cardiac expression of CYP7A1. Cardiomyocytes treated with the overrepresented taurocholic acid induced mitochondrial defects and cell death.

Conclusion: We reveal a novel signaling axis that functionally connects circadian regulated Cyp7A1-bile salt production to cardiac injury following myocardial infarction.

Food and Nutrition-related Implications: The circadian clock drives daily eating patterns. Food consumption at inappropriate times, like at night, disrupts circadian rhythm, and leads to alterations of circulating bile acid pool composition and concentrations. Therefore, incorrect timing of meals causes circadian defects leading to appearance of high levels of harmful bile acids in the heart, potentially worsening cardiac injury.

Portia Adams

Title: Traditional and Indigenous Foods as Pathways to Improved Nutrition: Recipe Documentation and Standardization in Northern Ghana

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Abstract:
Introduction
Traditional and indigenous foods are central to dietary diversity in Ghana. However, overreliance on staple cereals and tubers has contributed to micronutrient deficiencies, particularly among children under five and women of reproductive age (WRA). Underutilized nutrient-dense crops such as millet, Bambara beans, moringa, baobab, and yam have significant potential, but their culinary applications remain underexplored. This study aimed to document, standardize, and nutritionally enhance traditional dishes prepared from indigenous crops in Northern Ghana.

Methodology
Research was conducted in Saboba District using a mixed-methods design. Ethnographic interviews, focus group discussions, key informant interviews, and direct observations were employed to document recipes, ingredients, preparation techniques, and cultural practices. Participants included community elders, WRA, and food vendors to ensure both cultural authenticity and nutritional relevance.

Results
A comprehensive recipe database of over thirty traditional dishes was developed. These included one-pot meals (tubaani, yam pottage, wasawasa), accompaniments (tuo zaafi, rice balls), soups and stews (groundnut, baobab leaves, sesame-based), porridges, snacks, and beverages (soybean drink, baobab fruit drink). The recipes highlighted both the nutritional richness of indigenous crops and variations in preparation methods that inform future standardization.

Conclusion
The initial database provides a critical foundation for recipe standardization and nutritional analysis. Documenting these foods preserves cultural heritage while contributing to improved dietary quality and sustainable food systems.

Food and Nutrition-related implications:
This work supports strategies to reduce malnutrition, promote dietary diversity, and guide interventions utilizing nutrient-dense indigenous crops.

Keywords: Indigenous foods; Recipe standardization; Nutrition enhancement

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Elizabeth Alagbe

Title: Nutritional Properties of Low-Lactose Laban (yogurt) Made from Camel Milk.

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Abstract:
Camel milk is increasingly recognized for its nutritional and therapeutic value, particularly in regions where conventional dairy is less tolerated. This study aimed to assess the nutritional properties of a low-lactose laban drink developed from camel milk yogurt, with a focus on its potential benefits for lactose-sensitive populations.

Raw camel milk was sourced from Marmouri and Guerzni breeds in the Laayoune region of southern Morocco. The milk was fermented to produce yogurt and analyzed in triplicate. The parameters measured included fat, protein, solids-not-fat (SNF), lactose, inorganic salts, water admixture, ice point, density, temperature, pH, and conductivity.

The results showed a notable reduction in lactose content from 4.13% in raw milk to 3.33% in the yogurt-based laban drink. Protein content increased slightly from 2.74% to 2.88%, while fat content decreased marginally. The SNF rose from 7.41% to 7.81%, and the pH dropped from 6.16 to 4.21, indicating successful fermentation. Additionally, conductivity increased from 8867.83 µS/cm in raw milk to 13292.43 µS/cm in the yogurt, suggesting a higher concentration of ions post-fermentation.

These findings highlight the effectiveness of fermentation in reducing lactose while improving certain nutritional attributes of camel milk. The resulting laban drink demonstrates enhanced digestibility and potential functional benefits, making it a suitable dairy alternative for individuals with lactose intolerance.
This study supports the development of culturally relevant, health-promoting dairy products in arid regions and contributes to the growing body of evidence highlighting the nutritional versatility of camel milk.

Keywords: camel milk, lactose intolerance, laban drink

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Nayra Luz Alvarino-Molina

Title: "Suero Costeño": Gastronomic Heritage of the Colombian Caribbean and its Nutritional and Functional Value

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Abstract:
Nayra Luz Alvarino Molina, Omar Pérez Sierra, Maryoris Soto López

Introduction/Purpose
Suero costeño (SC) is a traditional fermented dairy product from the Colombian Caribbean, made from raw cow's milk or other species. Its spontaneous fermentation, driven by native microbiota, lowers pH and induces phase separation, resulting in a creamy, acidic, salted product widely used in local cuisine. This review critically examines scientific evidence on its nutritional value, functional properties, and potential health benefits.

Methodology
A narrative review was conducted using Scopus, PubMed, SciELO, and Google Scholar. Keywords included "suero-costeño," "fermented-dairy-products," "probiotic-function," and "nutritional-composition." Studies published between 2000-2025 in Spanish or English addressing composition, functional properties, or nutritional implications were included.

Results
SC averages 75% moisture and 4–8% high–biological-value protein, with a balanced essential amino-acid profile and favorable protein quality indices (PER 2.9; digestibility 78%; NPU 54.6%; BV 0.70)(Acevedo et al., 2018; Granados Conde et al., 2012; Simanca et al., 2010). Fat (5–14%) presents a balanced lipid profile, dominated by saturated fatty acids (≈60–69%, mainly palmitic and myristic), medium monounsaturated (≈26–36%) and low polyunsaturated, particularly omega-3 (<1%), with atherogenic (~1.9) and thrombogenic (~2.6) índices. (Muñoz-Acevedo et al., 2025). Calcium and chloride predominate among minerals (Cruz, 2006; Farelo De La Hoz, 2012; Pimienta & Vergara, 2007; Simanca et al., 2010). Fermentation yields diverse lactic acid bacteria—Lacticaseibacillus casei, L. paracasei, L. rhamnosus, Lactiplantibacillus plantarum, Lactococcus lactis, among others—and yeasts such as Kazachstania servazzii and Kluyveromyces lactis (Cruz, 2006; Cueto et al., 2007; Farelo De La Hoz, 2012; Gutierrez Castañeda et al., 2025; Motato et al., 2017; Pimienta & Vergara, 2007; Simanca et al., 2010). Several strains tolerate gastrointestinal conditions, adhere to intestinal mucus, and inhibit pathogens like Listeria monocytogenes and Salmonella Typhimurium, meeting probiotic criterio (Cueto-Vigil et al., 2010; Motato et al., 2016).

Conclusion and Food and Nutrition-related implications
SC's protein quality, characteristic lipid profile, mineral content, and probiotic microbiota support its classification as a functional food. While clinical evidence remains limited, moderate consumption within a balanced diet may contribute bioactive compounds, energy, and distinctive flavor, reinforcing its role in the Colombian Caribbean's gastronomic heritage.

Key words
"Suero costeño", "traditional fermented dairy product", "nutritional and functional value"

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Esther Kilanko

Title: Nutritional Composition of Gluten-free Pasta from Provitamin A Cassava (Manihot esculenta Crantz) and Bambara nut (Vigna subterranean) Flour Blends

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Abstract:
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Pasta is popular and offers several important advantages including: wide consumption, relatively long shelf-life, good eating quality and high palatability. It is typically high in carbohydrate but low in protein and Vitamin A content. This study investigated the nutritional qualities of pasta produced from high quality Provitamin A Cassava and Bambara nut composite flour blends.

Flour blends were prepared using mixture experimental design. Pasta was produced from the desirable blends. Proximate, anti-nutrient, antioxidant, ferric reducing antioxidant power (FRAP), beta carotene and sensory attributes of the pasta were investigated.

Mixture design gave 14 runs but the desirable blends were 100% Provitamin A Cassava flour. Bambara nut flours at 90:10, 80:20, 70:30, 60:40%. Moisture (9.83-11.83%), protein (1.83-6.17%), crude fat (0.34-1.13%), crude fibre (0.16-0.55%) and carbohydrate contents (80.02-85.31%) were significantly different ($p<0.05$). Anti-nutrient content (phytates, tannin and hydrocyanide) of pasta were significantly different (p0.05). A significant decrease in Beta carotene content (3.65-5.43%) was observed with the addition of Bambara nut flour. Overall acceptability of experimental pasta samples (4.33-6.20) varied significantly.

This study improved the value addition of Provitamin A Cassava and Bambara groundnut flours which could have significant applications in the food industry, especially for pasta consumers with gluten-free preferences. Formulation of gluten-free meals based on Provitamin A and Bambara nut improves nutritional content and aids the prevention of immunological reactions and digestive discomfort in celiac and non-celiac disease patients respectively.

Keywords: Gluten-free Pasta, Provitamin A Cassava, Bambara nut

Colleen Rogers

Title: Exploring the Role of Spirituality in Type 1 Diabetes: A Grounded Theory Study

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Keywords: Diabetes, Spirituality, Culture

Introduction/Purpose:
Type 1 diabetes (T1D) is a complex and demanding condition that requires a holistic approach to providing meaningful and effective support. Recent studies have identified spirituality as a key sociocultural factor influencing health outcomes. However, there is insufficient evidence to integrate it into standardized care guidelines. Certified Diabetes Educators (CDEs) are concerned not only with responding to diabetes-related matters but also with optimizing health and abilities. Promoting one's spirituality within this paradigm is a way to enhance health.

Methodology:
This constructivist grounded theory study aims to explore how a group of adults with T1D perceive the impact of spirituality on their wellness and self-management behaviours related to diabetes. To explore this phenomenon, the study will address five research questions: (a) How does T1D affect the participants' lives? (b) What do the participants identify as sources of motivation for adhering to diabetes self-management behaviours? (c) What do the participants view as sources of strength and hope? (d) How do the participants perceive the impact of spirituality on their diabetes self-management, and if so, what are their personal spiritual practices? (e) To what extent do participants feel a need for spiritual support during their diabetes appointments, and if so, how could the CDE provide that support?

Food and Nutrition-related implications:
This study aims to develop a theoretical model explaining the relationships between spirituality, wellness, and diabetes self-care behaviours. The researchers believe that deepening the understanding of this phenomenon will enable CDEs to provide education and support from a more informed, person-centred perspective.

Drupat Sharma

Title: Safety and Tolerability of Daily Wild Rice Consumption in Healthy Young Adults

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Abstract:
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Background: Wild rice is one of the oldest crops grown in Manitoba and the staple food of Indigenous people. Our animal studies have revealed cholesterol-lowering and anti-atherogenic properties of wild rice in LDL-receptor knockout mice. A demonstration of such effects of wild rice in humans warrant well-designed clinical investigations. Thus, we have designed Phase-I and Phase 2 clinical studies to demonstrate safety and efficacy of daily consumption of wild rice in humans. Here we report the preliminary data of our Phase-I clinical study.

Methods: Through local advertisements healthy male and female volunteers aged between 20-40 years were screened and recruited to participate in this study. The following samples and data were collected at the baseline and end of the 4-week intervention period: systolic and diastolic blood pressures, mean arterial pressure, body composition and BMI, blood, urine and fecal samples. Plasma samples were prepared and used for lipid analysis. A complete urinalysis test was performed using a commercially available kit.

Results: Eight male and nine female subjects completed the study. The average age of the male and female study participants was 32 and 27 years, respectively. The BMI was 24 and 23, in the male and females, respectively, at baseline, which did not change at the end of the study. No significant effects of daily consumption of wild rice on various parameters measured . However, we noticed differences in values between male and female individuals. All male and female subjects tolerated the meals containing wild rice very well with 0% drop out.

Conclusion: A daily consumption of 30 grams of wild rice for 28 days is well-tolerated in healthy young women and men.

Keywords: Wild rice, Cardiovascular health, clinical trial

Francesca Vurro

Title: Acorn: From Famine Food to a Functional Option

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Abstract:
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The practice of balanophagy has been documented since prehistoric times, particularly during periods of famine and warfare. Acorns from different Quercus species were an accessible, available and nutritionally valuable resource, primarily composed of carbohydrates, fiber and bioactive compounds, such as phenols and tocopherols. In the Mediterranean Basin, acorns were consumed roasted, as a coffee substitute, and in salty and sweet bakery products. In light of the historical and ethnocultural context, this research aims to enhance the added value of acorns by incorporating them into focaccia, a traditional Italian garnished flat bread. This product is recognized for its historical significance, production versatility, and capacity to meet the local needs and integrate alternative ingredients. The aim was to improve its nutritional profile, bioactive compound content, and physical properties. Two substitution levels - 15% and 30% acorn flour - were evaluated and compared to a wheat-based control formulation. Acorn flour increased the fiber content. In fact, the formulation containing 30% of acorn flour was a “source of fiber" (> 3 g/100 g), according to Reg. EU 1924/2006. Both acorn-enriched samples had a low predecited glycemic index (pGI) and were characterized by the presence of phenols, carotenoids, and significantly higher antioxidant activity compared to the control. Acorn flour influenced the color, imparting a brown hue, and the texture of focaccia, resulting in a denser crumb, due to gluten dilution. Overall, acorn focaccia represents a bridge between the past and the future, offering a promising strategy to promote the revival of acorns by combining tradition, innovation and sustainability.

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Keywords: Quercus ssp.; flat bread; functional food

Tadesse Fenta Yehuala

Title: Fermentation Kinetics and Effects on Antinutrients in Pearl Millet-Based Dough Recipes used to Prepare Injera

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Abstract:
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Pearl millet is rich in important nutrients with potential health and nutrition benefits, while it contains antinutrients that limit the bioavailability of minerals and the digestibility of starches and proteins; however, fermentation is believed to reduce these antinutrient levels. The objective was determining fermentation kinetics and its implications for changes in antinutrients in pearl millet-based dough recipes used to prepare injera, a traditional fermented staple flatbread consumed in Ethiopia. Three dough recipes identified through FGD with women from Dangeshita sub-district, Ethiopia: pure pearl millet (P), a 1:1 mixture of pearl millet and maize (P1M1), and 1:2 mixture of pearl millet and maize (P1M2) doughs. Significant decreases in pH were observed after 48 hours of fermentation. Counts of aerobic mesophilic bacteria and molds decreased, while counts of yeasts and lactic acid bacteria (LAB) increased at the later stage of fermentation across dough recipes. A two-step fermentation process characterized by both lactic acid and alcoholic fermentation was identified, yielding lactic acid and mannitol as primary end products. Phytate was degraded by 91.3% in P, by 98.2% in P1M1, and by 72.7% in P1M2 doughs after 168 hours fermentation. All fermented dough recipes resulted in reduced levels of raffinose at the later stages of fermentation with the highest degradation noted in P dough (95%) followed by P1M1(87.7%), and P1M2(80.8%) dough. In conclusion, seven days fermentation resulted in significant reductions of phytate and raffinose in P dough and P1M1 dough. Consequently, injera prepared from these recipes can be beneficial for the community due to their lower antinutrient concentrations.
Keywords: Pearl millet, phytate, and fermentation

Chandrika Chaturvedi

Title: Antioxidant Capacity and Anti-Elastase Activity of Glucosinolate and Sulforaphane-Rich Broccoli Extract

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Abstract:
Antioxidant capacity and anti-elastase activity of glucosinolate and sulforaphane-rich broccoli extract
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Managing vegetable waste is a growing global concern in agriculture industry, especially with high-loss crop like broccoli, which generate significant waste across the supply chain. Broccoli waste is rich, yet underutilized source of health-promoting bioactive phytochemicals such as glucosinolates and isothiocyanates. Therefore, this study aimed to optimize the extraction conditions to recover sulforaphane using ultrasonic-assisted extraction (UAE). Total glucosinolate content (TGC) was determined spectrophotometrically, while individual compounds (sulforaphane, glucoraphanin and glucobrassicin) were quantified using ultra-performance liquid chromatography-electrospray tandem mass spectrometry (UPLC-ESI-MS). The optimized UAE conditions (25% ethanol, 41 °C, 32 min), provided a predicted yield of 46633 µg sinigrin equivalence/g dry weight (DW) based on spectrophotometric analysis. UPLC-ESI-MS confirmed comparable optimal conditions (23.23% ethanol, 36 °C, 38 min), resulting in 384 µg sulforaphane/g DW. Among the different extraction methods tested, UAE 25% ethanol provided the highest TGC, FRAP, and ORAC values (35547.5 ± 1262.6 µg sulforaphane/g DW, 21.2 ± 2.6 µmol Trolox equivalents/g, 156.3 ± 15.2 µmol Trolox equivalents/g) respectively. Anti-elastase activity was highest in shaker extract (IC50: 0.62 ± 0.26 mg/mL), followed by UAE 25% ethanol (IC50: 0.85 ± 0.05 mg/mL). These findings demonstrate the potential of UAE combined with food-grade ethanol as a green and selective technique to recover compounds from broccoli florets for possible cosmeceutical applications.

Keywords - Broccoli, ultrasonic-assisted extraction, Glucosinolates, sulforaphane, food waste, green extraction, nutraceuticals.

Ishika Mittal

Title: Association of Fontan Circulation with Gut Microbiome Derived Straight and Branched Short Chain Fatty Acids.

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Abstract:
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Background: The Fontan circulation, a surgical palliation for single-ventricle congenital heart disease, is associated with progressive multisystem dysfunction. However, the underlying biochemical mechanisms remain poorly understood. Gut microbiota-derived metabolites, particularly short-chain fatty acids (SCFAs) and bile acids play significant roles in cardiovascular health. While our previous research identified elevated secondary bile acids in Fontan patients, the profile of SCFAs in this population has not been characterized.

Materials and Methods: Fontan patients and matched healthy subjects were evaluated by body composition, frailty, cardiopulmonary exercise testing, hemodynamics, and plasma SCFA quantification.

Results: Twenty Fontan patients (28.8 ± 9.8 years of age; 35% women) and 20 healthy controls (29.7 ± 6.0 years of age; 30% women) were enrolled. Compared to controls, Fontan patients exhibited significantly elevated plasma levels of several SCFAs: propionic acid (1.84 [1.45–2.68] vs. 1.19 [1.07–1.49] μM; $p = 0.002$), butyric acid (1.27 [0.90–1.71] vs. 0.75 [0.52–0.94] μM; $p = 0.002$), valeric acid (0.25 [0.15–0.36] vs. 0.13 [0.11–0.16] μM; $p < 0.001$), and caproic acid (0.44 [0.35–0.67] vs. 0.25 [0.21–0.39] μM; $p < 0.001$). Acetic acid levels did not differ significantly between groups. Additionally, branched-chain SCFAs were elevated in Fontan patients: isobutyric acid (0.44 [0.32–0.68] vs. 0.26 [0.23–0.30] μM; $p < 0.001$) and 2-methylbutyric acid (0.38 [0.27–0.58] vs. 0.19 [0.15–0.25] μM; $p < 0.001$). Notably, caproic, isobutyric, and 2-methylbutyric acids showed strong correlations with key clinical and hemodynamic parameters. Furthermore, isobutyric and 2-methylbutyric acids were significantly correlated with dehydrolithocholic acid levels ($R = 0.67$ and 0.54, respectively) and other bile acid components.

Conclusion: This study demonstrates that Fontan patients have elevated plasma levels of specific straight and branched SCFAs, which are associated with adverse clinical and hemodynamic profiles. Such findings warrant further evaluation.

Anwar Rovik

Title: New Brews for Prevention: Exploring the In Silico-Predicted Chemopreventive Effects of Tea Catechins on Colon Adenocarcinoma

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Abstract:
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Colon adenocarcinoma, the second leading cause of cancer-related mortality worldwide, urgently necessitates the development of effective prevention strategies, particularly through plant-based interventions. This study, aligned with the need for novel chemopreventive agents derived from food sources, employed an in-silico approach to evaluate the potential of tea catechins, naturally occurring bioactive compounds abundant in tea, against colon adenocarcinoma. We utilized computational methods, including molecular docking and protein-target interaction analysis, to predict specific tea catechins capable of interacting with key protein targets in colon cancer. Our study revealed that epicatechin-3-gallate, epigallocatechin-3-gallate, and epigallocatechin exhibit promising predicted binding affinities to six crucial proteins implicated in colon cancer progression: AURKA, CA9, SERPINE1, MET, SQLE, and VEGFA. The protein network analysis further demonstrated strong interconnectivity among these targets and other proteins within human cancer cells, suggesting a broad impact on critical cellular pathways, specifically in cancer development, invasion, and metastasis. These in silico findings highlight the potential of readily available dietary components such as tea catechins, particularly epigallocatechin-3-gallate (EGCG), as accessible chemopreventive agents against colon adenocarcinoma by targeting multiple key proteins and pathways. This research underscores the importance of exploring the bioactive constituents of common foods for cancer prevention and warrants future studies focusing on in vitro and in vivo validation of these predicted effects, as well as investigating optimal consumption strategies for maximizing their potential health benefits.

Keywords: chemopreventive; colon cancer; EGCG; ethnopharmacology; tea catechin

Carla Navarro Molina

Title: High-protein Functional Crackers with Rhodiola Rosea: Impact on the Microstructure and Bioaccessibility of Bioactive Compounds

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Abstract:
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Consumers increasingly seek convenient, healthy snacks with innovative flavors and enhanced nutritional profiles. In this context, baked crackers are gaining popularity as a versatile snack but from a nutritional perspective have low protein content. Incorporating pulse protein isolates offers a plant-based, nutritious alternative. Additionally, adaptogenic roots such as Rhodiola rosea (RR) present a promising option for developing functional, health-promoting foods. This study aimed to develop high protein enriched crackers made with lupin (LuPI) and pea (PPI) protein isolate containing RR root powder and examine how cracker microstructure is affected and the ensuing effects on in vitro bioaccessibility of RR bioactive compounds. Bioactive compounds were quantified and proximate composition, microstructure of the crackers and the in vitro bioaccessibility were analyzed. Cracker protein content ranged from 42 to 52 g/ 100 g cracker, while fat content was higher in LPI_control cracker (8.4 g/ 100 g cracker). PPI_control crackers had a discontinuous structure characterized by the formation of a protein network enveloping starch granules while LuPI_control cracker microstructure appeared to be continuous and compact. RR addition led to a denser and more cohesive structure in LuPI cracker. Significant differences were observed in salidroside and rosavin content, as compared to the rest of bioactive compounds. Furthermore, salidroside (17%), rosarin (56%) and rosavin (16%) shown higher bioaccessibility in LuPI_RR cracker. Therefore, the study demonstrates the potential use of RR root powder for developing functional plant-based high protein crackers with preserved structural integrity.

Keywords: pulse protein isolates, Rhodiola rosea, in vitro bioaccessibility

Hrishikesh Patil

Title: Bibliometric and Systematic Analysis of Protein-Polysaccharide Complexes for Bioactive Food Delivery

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Abstract:
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The effective incorporation of bioactive compounds into food systems is often limited by their poor water solubility, susceptibility to degradation, and low bioavailability. Protein-polysaccharide nanocomplexes have emerged as promising, food-grade delivery systems to overcome these challenges. This study provides a comprehensive bibliometric and systematic analysis of the research landscape from 2014 to 2025, using data from the Web of Science Core Collection. Our analysis comprises 381 publications from the initial search, with 258 publications (223 articles and 35 reviews) included in the final analysis, to identify key trends and research gaps. This study also reveals a rapid and continuous growth in publications and citations since 2020, with a major spike in citations in 2024, highlighting this field's transition into a highly active research area. Thematic mapping identified a core focus on nanoparticles, encapsulation, bioavailability, and specific model compounds like curcumin. The analysis also revealed a shift from foundational studies to more applied research, particularly concerning oral delivery, Pickering emulsions, and the use of plant-based biopolymers in response to sustainability trends. Furthermore, the bibliometric review underscores the need for more in vivo validation, toxicological and safety assessments, and viable scale-up strategies for industrial translation. The findings indicate a potential for these nanocomplexes in developing functional, clean-label foods, valorizing agro-industrial byproducts, and advancing the principles of a circular bioeconomy.

Keywords: Functional foods, Nano-nutrition, Plant-based food

Giusy Rita Caponio

Title: Functional Bakery Products with Enhanced Fiber and Antioxidant Activity: A Novel Approach to Healthy Snacking

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Abstract:
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The food industry is increasingly focused on developing functional foods that offer high nutritional value and health benefits [1]. In this context, a portion of whole durum wheat semolina was replaced with Pleurotus eryngii powder (PeP) at concentrations of 5% and 10% (w/w) to produce two variants of taralli, TPE5 and TPE10, respectively. Pleurotus eryngii is rich in protein, essential minerals, fiber (β-glucans), and antioxidants, which are associated with potential health advantages such as anticancer properties and inflammation modulation [2]. The impact of PeP on the technological, chemical, physical, and sensory properties of taralli has been evaluated. Nutritionally, the inclusion of PeP in the taralli enhanced the total dietary fiber, meeting the “high fiber content” criteria of Regulation 1924/2006, while improving the total phenol content. This increase is mainly due to the presence of polysaccharides in cereals and mushrooms, particularly β-glucans [3]. The higher fiber and polyphenol content in the enriched samples contributed to a significant reduction in the predicted glycemic index. Experimental evaluations using HCT8 human colon carcinoma cells highlight the antioxidant potential of PeP-enriched taralli, showing a significant decrease in intracellular ROS levels. Additionaly, TPE5 exerted beneficial effects by reducing inflammation as demonstrated by a significant reduction in phosphorylation of NFkB at serine 536 and promoting apoptosis. These effects are likely mediated by regulation of intracellular oxidative states. Overall, these results indicate that enrichment with PeP improves the nutritional profile of taralli and offers potential health benefits, reinforcing its role as a valuable functional ingredient.

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Valeria Valderrama Sánchez

Title: Evaluation of the Hypocholesterolemic Activity of Soluble and Insoluble Fiber from Amaranth Cookies through Bile Salts Binding Assays

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Abstract:
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Amaranth (Amaranthus spp.) is a pseudocereal recognized for its high content of proteins, bioactive compounds, and dietary fiber, conferring potential as a health-promoting food. Both dietary fiber and bioactive peptides can bind to bile acids through physicochemical mechanisms that enhance their fecal excretion and stimulate the conversion of hepatic cholesterol into new bile acids, thereby contributing to the reduction of serum cholesterol. This study aimed to evaluate the interaction capacity of dietary fiber and peptides from cookies made with amaranth flour with four bile salts. For this purpose, the cookies were subjected to simulated gastrointestinal digestion following the protocol described by Minekus (2014), to obtain the soluble (bioaccessible) fraction. Soluble and insoluble fiber fractions were also isolated using the Megazyme Total Dietary Fibre kit. Binding capacity was evaluated against solutions of bovine bile, sodium taurocholate, sodium deoxycholate, and sodium cholate (0.5 M) using the Diazyme Dzoyza enzymatic kit, which quantifies the fraction of bile salts not retained after contact with the samples. Cookies contained 4.9% total fiber (4.3% insoluble, 0.6% soluble). Although insoluble fiber predominated, the soluble fraction exhibited the highest affinity for bovine bile and bile salts, with binding percentages of 62-73% relative to the positive control (cholestyramine). Similar values were observed for the bioaccessible fraction (46-74%). In contrast, the insoluble fiber fraction showed significant interaction only with sodium deoxycholate (38%) and bovine bile (34%). These findings indicate that amaranth-based cookies possess potential hypocholesterolemic activity, supporting their inclusion in commonly consumed foods aimed at the prevention of non-communicable diseases

Xiaohang Zou

Title: Comparative Evaluation of Dough Rheology, Bread Characteristics, and In Vitro Starch Digestibility in Common and Purple Wheat Bread

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Abstract:
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Wheat, a staple food rich in starch, significantly impacts post-meal glycemic responses. Recently, colored wheats like purple wheat have gained interest for their high levels of polyphenols and dietary fiber, enhancing nutritional benefits. This study compared common and purple wheat regarding dough rheology, bread quality, and in vitro starch digestibility to evaluate their potential for functional bread products.

The Mixolab analysis revealed that dough made from purple wheat had a development time of 5.5 minutes, compared to 3.5 minutes for common wheat. Additionally, it exhibited a higher water absorption rate of 69.8%, compared to 65.3% for common wheat. This suggests that purple wheat has stronger gluten development and better hydration properties.

Bread made from purple wheat displayed increased crumb hardness and chewiness. In terms of color, the purple bread had lower lightness and yellowness but higher redness, which could be attributed to the presence of anthocyanins. Regarding in vitro starch hydrolysis, purple wheat bread contained less rapidly digestible starch (RDS) (25.03 g/100 g) and resistant starch (RS) (8.41 g/100 g), but more slowly digestible starch (SDS) (45.42 g/100 g) than common wheat bread, which had 37.52 g/100 g RDS, 38.53 g/100 g SDS, and 9.99 g/100 g RS. Overall, purple wheat offers potential as a functional bread ingredient with improved nutrition and lower glycemic impact, along with unique texture and color.

Keywords: bread quality, dough rheology, in vitro starch digestibility, purple wheat

Jordan Charney

Title: Contribution of Arachidonate Lipoxygenases (ALOX) to Biological Actions of Dietary Polyunsaturated Fatty Acids (PUFA)

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Abstract:
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Funding source: CIHR

Keywords: ALOX, EA.hy926 cells, primer design

Introduction/purpose: The human genome contains six lipoxygenase (ALOX) genes (ALOXE3, ALOX5, ALOX12, ALOX12B, ALOX15, ALOX15B), but how their expression is regulated and their role in endothelial cells lining the blood vessel wall is poorly understood. Since animal studies have shown that high PUFA diets increase ALOX levels, it is likely that ALOX genes are responsive to several different cues, including cell type, growth status and extracellular mediators. Given that appropriate RT-PCR primer sequences are rarely reported, human-specific primers must be designed and tested for this purpose. The goal of this research project is to establish which ALOX genes are active in human endothelial cells under different growth conditions.

Methodology: ALOX primers were designed based on existing guidelines using Primer3web. Primer efficiency was determined using RT-qPCR, with agarose gels confirming band size. Total RNA will be prepared from human EA.hy926 endothelial cells in growing and quiescent states.

Results: ALOX5 and ALOX15B primers were the only ones to yield efficiencies of 99% and 100%, respectively. All others were not within the desirable range (90-110%). However, these primers were not usable due to non-linear relationship when assessing slope and non-specificity based on agarose gel electrophoresis.

Conclusion: Designing efficient ALOX primers remains challenging due to issues with dimers, enzyme isoforms, and specificity. Further design and refinement are required. Food and nutrition-related implications: The generation of oxylipins from dietary PUFAs has been shown to improve cardiovascular health, however, little information is currently available about the cellular and tissue distribution of ALOXs that catalyze these reactions.

Mohammed Salman C K

Title: Synergistic MXene–Metal Oxide Nanohybrids and Machine Learning for Predictive Nutritional Modeling of Glycemic Index

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Abstract:
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The global rise of diabetes, currently affecting over 537 million adults, highlights the critical role of dietary strategies such as low Glycemic Index (GI) foods in maintaining metabolic health. Accurate determination of GI is essential for guiding nutritional recommendations and functional food development; however, in vivo testing, though considered the gold standard, is costly, time-consuming, and constrained by ethical considerations. To address this limitation, we developed a high-throughput in vitro protocol for rapid and precise GI prediction. Comparative evaluation of six established methods enabled identification and optimization of the most effective approach, achieving strong predictive accuracy (MAE 0.81, RMSE 0.89) while lowering per-sample costs by 37-fold. Validation with 53 rice accessions revealed predictive GI (pGI) values ranging from 46.98 to 87.26 and Inherent Glycemic Potential (IGP) values between 23.27 and 44.01. To enhance glucose detection in complex digesta, we further developed a non-enzymatic electrochemical nanosensor based on V_2O_5–Ti_3AlX_2 (MXene) nanohybrids. The sensor exhibited high selectivity, with performance confirmed through SEM-EDS and EIS analyses, and showed strong correlation with conventional colorimetric assays ($R^2 = 0.857$). Integration of machine learning models, including decision trees ($R^2 = 0.991$) and random forests ($R^2 = 0.984$), further improved predictive robustness. Importantly, this study established the first significant correlation between pGI and IGP, providing a new framework for nutritional evaluation. Overall, the integration of optimized in vitro digestion, nanosensor technology, and AI offers a rapid, cost-effective strategy for advancing low GI food design and supporting dietary management of metabolic health.

Keywords: Glycemic Index, Electrochemical Sensor, Machine Learning

Dinushi Gamage

Title: Microencapsulated Fermented Wild Blueberries Attenuate Diet-Induced Lipid Dysmetabolism

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Abstract:
Medical management of metabolic syndrome often has limited efficacy and adverse effects, whereas food bioactive-rich dietary interventions, such as anthocyanins of wild blueberries offer safer alternatives. However, the instability of these bioactive compounds restricts their effectiveness. In this context, fermentation can enhance bioactive diversity and efficacy, while microencapsulation improves their stability. Hence, we hypothesized that microencapsulated fermented wild blueberries could reverse the signs of diet-induced metabolic syndrome in mice.

Wild blueberries were sequentially fermented with Saccharomyces cerevisiae and Komagataeibacter spp., then microencapsulated with inulin and maltodextrin (1:1 w/w) via spray-drying (4:1 w/w). Male C57BL/6J mice on a high-fat, high-sucrose diet received fermented, non-fermented, or microencapsulated fermented wild blueberries (416 mg gallic acid equivalents/kg body weight/day) for 22 weeks. Controls included chow-fed and high-fat, high-sucrose-fed non-supplemented groups.

Microencapsulated fermented wild blueberries reduced food and energy intake, body weight gain (−13%), total body fat, liver weight, hepatic lipid accumulation (all about −37%), plasma total and free cholesterol (−46% and −66%, respectively), and hepatic triglycerides (−51%) and preserved normal liver structure in high-fat, high-sucrose diet fed mice. These effects corresponded with altered hepatic lipid metabolism protein levels. However, glycemic control and insulin sensitivity were unaffected, suggesting benefits are specific to lipid dysmetabolism.

Thus, microencapsulated fermented wild blueberries may provide a safe, non-pharmaceutical strategy to mitigate diet-induced lipid abnormalities. This research outcome could be developed into a convenient functional food ingredient and/or nutraceutical that could serve as a preventative approach for at-risk individuals or as an adjunct therapy for patients with metabolic syndrome.
Keywords: wild blueberries, food bioprocessing, lipid metabolism

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Bertha Nametso Tema

Title: *In Vitro* Micropropagation and Effect of Silver Nanoparticle Elicitation on Yield of Specialized Metabolites in *A. Afra*

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Abstract:
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Artemisia afra is an indigenous herb potent with specialized metabolites. However, it is yet to be extensively studied with the objective of improving the production of specialized metabolites. The present investigation was initiated to develop a protocol for *in vitro* micropropagation of A. afra, and the impact of AgNPs on the yield of phytochemicals in *in vitro A. afra* investigated. Nodal meristems of *A. afra* were subjected to aseptic process using varying concentrations of NaOCl (5%, 4.5%, 4%, 3.5%, and 3%) with different time exposures (10, 15 and 20 minutes). Shoot induction rate was also assessed in MS supplemented with different concentrations of BAP (0, and 0.45, 0.90, 1.25, 1.50mg/ml) combined with KIN (0, 0.025, 0.050, and 0.075, 0.090mg/ml). *In vitro A. afra* was elicited with Ag-NPs concentrations 12.5-200µg/ml. Methanol: Dichloromethane (1:1) extracts of the leaves of *A. afra* were then subjected to GC-MS analysis. At rate 79.00% ± 3.07, 3.5% NaOCl for 20 minutes was optimal for regeneration of sterile shoots. 96.66% ±1.27 shoot induction rate was on MS with 0.90mg/L BAP and 0.090mg/L KIN, with 10.71 ± 0.17 shoots /explant as the highest shoot number after 30 days. Phytochemicals increased from 26 to a maximum of 45, from untreated *in vitro A. afra* to 50µg/ml Ag-NPs elicited *A. afra*. The highest shoot proliferation was at 50µg/ml Ag-NPs. Therefore, an efficient protocol for micropropagation of *A. afra* was developed. 50µg/ml Ag-NPs is a potential elicitor than can significantly enhance levels of beneficial specialized metabolites for nutraceutical benefit.

Key words: Micropropagation, elicitation, specialized metabolites

Jiaxuan Li

Title: Construction of Fucoxanthin Stabilizing System and its Precise Nutritional Intervention of Lipid Metabolism

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Abstract:
As the global prevalence of obesity-related conditions continues to rise, innovative approaches that combine advanced material science with nutritional intervention will play an increasingly important role in public health strategies. Fucoxanthin (Fx), as a main marine xanthophyll carotenoid, has demonstrated remarkable anti-obesity, anti-diabetic, and hepatoprotective properties. However, poor water solubility and low bioavailability limit its therapeutic efficacy. Therefore, it is of great importance to construct a delivery system for effective biological applications. Microfluidic spinning can provide strong technical support for the preparation of composite materials in the food industry. The inherent high surface area to volume ratio of microfluidic spinning contributes to its high drug loading capacity and high encapsulation efficiency.

In this work, we proposed a new strategy for the preparation of composite fiber materials for enhancing the excellent antioxidant and anti-obesity properties of Fx. The Fx-loaded nanofibers were prepared by blending Fx, HP-γ-CD and PVP via microfluidic spinning, and the composite nanofiber showed an excellent ROS savaging activity against H2O2. Besides, the nanofibers were used for juice clarification and browning control, which not only embodied the excellent antioxidant properties of Fx, but also achieved a more optimal amount of PVP. The results provided a new strategy for food processing and the extensive high-value use of marine natural products. We also constructed a nanofiber by natural small molecules or cyclic oligosaccharides (HP-β-CD) without using artificial polymers. The polymer-free Fx composite fibers not only displayed excellent environmental stability, but also achieved good in vivo anti-obesity effects.

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Chamali Kodikara

Title: Comparison of ELISA, UHPLC-MS/MS, and Development of UHPLC-HRMS Method for Ergot Alkaloid Quantification in Wheat

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Abstract:
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Background & Objective: Wheat is critical to Canada's economy, contributing approximately $10.2 billion annually, with 80% of wheat exported. However, ergot contamination caused by Claviceps purpurea poses a significant food safety risk due to the presence of toxic ergot alkaloids (EAs). This study aimed to evaluate the performance of an enzyme-linked immunosorbent assay (ELISA) for EA detection compared to ultra-high-performance liquid chromatography-tandem mass spectrometry (UHPLC-MS/MS). Additionally, an ultra-high-performance liquid chromatography-high resolution mass spectrometry (UHPLC-HRMS) method was developed and validated to improve the accuracy and sensitivity of EA detection.

Methods: The ELISA kit was validated using standard and in-house reference materials. CR was determined as the ratio of IC50 values of individual alkaloids to ergotamine. Spiked solvent and wheat matrix were analyzed using ELISA and UHPLC-MS/MS, followed by regression analysis and Bland-Altman plots. A UHPLC-HRMS method was developed and validated for enhanced EA quantification.

Results: ELISA showed a strong correlation with UHPLC-MS/MS (r=0.8793) but underestimated total EA concentrations by a factor of two. CR varied widely, with ergometrine exhibiting the highest CR in solvent and wheat matrix, indicating substantial matrix effects. UHPLC-HRMS provided superior resolution, sensitivity, and mass accuracy, enabling comprehensive EA profiling and identification of previously undetected alkaloids.

Conclusion: While ELISA offers a rapid screening approach, its accuracy is highly influenced by matrix effects and CR variability. The validated UHPLC-HRMS method enhanced analytical capabilities by providing high sensitivity and specificity, complementing UHPLC-MS/MS for regulatory compliance and improved food safety in wheat monitoring, ensuring more reliable and comprehensive analysis.

Keywords: ELISA, UHPLC-MS/MS, Ergot Alkaloids, Cross Reactivity

Oakantse Dineo

Title: Impacts of Heavy Metal Contamination from the BCL Mine on Soil Quality, Crop Production, and Associated Health Risks

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Abstract:
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Many African countries rely heavily on mining for export revenue. This may lead to significant environmental challenges, particularly from heavy metal pollution. The BCL Cu-Ni mine in Selibe-Phikwe, Botswana, operated for 42 years, contributing significantly to the country's development. However, post-closure, local arable communities experienced low crop yields and health risks from contamination left behind by the mine. This study evaluated heavy metal pollution near the mine and its effects on crops, particularly carrots and maize, and assessed the use of manure to improve soil quality and food safety. Soil samples from distances (0-15 km) and directions (windward and leeward) from the mine smelter were collected and analyzed for pH, EC, and heavy metals (Cu, Ni, Pb, As, Fe, Mn). Carrots and maize were grown in untreated, NPK-amended, and manure-amended (5% and 10%) soil samples. These crops were evaluated for germination percentages, number of leaves, plant height, leaf area, biomass, and root length. Heavy metal content in carrots and maize was analyzed using pXrf and used to assess associated health risks. Within the study area, germination percentages, seedling survival, leaf number, biomass, and root length were highly diminished. The plants also accumulated high concentrations of heavy metals in both roots and shoots, to levels that are not safe for either human consumption or use as livestock feed. Manure amendment improved both the growth and safety parameters.

Keywords: Mining pollution, food safety, health risks

Eric Tetteh Mensah

Title: Non-Destructive Authentication of Functional and Traditional Powdered Food Ingredients using Near Infrared Spectroscopy

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Abstract:
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Food fraud poses a significant challenge to food safety and product quality usually in developing regions where there is limitation to regulatory enforcement. This study investigated the application of Near Infrared Spectroscopy liaised with chemometrics to authenticate a maca powder, white melon seed powder and herring powder. Pure herring powder was adulterated with the tail and head in 7 different concentration. Chemometric models were developed, tested and validated with herring powder from 5 different markets. Adulterants including soybeans, gari (Manihot esculenta), and maize were added to pure white melon seed powder in 10 different concentrations. Authentic maca powders i.e. Yellow (YM), black (BM), and red (RM) were adulterated with adulterants (soybean and maize powders) in 5 different concentrations Chemometric models were developed, tested and validated using 3-fold cross validation and leave one sample out cross validation respectively.

High classification accuracy was obtained for pure cultivars and adulterated samples in Maca adulteration, with PLSR models optimized using Savitzky-Golay smoothing (filters 17 and 19) achieving strong predictive performance ($R^2 > 0.95$, RMSE 0.95, RMSECV < 3.92% w/w). For herring powder, visible color changes were effectively modeled using PLSR ($R^2CV = 0.9093$, RMSECV = 7.7351 g/100g), and LDA classified both market and laboratory samples with over 80% accuracy, emphasizing the robustness of NIRS-based models for detecting food adulteration.

Keywords: Machine learning, food fraud, protein powder

Giuseppe Natrella

Title: Biochemical Markers and Safety Implications of Using Stored Curd in Mozzarella Production

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Abstract:
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The use of stored curd in mozzarella production can provide technological and logistical benefits, such as improved process flexibility, the ability to manage milk shortages, and a reduction in process-related waste. Despite these advantages, the absence of specific EU regulations on its use raises concerns, particularly regarding consumer transparency about the origin and nature of raw materials, as well as potential safety risks. One such risk is the accumulation of biogenic amines (BAs), which may form from free amino acids released during proteolysis that occurs throughout curd storage. This study evaluated proteolytic activity and BA accumulation in mozzarella cheese manufactured using fresh, stored, and blended curds. Mozzarella from stored curds showed significantly higher levels of both primary and secondary proteolysis, correlating with increased concentrations of BAs. Although no official regulatory limits for BA content in cheese have been established, the concentrations measured—both for total and individual amines—remained below the safety thresholds suggested in the scientific literature. These findings indicate that, under the conditions tested, the use of stored curd does not pose immediate health concerns. Nonetheless, prolonged storage could promote further BA accumulation, warranting additional investigation.

Keywords: food safety, cheeses, stored curd.

Leire Cantero-Ruiz de Eguino

Title: Identifying Sensory Drivers in Gluten-Free Bread: A Proposal of a Quality Evaluation Tool

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Abstract:
Designing gluten-free (GF) bread that aligns with consumer expectations is particularly complex. To address this challenge, this study explores a case study formulation incorporating two sustainable ingredients -upcycled apple pomace and locally sourced flaxseeds- focusing on two main objectives: to identify key sensory attributes that drive liking in GF and to develop a decision-support tool for guiding evaluation of GF bread.

A consumer test (n=157) was conducted with both habitual and non-habitual GF consumers, who evaluated samples differing in flaxseed and apple pomace content. Cochran`s Q test was used to identify significant differences in CATA term selection across bread samples, and attributes were weighted according to their relative impact on linking scores. RV coefficient was calculated to assess similarity between CATA matrices of different consumer groups, and regression tree analysis was applied to determine the most influential attributes related to overall acceptability. These analytical layers were integrated into a decision-tree model organizing key sensory drivers.

Although no significant differences were observed in overall acceptability between consumer groups, GF consumers provided more detailed and critical feedback, particularly regarding texture. In general, attributes like “crispy crust”, “light texture” and “artisan appearance” enhanced liking, while “rubbery” texture was the main negative driver. The proposed decision-tree model evaluates four negative attributes by their presence or absence, and seven positive attributes through intensity scales. This balance of positives and negatives provides a practical tool for quality evaluation and sensory optimization in GF bread development, and it could set the basis for a standard method of analysis.

Keywords: gluten-free bread, sensory drivers, evaluation tool

Sarra Rafai

Title: In Vitro Evaluation of Aflatoxin B1 Detoxification by Lactobacillus, Pediococcus and Bacillus Strains

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Abstract:
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Biologically based detoxification strategies are increasingly being investigated as alternatives to conventional methods for eliminating toxic contaminants from food products. Among these, aflatoxin B1 (AFB1) stands out as one of the most potent mycotoxins due to its high toxicity and genotoxicity. In this study, the detoxification potential of bacterial strains belonging to the genera Lactobacillus/Pediococcus (n = 10) and Bacillus (n = 10) was evaluated using extracts from contaminated corn flour. Detoxification was assessed after 12, 24, and 48 hours of incubation in specific culture media. AFB1 quantification and metabolite profiling were carried out at each time point using Quadrupole Time-of-Flight Mass Spectrometry (LC-QTOF-MS). The highest detoxification rates were recorded with Lactobacillus curvatus 14 (L. curvatus 14) (41.1 ± 19.3%) and Pediococcus pentosaceus 4 (P. pentosaceus 4) (25.4 ± 11.3%) after 48 h, and Bacillus firmus 6 (B. firmus 6) (25.1 ± 12.9%) after 24 h. An in vitro digestion model was also employed to evaluate the detoxification efficiency under simulated gastrointestinal conditions. Results revealed significant AFB1 reduction at the colonic stage, reaching 72.26 ± 7.54% for P. pentosaceus 4 and 69.67 ± 9.70% for L. curvatus 14. These findings highlight the promising application of Lactobacillus, Pediococcus, and Bacillus strains in biological detoxification strategies to mitigate dietary exposure to AFB1.

Keywords: Biological detoxification; Mycotoxins; Lactic acid bacteria (LAB); In vitro digestion.

Hariniha Selvarajan

Title: Determining the Connection Between Barley-Produced Polyamines and Fusarium Graminearum Pathogenesis and DON Production

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Abstract:
Fusarium graminearum is a destructive fungal pathogen that causes Fusarium Head Blight (FHB) in cereal crops, especially in North America, Asia, and Europe. It lowers grain yield and quality by contaminating kernels with the mycotoxin deoxynivalenol (DON), making the grain unsuitable for livestock feed, malting, and brewing. Polyamines are biomolecules involves in plant growth, development, and stress responses. The main polyamines are putrescine, spermidine, and spermine. Polyamines may be linked to DON production, and understanding their role in FHB is important. This study explores the relationship between polyamine production and DON accumulation in twenty-five FHB-infected barley cultivars from field trials. Polyamines were identified and measured using high-performance liquid chromatography (HPLC), and DON levels were determined by enzyme-linked immunosorbent assay (ELISA). Total polyamine content ranged from 60 to 160 µmol/100 g d.w., with spermidine and spermine levels higher than putrescine. DON content ranged from 5 to 55 ppm. A significant positive correlation was found between spermidine levels in healthy and infected barley cultivars and DON content, indicating an active defense response. Some cultivars maintained stable polyamine levels and lower DON, showing greater resistance under stress. Therefore, selecting cultivars with low DON and stable or high polyamine levels under stress can enhance malting quality, support food and feed production, and reduce economic losses from contaminated grain. Lowering DON in barley also improves food safety and maintains nutritional quality.

Keywords: Fusarium, deoxynivalenol, and polyamines.

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Helena Rodrigues

Title: Veterinary Drug Residues and Mycotoxins in Honey and Api-Products: Occurrence, Risks, and Food Safety Implications

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Abstract:
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Introduction: Beekeeping products are increasingly consumed worldwide for their nutritional properties. However, their safety is threatened by contamination with veterinary drugs and mycotoxins, which compromise consumer trust and pose health risks. Antibiotics are used in apiculture to control bacterial diseases such as American and European foulbrood or Nosema, but residues may persist in honey due to misuse or environmental sources. Mycotoxins, secondary metabolites of fungi, can also contaminate honey through primary or secondary sources.

Methodology: This review screened recent scientific publications and food safety notifications to evaluate the occurrence of veterinary drugs and mycotoxins in honey and related products. Emphasis was given to compound classes, prevalence, toxicological risks, and regulatory gaps.

Results: Antibiotic residues in honey are widely documented, particularly outside Europe. Detected classes include sulfonamides, aminoglycosides, macrolides, quinolones, tetracyclines, and prohibited compounds such as nitrofurans and chloramphenicol. Although maximum residue limits exist for animal-derived foods, honey is not covered by EU regulations, resulting in a “zero tolerance” approach. Mycotoxins, less studied until recently, are increasingly reported in honey, especially aflatoxin B1, deoxynivalenol, ochratoxin A, and T-2/HT-2 toxins. These compounds exert hepatotoxic, immunosuppressive, genotoxic, and carcinogenic effects.

Conclusions: Veterinary drugs and mycotoxins represent emerging threats to honey quality and consumer safety. Their co-occurrence underscores the need for harmonized international monitoring, stricter regulation, and preventive strategies.

Food and Nutrition-related implications: Safe honey production is essential for maintaining consumer confidence in natural foods. Preventing contamination safeguards nutritional value while reducing exposure to toxic and antimicrobial resistance–related hazards, thereby protecting public health.
Keywords: Food safety; Mycotoxins; Veterinary drugs.

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Devsankar Sunilkumar

Title: Veterinary Drug Residues and Antimicrobial Resistance: Exposure Pathways and Consequences for Bee Health

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Abstract:
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Introduction
The intensification of livestock production leads to widespread use of veterinary drugs. These drug residues enter into food chain through multiple-pathways, imposing potential threat to non-target organisms. This paper relies on environmental presence of veterinary drug residues, antimicrobial resistance and exposure pathways particularly on the impact of bee health.

Methods
Study is conducted based on the comprehensive literature survey on scientific articles, case-studies, & antimicrobial drug-resistance monitoring reports. Key databases are used such as PubMed, Scopus & Web of Science.

Results
Veterinary drugs including antibiotics, anti-parasitic and pesticides are frequently found in proximity to livestock farms. Diverse exposure pathway includes manure application, animal excretion and wastewater from the farms. Bees are exposed to sub-lethal concentration of veterinary drugs resulting altered immune-response, acute toxicity and mortality. Studies reveal drugs are bio-transformed into another metabolite by flowering plants that may be equally or more hazardous. Environmental contaminations by pharmaceuticals results in development of antimicrobial resistance in livestock's & humans, complicating disease management.

Conclusion
Pharmaceutical pollution occurs by use of veterinary drugs in animal production causes prolonged effect on bees and other non-target organisms. Extensive research is essential to elucidate the consequences of exposure and develop preventive strategies to retard
environmental contamination.

Food and Nutrition - Related Implications
The presence of pharmaceuticals & pesticide residues in bee matrices leads to anaphylactic reactions, carcinogenicity, genotoxicity & reproductive malfunctions. Exposure to wide array of pharmaceuticals may have an impact on nutritional effect of honey and derived products by altering biochemical composition and microbial balance.

Davide De Angelis

Title: Identification and Quantification of Honey Adulteration Using NIR and Fluorescence Spectroscopy Approaches

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Abstract:
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Introduction/Purpose
Honey adulteration is one of the most widespread and difficult-to-detect food frauds, making advanced analytical techniques necessary. In this study, predictive models were developed to detect and quantify honey adulteration using near-infrared (NIR) spectroscopy and fluorescence spectroscopy.

Methodology
Two authentic honeys (citrus and wildflower), produced by a local company, were adulterated with three types of sugar syrups (glucose-fructose mixtures from corn and beet) at concentrations ranging from 2% to 40%, for a total of 42 samples. NIR spectra were processed using Principal Component Analysis (PCA), followed by Partial Least Squares (PLS) regression to estimate adulteration levels. For fluorescence data, Parallel Factor Analysis (PARAFAC) was employed.

Results
The PCA of NIR spectra showed a clear separation between honey and adulterants, with the PC1 component correlated to the level of adulteration. The PLS model showed improved accuracy when one syrup was excluded. Fluorescence excitation-emission matrices revealed distinct absorption in pure honeys, likely associated with Maillard reaction products and phenolic compounds, whereas syrups had lower intensities. PARAFAC analysis identified two significant components, with Component 2 negatively correlated with the percentage of adulteration. Linear regression produced accurate estimates for some samples but revealed a bias between honey types, suggesting the need for honey-specific models. The second approach, based on NPLS, showed promising results.

Conclusion
Overall, NIR and fluorescence spectroscopy were effective techniques for honey authentication, with fluorescence being particularly sensitive to compositional changes caused by adulteration.

Food and Nutrition-related implications
Finding methods to authenticate honey helps to ensure nutritional quality, food safety, and safeguards consumer trust. It also promotes fair market practices and the value of authentic, products.

Lekhraj Dhakal

Title: Status of Aflatoxin B1 Contamination in Rice and Rice Products from Eastern Region of Nepal

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Abstract:
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Introduction/Purpose: Aflatoxin B1 (AFB1) is one of the most potent naturally occurring carcinogens, posing major food safety and public health concerns. Rice, Nepal's staple crop, is highly susceptible to fungal infestation and aflatoxin accumulation. This study assessed the status of AFB1 contamination in rice and rice-based products from eastern Nepal, a key rice-producing region.

Methodology: A total of 108 samples (paddy, rice, and rice products) representing four rice varieties were collected from farms, wholesalers, and retail markets. AFB1 levels were quantified using enzyme-linked immunosorbent assay (ELISA). Farmer knowledge of good agricultural practices (GAP) and awareness of aflatoxin risks were also evaluated through structured surveys.

Results: Mean AFB1 concentrations were 1.43 µg/kg in paddy, 1.41 µg/kg in rice, and 1.64 µg/kg in rice products, with significant varietal differences ($p<0.05$). The Ranjit variety showed consistently higher levels. While all samples complied with Nepal (20 µg/kg) and WHO (30 µg/kg) limits, several exceeded the stricter European Union threshold (2 µg/kg). Surveys revealed limited awareness of GAP (76.9%) and aflatoxin-related health risks (87%).

Conclusion: Rice and rice products from eastern Nepal generally meet national and WHO standards, yet exceedances of EU limits highlight hidden risks to consumers.

Food and Nutrition Implications: Continuous monitoring and farmer education on safe production and storage practices are essential to safeguard public health and strengthen Nepal's rice value chain.

Keywords: aflatoxin B1, rice safety, food contamination, public health, Nepal

Isanka Gimhani

Title: Non-Destructive Characterization of Germinated Wheat Kernels using X-Ray Micro-Computed Tomography

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Abstract:
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Wheat germination is attracting considerable attention, whether as a consequence of climate change-induced pre-harvest sprouting or as a deliberate strategy to boost bioactive compounds. In both scenarios, germination activates hydrolytic enzymes, particularly alpha amylase. Although the biochemical effects of germination are well understood, the accompanying microstructural and morphological changes in germinating kernels have received comparatively less attention. Therefore, this study aimed to use high-resolution X-ray micro-computed tomography (micro-CT) and image analysis to examine structural changes in wheat kernels during germination.

Controlled germination of a Canadian Western Red Spring wheat variety was conducted for 6, 12, 18, 24, and 36 hours, with non-germinated kernels serving as the control. Alpha-amylase activity was measured using the Falling Number test and Ceralpha K-CERA assay. Microstructural and morphological assessments were performed using X-ray micro-CT imaging and Fiji ImageJ software. The results showed a decrease in the Falling Number and an increase in alpha-amylase activity with germination time. Additionally, significant increases ($p < 0.05$) in open and total porosity were observed at 24 and 36 hours, while closed porosity remained unchanged.

Radicle development became visible after 6 hours and showed substantial growth by 36 hours. Cracks and pores appeared only after 24 hours, indicating enzyme degradation. Although changes in cross-sectional area were not statistically significant, the outer layer thickness increased significantly ($p < 0.05$) in the apical region at 36 hours.

These findings demonstrate that increased alpha-amylase activity during germination has a notable impact on the microstructure of wheat kernels.

Keywords: Alpha-amylase activity; Microstructure; 3D Analysis

Íris João Fidalgo

Title: Grayanotoxins in Honey as Emerging Natural Food Contaminants with Clinical Human Poisoning Cases and Online Market Availability

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Abstract:
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“Mad honey” is honey contaminated with grayanotoxins (GTXs), diterpenes from Rhododendron spp. associated with human poisoning and adverse health outcomes (Thapa et al., 2024). Despite its toxicity, it continues to be consumed for cultural, medicinal, and recreational purposes, and its online availability has been increasing (Ali et al., 2024; Jamal et al., 2025). This study aims to assess clinical cases of grayanotoxin (GTX) poisoning and to evaluate the current online availability of “mad honey” on e-commerce platforms, including its marketing, labeling, and product characteristics, given its potential impact on human health and safety. Preliminary findings indicate that mad honey is frequently available online, often without clear toxicological warnings, which may increase the risk of unintentional exposure and poisoning.

Twenty articles were included, reporting 132 human cases, mostly adult males. The most frequent clinical signs were bradycardia (97.7%), hypotension (88.6%), nausea (48.5%), and syncope (33.3%). Most exposures were self-limiting, although severe cases required hospitalization, including one fatality (Zhang et al., 2016). Beyond endemic regions, mad honey is sold internationally, especially from Nepal and Turkey, under names such as “red honey” or “hallucinogenic honey,” promoted with cultural narratives and exclusive branding at premium prices (EFSA et al., 2023). Limited regulation, however, allows fraudulent sales and uncontrolled toxin levels. GTX-contaminated honey represents an emerging global foodborne risk. Its online availability increases consumer exposure and highlights the need for monitoring, regulation, and clear risk communication.

Keywords: Grayanotoxins; Mad Honey; Foodborne risk

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Sachini Senarathna

Title: Variation in celiac antigenicity among diverse oat cultivars determined by liquid chromatography tandem mass spectrometry

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Abstract:
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Keywords: avenin, celiac epitopes, LC-MS/MS

Celiac disease is an autoimmune disorder triggered by gluten proteins in wheat, barley, and rye. Oat contains avenin proteins structurally similar to gluten, raising concerns about its safety for individuals with celiac disease, despite being classified as gluten-free in some countries. This study aimed to develop a validated Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) method for quantifying celiac epitopes in oat and to assess variability in celiac antigenicity among diverse oat cultivars.

Thirty-eight oat cultivars from Brandon, Swan River, and Saskatchewan, were dehulled and milled. The total protein content of each sample was measured. Avenin proteins were extracted using an optimized Osborne fractionation method and digested with chymotrypsin. Three celiac epitopes (PYPEQQQPI, PYPEQQPF, PYPEQQEPF) were quantitively analysed. An untargeted LC-MS/MS approach using the Evosep One LC system coupled with the Orbitrap ExplorisTM 480 Mass Spectrometer confirmed epitope-containing peptides. Then the total gluten levels were determined by RIDASCREEN Total Gluten ELISA kit.

The total protein content ranged from 11.7% to 16.9% among cultivars. LC-MS/MS analysis detected multiple peptides per epitope, showing cultivar-dependent differences. Douglas-Brandon exhibited the highest summed peptide intensity. ELISA assays measured total gluten concentration, revealing Triactor-Brandon had the highest mean gluten content (14.47 mg/kg). A weak association between LC-MS/MS and ELISA results indicated that the specific celiac epitopes are minor components of total gluten. This study demonstrates the effectiveness of LC-MS/MS for celiac epitope quantification and highlights significant variability in oat immunogenicity among cultivars, supporting breeding and product development strategies for safer oat-based foods for individuals with celiac disease.

Vidheesha Abeysinghe

Title: Functional Evaluation of Extrusion-Moulded Canola Protein Films for Eco-Friendly Packaging

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Abstract:
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The development of sustainable bioplastics has gained significant attention as an alternative to petroleum-based plastics. Canola meal, a major by-product of the oil milling industry, is rich in canola protein (CP) and has excellent film-forming capabilities. Extrusion molding is the preferred industrial method for bioplastic production due to its low cost and continuous process. However, canola protein has not yet been studied for this application. In this study, alkaline-extracted canola protein from industrial canola meal was plasticized with glycerol. Various polymers, crosslinkers, and fillers were mixed, including polyvinyl acetate (PVA), ammonium persulfate (APS), nanocrystalline cellulose (NCC), and graphite oxide (GO). These polymer blends were extruded using a twin-screw extruder, and films were produced via compression molding. The mechanical, barrier, thermal properties, and light transmittance of the extruded films were characterized. The highest tensile strength (TS) (3.38 ± 0.32 MPa) and Young's modulus were observed in PVA-added extruded films, while the highest elongation at break (61.7 ± 11.2%) was seen in the control film. TS increased by 20.5% in the APS-added blend compared to the modified APS CP blend, indicating APS's cross-linking effect within the extruder. Water vapor permeability was reduced by up to 80.04% in GO-added films compared to the control. The highest light transmittance (62%) was found in the blend with PVA, while GO-added films were opaque, making them suitable for light-sensitive food packaging applications. Overall, this study demonstrates the feasibility of scaling up the production of biodegradable plastic packaging, supporting environmental sustainability.

Alexandra-Mihaela Ailoaiei

Title: Gluten-Free Fresh Pasta from Acorn Flour: Valorisation of Marginal Land Resources

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Abstract:
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Marginal areas, often characterized by low agricultural productivity and poor soil fertility, host a variety of underutilized botanical species with promising potential for innovative food applications. Among these, acorns — the edible fruits of oak trees (Quercus L. spp.) — were historically a staple during times of scarcity and war, but have gradually fallen into disuse. In recent years, however, they have regained attention due to their noteworthy nutritional profile and abundance of bioactive compounds. This renewed interest coincides with the growing numbers of diagnosed celiacs, which has significantly increased the demand for gluten-free products. As acorns are naturally gluten-free, they represent a valuable resource for the development of functional food alternatives.
This study aimed to develop a gluten-free fresh pasta using rice and acorn flour, evaluating the impact of substituting the former partially (50%) or completely (100%) with acorn flour. The nutritional composition, sensory properties, antioxidant activity and cooking properties of these formulations were compared to a control sample made entirely from rice flour. Incorporating acorn flour improved the nutritional profile by increasing fiber and lipid content and significantly enhanced phenolic compounds levels and the antioxidant activity, particularly in pasta made with 100% acorn flour.

Sensory analysis of the fresh pasta revealed significant differences among formulations. Pasta made with 100% acorn flour was characterized by an intense brown color, a sweeter taste, and a distinctive cooked must-like odor. These results support the potential of acorn flour as a functional, gluten-free ingredient in pasta production, especially suitable for valorizing marginal lands.

Keywords: marginal areas, Quercus spp., acorn flour, gluten free pasta

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Laura Giselle Alonso

Title: Dehydrated Water Dispersible Cellulose Nanocrystals Produce from a Residue of Kombucha Beverage Industry

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Abstract:
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In this study, cellulose nanocrystals (CNCs) were successfully isolated through the acid hydrolysis of freeze-dried and oven-dried bacterial nanocellulose (BNC) recovered from the floating pellicle generated during Kombucha tea production. The influence of the BNC drying method and its concentration on the yield and main characteristics of the CNCs obtained were studied (SEM, TEM, AFM, Crl, Z-Potential). The Kombucha residue resulted in products with whisker-like structures typical of CNCs, with nanometric sections and lengths of several hundred nanometers. In all of the samples, most particles have widths below 10 nm and lengths between 200 and 800 nm. In terms of the surface charge, all CNCs showed negative Z-potential values, between -38 and -17 mv. And a crystallinity index under Segal's method between 90 %. Additionally, selected CNC suspensions at various pH levels were subjected to freeze-drying and oven-drying, followed by an assessment of their dispersibility in water after undergoing different mechanical treatments (magnetic stirring and ultrasound).

Results demonstrate the potential of utilizing byproducts from the expanding Kombucha industry as an alternative cellulose source for CNC production. Furthermore, the drying method applied to the BNC and its initial concentration in the hydrolysis medium were found to significantly impact the properties of the resulting CNCs, which exhibited diverse size distributions and Z-potential values. Finally, the redispersion studies highlighted the beneficial effect of drying CNCs from neutral and alkaline dispersions, as well as the requirement of ultrasound treatments to achieve the proper dispersion of dehydrated CNC powders.

Keywords: cellulose nanocrystals; Kombucha residue; dispersibility.

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Claudia Antonino

Title: Reuse of UHT Milk Close to Expiring and Almond Okara in the Production of Fresh Cheese

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Abstract:
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Keywords: almond okara, expired UHT milk, fresh cheese

To meet growing consumer demand for healthier, more environmentally friendly products and to promote greater sustainability, the dairy industry is continuously innovating. This study investigated strategies for reducing food waste and adding value to agri-food by-products by reusing near-expiry UHT milk (EM) and almond okara (AO) to produce fresh cheese. The study highlighted the nutritional properties of OM and the potential for incorporating it into dairy products. While, the reuse of LPS, which is microbiologically safe, but has large volumes of unsold stock on the market, offers an opportunity to extend its useful life through innovative dairy formulations. AO was characterized as having a high content of fiber (13.47%) and fat (18.62%), 90% of the latter consisting of unsaturated fatty acids. The experimental design involved adding AO to skimmed and semi-skimmed EM at two concentrations (25% and 50%), producing cheese prototypes labelled CS-1/CS-2 and CP-1/CP-2, along with their respective control cheeses, CS and CP. The prototypes underwent physicochemical, microbiological and sensory characterization, demonstrating that fortification with okara enabled to attain the minimum levels of fiber and unsaturated fatty acids required for the nutritional claims “source of fiber”, “high in fiber”, and “rich in unsaturated fat” (Regulation (EC) No. 1924/2006). The samples differed in appearance, texture, volatile profile and sensory attributes. Adding AO at 50% level produced firmer cheeses with a pleasant almond flavor, due to the significant amount of benzaldehyde transferred to the cheese. Finally, all samples were microbiologically safe over a 30-day storage period. It was concluded that the combination of EM and AO is an innovative solution to produce a functional cheese, enhancing circularity in the food supply chain.

Josep Biosca-Micó

Title: In Vitro Protein Digestibility in Phaeodactylum Tricornutum: From Raw Biomass to a Protein-Rich Concentrate Derived from Industrial By-Product

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Abstract:
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1. Introduction
The microalga Phaeodactylum tricornutum is a promising source of bioactive compounds, especially proteins, lipids and essential nutrients. Within the framework of circular economy and biorefinery principles, industrial residues represent underutilized biomass with potential nutritional value. This study evaluates protein digestibility and quality in three P. tricornutum fractions: raw biomass, the industrial by-product after lipid extraction and a protein-rich concentrate derived from the by-product.

2. Methodology
Samples underwent standardized in vitro gastrointestinal digestion (INFOGEST). Protein digestibility was assessed via total nitrogen (TN), free amine groups (OPA) and total amino acids (TAA). Digestible Indispensable Amino Acid Ratios (DIAAR) and Digestible Indispensable Amino Acid Score (DIAAS) were calculated to evaluate protein quality and the limiting amino acids. Microstructural changes were studied by Confocal Laser Scanning Microscopy (CLSM) after the oral, gastric and intestinal phases.

3. Results
In vitro protein digestibility was 56.3%, 55.7%, and 90.9% for the raw biomass, the by-product biomass and for the protein-rich concentrates, respectively. DIAAR values indicated low-to-moderate quality in raw and residue samples, with histidine as the limiting amino acid. The concentrate showed improved quality, with some DIAAR values exceeding 100%, and sulphur-containing amino acids as the limiting ones. CLSM confirmed structural changes during digestion.

4. Conclusion
Extracting and concentrating proteins from microalgal residues enhances digestibility and amino acid quality, increasing their potential as functional food ingredients.

5. Food and Nutrition-related Implications
These findings support the use of P. tricornutum by-products as sustainable, high-quality protein sources, promoting their application in functional foods and nutraceuticals.

Mariana Pereira

Title: Carbon Source Utilization by Aspergillus Niger for Mycoprotein Production: Implications for Food Waste Valorisation

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Abstract:
As global population approaches 9.7 billion by 2050, the demand for sustainable protein sources intensifies, while one-third of all food produced is lost[1,2]. Addressing both protein demand and food waste while aligning with circular bioeconomy principles is crucial. Mycoprotein offers a promising solution to both challenges, as food waste can be used as substrate for mycoprotein production[3]. This study evaluates the growth of the filamentous fungus Aspergillus niger on food waste-relevant carbon sources, to assess its potential for mycoprotein production. Small-scale submerged fermentations were carried out in shake flasks under aerobic conditions (30°C, 200rpm, 96h). Media containing peptone and yeast extract as nitrogen sources and 10 g/L of simple and complex carbon sources (glucose, fructose, sucrose, cellulose, pectin, starch, galactose, or lactose) were pitched with A. niger spores at an initial concentration of 0.5×10^6 spores/mL. Sampling was done at 24h timepoints to monitor pH and carbon source consumption. Biomasses were harvested through filtration at 96h for yield and protein content determination.

A. niger grew on media containing glucose, fructose, and galactose, yielding 4.4±0.3, 5.1±0.3, and 3.6±0.6 g/L biomass, respectively. It also hydrolysed sucrose, pectin, and starch, with respective biomass yields of 4.4±0.3, 3.6±0.1, and 3.9±0.2 g/L. Protein content ranged from 27.2±1.8% to 46.6±0.8%. These results support the potential of A. niger to convert food waste rich in simple and complex carbohydrates into high-protein biomass.

Food waste valorisation through fungal fermentation may contribute to more sustainable, circular food systems and enhance access to alternative protein sources in a resource-constrained future.

Keywords: Mycoprotein, Circular bioeconomy, Food waste valorisation

Acknowledgements:
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Tafadzwa Kaseke

Title: Exploring the Potential of Opuntia Ficus-Indica Cladodes as Novel and Sustainable Animal Feed Supplement

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Abstract:
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Climate change is impacting traditional animal feed sources, necessitating the exploration of sustainable and adaptable alternatives like indigenous plants. These plants, often overlooked, offer a promising solution due to their resilience to harsh conditions and nutritional richness. This study investigated the potential of using freeze-dried powders from different parts of the Opuntia ficus-indica cladode ('Morado' cultivar) (peel, mucilage, and insoluble fiber), an indigenous plant in South Africa, as an animal feed supplement. The developed powders were characterized based on their physical properties, such as solubility and water holding capacity (WHC), and chemical properties, like vitamin C, total phenolic content (TPC), total tannins (TT), total alkaloids (TA), and the radical scavenging activity. Additionally, ATR-FTIR analysis was done to identify the functional groups present in the developed powders. Our results revealed that the mucilage and peel showed significantly (p0.05). WHC was significantly higher in the peel and fiber, while solubility was 3-7-fold higher in mucilage than in peel and fiber. The ATR-FTIR analysis revealed similar functional groups within the different samples, although the transmittances varied. While both the peel and mucilage showed potential as sources of bioactive compounds, proximate analysis, metabolomic analysis, and mineral analysis are crucial for a more informed conclusion.

Keywords: Animal nutrition, sustainability, valorization

Ana Maria Quiros

Title: Purple Corn Cob as a Sustainable Feed for Tenebrio Molitor: Enhancing Nutritional Quality, Bioactivity, and Protein Digestibility for Human Consumption

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Abstract:
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The edible insect Tenebrio molitor is increasingly recognized as a sustainable protein source for human consumption, with high nutritional value and the ability to be reared on agro-industrial by-products. Purple corn cob (PCC), an abundant regional residue rich in polyphenols and anthocyanins, was evaluated as a feed ingredient to enhance the nutritional and bioactive profile of T. molitor larvae. Insects were reared for 40 days on three diets: control (100% wheat bran (WB), 13 g protein/100 g), T50 (50% PCC-50% WB, 7.7 g protein/100 g), and T80 (80% PCC-20% WB, 4.4 g protein/100 g). Proximate composition, mineral content, antioxidant capacity (ABTS and ORAC), enzyme inhibition (α-glucosidase and lipase), and in vitro protein digestibility were assessed. Despite reductions in dietary protein supply, larval protein content remained high (47.6–52.6 g/100 g). In vitro protein digestibility showed no significant differences ($p < 0.05$) across treatments, demonstrating that protein quality was preserved regardless of feed composition. Fat content decreased significantly with purple corn cob inclusion (37.4 to 21.3 g/100 g), while ash, iron, and copper increased. Larvae from the T80 diet exhibited significantly higher antioxidant capacity and stronger inhibition of α-glucosidase and lipase ($p < 0.05$), suggesting enhanced potential to modulate oxidative stress and metabolic health. Purple corn cob supplementation improved the bioactive and functional properties of T. molitor larvae without compromising protein digestibility. Incorporating this by-product into insect feed supports circular food systems while producing insect-based ingredients with consistent protein quality and enhanced health-promoting potential for human diets.

Keywords: Edible insects; Protein digestibility; Food bioactivity

Emanuele Tomassini

Title: Technological and Nutritional Impact of Canola Leaf Powder Incorporation in Wheat Bread

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Abstract:
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Canola is the second most important oilseed crop worldwide, with Canada being the main producer. Besides canola meal, another underutilized by-product is the plant's leaves, which are often left in the field as cover crops. Their incorporation into food products such as bread may offer a promising strategy for valorization and food loss reduction, aligning with the principles of a circular economy. In this study, the effects of incorporating 5% of freeze-dried canola leaf powder (CLP) into wheat flour-based doughs and breads were evaluated in terms of their rheological, technological, and nutritional properties. The inclusion of CLP significantly ($p < 0.05$) increased dough development time (8.6 vs. 1.8 min in control) during the Mixolab© mixing test, while markedly reducing dough stability (1.7 vs. 18.1 min). These effects are likely due to water competition and interactions between gluten and fibers from the plant leaves. These mechanisms were further supported by gluten aggregation analysis using the GlutoPeak, which highlighted a weakening of the gluten properties. In contrast, no significant differences were found on dough pasting properties, that reflects starch features during heating and cooling. CLP-enriched breads had a total dietary fiber content of 4.76 g/100 g, significantly higher than that of the control (2.22 g/100 g), which may have contributed to their firmer crumb texture and reduced elasticity. Crumb image analysis showed a finer and more homogeneous structure, with increased pore density and reduced mean pore area. From a nutritional perspective, leaves addition led to higher total phenolic content in CLP breads (1.62 vs 0.57 mg gallic acid equivalent/g d.m. in the control). An additional benefit was the reduced *in vitro* starch hydrolysis rate (k: 2.04 vs 2.56 min^{-1}) and lower starch hydrolysis extent ($C\infty$: 1256.67 vs 1707.17 mg glucose/100 g d.m.). These effects, likely due to phenolic–starch and phenolic–enzyme interactions, indicate a potential for improved glycemic response.

Keywords: canola leaves, bread quality, starch digestibility

Liliana Espírito Santo

Title: Tannins Content of Vine Leaves from Pruning: Possible Applications in Food Processing and Health

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Abstract:
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Viticulture is an agro-industrial sector that produces large amounts of waste. Green pruning of the vine involves removing excess of shoots and leaves, to improve air circulation and sun exposure for the good quality of grapes. Although pruning is a necessary technique, it generates a wide amount of biomass, emerging as a valuable resource for multiple applications using a circular approach to bioeconomy. Tannins are becoming increasingly recognized due to their functional properties and health benefits. Therefore, the aim of this study was to extract, identify and quantify some tannin compounds of pruned leaves from eight vine varieties (Vinhão, Touriga Nacional, Padeiro de Basto, Alvarinho, Sauvignon Blanc, Loureiro, Moscatel and Arinto) by HPLC-DAD. Based on the obtained results, ellagic acid, catechin, gallic acid, 3-*O*-methlylellagic, and epigallocatechin gallate were detected in all studied hydroalcoholic extracts (50:50 v/v), revealing significant differences between cultivars. Gallic acid was the most abundant compound in the leaves (150 mg - 912 mg/100 g) and is related to antioxidant, anti-inflammatory, antimicrobial, and neuroprotective effects. 3-*O*-methlylellagic, a prospective medication for cancer treatment, was identified in all varieties except into Arinto. Rutin and quercetin, flavonoid compounds were also presented. High quercetin contents were determined in Vinhão (53 mg/100 g) and Touriga Nacional (45 mg/100 g) varieties. Quercetin is known for its antioxidant, anti-inflammatory, and anticancer effects, which may improve cardiovascular health, neurological illnesses, and allergy conditions. The leaves from pruning are nowadays discarded, however they are a good source of beneficial bioactive compounds. As a result, valorizing this biomass may contribute to creating a more circular and sustainable economy.

Keywords: *Vitis vinifera*, gallic acid, quercetin.

Acknowledgements: This work received financial support from the PT national funds (FCT/MECI, Fundação para a Ciência e Tecnologia and Ministério da Educação, Ciência e Inovação) through the project UID/50006 - Laboratório Associado para a Química Verde - Tecnologias e Processos Limpos. L.E.S. is grateful to LAQV-Tecnologias e Processos Limpos-UIDB/50006/2020 for her grant (REQUIMTE 2023-49). The authors also acknowledge to the project STrengthS4WineChaiN – Sinergias científicas e tecnológicas para o desenvolvimento da cadeia da vinha e do vinho na Região Norte, and to the project 'GrapeUP – Grapes by-products high-value upcycling' (Ref. COMPETE2030-FEDER-02182500). Also, to Quinta D' Amares, Rua da Cerca, n.º 15 Bico, 4720-173, Amares, Braga, by supplying the samples.

Huijuan Zhang

Title: Utilizing Fish Waste as a Sustainable Nitrogen Source for Enhancing Growth and Metabolism Regulation in Bifidobacterium Animalis ssp. Lactis BB-12

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Abstract:
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The fish processing industry generates a substantial volume of solid waste, resulting in pronounced environmental pollution. This study aimed to employ silver carp waste as a nitrogen source for cultivating the probiotic Bifidobacterium animalis ssp. lactis BB-12 (BB-12), providing a cost-effective and culturally acceptable alternative to the traditionally expensive and religiously restricted peptone. The silver carp waste hydrolysate (SCWH) was produced through papain hydrolysis and subsequently employed as a substitute for the nitrogen source in the conventional MRS medium. This study examined the impact of SCWH on the growth, productivity of short chain fatty acids, and metabolite profile of BB-12. The findings indicated that substituting 75% of the nitrogen source with SCWH resulted in an increased proliferation of BB-12. The bacterium eficiently utilized both hydrophobic and hydrophilic amino acids, displaying a preference for oligopeptides and hydrophilic peptides. Moreover, the utilization of SCWH led to significantly ($p < 0.05$) higher concentrations of acetic acid in BB-12 cultures. Additionally, elevated levels of quanine and taurine, coupled with the inhibition of fatty acid degradation through glycerophospholipid metabolism, plaved a role in the observed enhancement of BB-12 arowth with SCWH substitution. SCWH proved to be an excellent substitute for supporting BB-12 cultivation, and the proposed strategy emerges as a profitable and sustainable solution for valorizing freshwater fish waste.

Victoria Fernández-Tucci

Title: Circular and Clean-Label Gluten-Free Bread Compared to Industrial and Artisan Alternatives in Terms of Composition and Sensory Features

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Abstract:
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Keywords: circular-gluten-free bread; fiber content; sensory analysis.

Introduction
Celiac disease and other forms of gluten sensitivity have increased the demand for gluten-free bread (GFB). However, technological and nutritional limitations persist, particularly regarding sensory quality and clean-label expectations (1,2). This study compares ingredient profile, physicochemical and sensory properties of a circular-GFB (CB), formulated with apple pomace and flaxseed (3), with GFBs available in the Basque Country.

Methods
Eight samples were analyzed: four industrial (IB), three artisanal (AB) and the CB. Texture was assessed with TA.XTplus analyzer (Stable Micro Systems, UK) via double-compression. Dietary fiber was quantified with the RITDFA-Kit (AOAC 2017.16). Sensory evaluation was performed by 12 assessors using a 5-point hedonic scale. Label declared ingredients were extracted and categorized by function (4).

Results
CB included ten ingredients, with no added hydrocolloids. In contrast, IB samples contained more ingredients (mean 15±2.16), including hydrocolloids (3.25±0.96). Breads with higher hydrocolloid count showed lower resilience, elasticity and cohesiveness. CB showed the highest crust hardness and crispiness (4.82 and 4.69 out of 5). It was also the best rated for aroma (3.81±0.8) and achieved a higher overall liking (3.18±0.53) than IB (2.15±0.29), comparable to the best rated AB (3.30±1.13). CB reached 10% of insoluble fiber and 1.9% soluble fiber (SDFP), exceeding most samples.

Conclusions
Upcycled apple pomace and flaxseed represent a promising strategy to improve clean-label gluten-free bread in line with circular and sustainable food system goals.

Food and Nutrition-related implications
According to Regulation (EC) N°1924/2006, CB qualifies as “high in fiber”, aligning nutritional value with clean-label trends and sensory quality.
Funding sources

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Gaia Gadaleta-Caldarola

Title: Valorization of Nuts Processing Waste in the Formulation of Innovative Bakery Products

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Abstract:
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The bakery sector plays an important role both economically and in terms of nutritional impact. Bakery products are widely consumed across cultures and represent a consistent element of human nutritional habits. The growing demand for nutritionally enhanced and sustainable bakery products has prompted the food industry to explore the use of alternative ingredients derived from agri-food waste and by-products.

This study aims to valorize nuts processing waste, specifically from walnuts and cashews, by incorporating these products into durum wheat-based bakery formulations. The objective is to characterize nuts processing waste and create sustainable and functional food solutions through their integrations and reuse, with the aim of improving the nutritional quality of final products.

Preliminary characterization of this waste highlighted distinct nutritional and oxidative profiles. Walnuts waste showed high levels of polyunsaturated fatty acids and tocopherols, while cashews waste exhibited greater oxidative stability due to its high oleic acid content. These insights will guide the development of optimized bakery prototypes, aiming to achieve an enhanced nutritional profile, while also improving the integration of nuts waste into bakery matrices to ensure both technological performance and product stability over time.

The valorization of nuts waste aligns with circular economy principles, offering a promising and strategic route to reduce food waste and enhance the functional and nutritional value of bakery products. This work contributes to developing innovative, sustainable and food solutions tailored to modern dietary need and growing environmental demand.

Keywords: bakery products, nuts waste, nutritional profile.

Paula García Abril

Title: Innovative Packaging from Vine Shoots: A Circular Economy Solution Based on Cellulosic Aerogels for the Wine Industry using PLA as Reinforcement

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Abstract:
Lightweight and highly porous aerogels were developed using cellulose extracted from vine shoots (VS) waste biomass – a common by-product from the wine industry – via industrial Kraft processing, as well as from eucalyptus (EU) to mitigate seasonal limitations. To improve both hydrophobicity and mechanical strength, the aerogels were coated with poly-lactic acid (PLA) using two methodologies: spray coating and pipette coating. The resulting materials presented increased but low densities (23–80 kg/m^3) and significantly enhanced mechanical properties, with compressive strength increasing up to 20 times (reaching 1.54 N/cm^2) following PLA application. Moreover, thermal conductivity remained stable or slightly improved with spray coating (0.0305 W/mK), outperforming conventional polymeric foams or rockwool used for insulation purposes. After evaluating samples subjected to high humidity conditions and water immersion tests, the results demonstrated that PLA reinforcement enhanced water resistance, thereby reducing its sorption and improving aerogels' resistance to degradation. As a plausible final application, they were employed for insulating wine bottles minimizing fluctuations in temperature and mechanical impacts thanks to their optimum balance between thermal insulation, mechanical resistance, biodegradability, ability to be shape-designed and circular economy.

Keywords : cellulose, aerogel, PLA.

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Zainab Husain

Title: Sunflower Proteins Redefined: Valorization of Sunflower Meal Through Sustainable and Novel Extraction Technologies

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Abstract:
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The rise in protein demand pushes the need to develop new plant protein ingredients using sustainable technologies. Sunflower is a widely cultivated oilseed, resulting in a defatted sunflower meal (SFM) by-product with 30-40% protein content (DWB). The objective is to enhance the production of sunflower protein isolates (SFPI) from commercial SFM using three sustainable and novel extraction technologies: divalent salt-based (DV-SFPI), monovalent salt-based (MV-SFPI), and deep eutectic solvent (DES-SFPI) extractions. The performance, techno-functional, and structural properties of extracted SFPI were compared to the industrial-standard alkaline extracted SFPI (ALK-SFPI). The protein purity of MV-SFPI, DV-SFPI, and DES-SFPI of 90.18 ± 0.48%, 90.06 ± 1.01%, and 88.46 ± 1.38%, respectively, are significantly higher than Alkaline-SFPI with 69.35 ± 0.49%. Compared to ALK-SFPI, the protein yield and extraction recovery rate were significantly improved and highest for DES-SFPI (56.92 ± 0.61% and 24.73 ± 0.50%). Furthermore, DV- and MV-SFPI reduced the fat content of to 6%, compared to the initial 15% present in SFM. While the water holding capacity was decreased for all SFPI samples compared to ALK-SFPI, the oil holding capacity was significantly improved for DES-SFPI and DV-SFPI to 1.62 ± 0.01 and 1.48 ± 0.02 (g oil/g protein), respectively, compared to 1.30 ± 0.01 (g oil/g protein) for ALK-SFPI. Lastly, DV-SFPI had an enhanced off-white colour with the highest L* value of 84.07 ± 0.23 due to the exclusion of green chlorogenic acid present in ALK-SFPI. The novel extraction methods added value to SFM by producing SFPI as a sustainable food ingredient.

Balikis Mustapha

Title: Boosting Nutrition with Edible Insects: Proximate and Mineral Composition of Cookies Fortified with African Palm Weevil Larvae

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Abstract:
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Introduction:
As the world looks for sustainable protein sources, edible insects are gaining attention. The African palm weevil larvae (Rhynchophorus phoenicis), rich in high-quality protein, essential fatty acids, and key minerals, offer a new solution to addressing protein-energy malnutrition. This study explored how fortifying cookies with palm weevil larvae flour could improve their nutritional value.

Methodology:
Wheat flour was partially replaced with 10%, 20%, and 30% larvae flour, along with a control group (0%). The proximate composition (moisture, protein, fat, ash, fibre, carbohydrate) was determined using AOAC methods. Sodium, calcium, and iron contents were analysed through atomic absorption spectrophotometry and flame photometry.

Results:
Fortifying with larvae significantly ($p < 0.05$) increased protein, fat, and ash content. At 30% inclusion, protein reached 29.46% and fat 14.53%, which were much higher than in the control. Carbohydrate levels decreased with more substitution. Mineral content showed significant increases: 10% inclusion had the highest sodium (768.69 mg/100 g) and calcium (333.26 mg/100 g), while 30% had the highest iron content (1.48 mg/100 g). All samples had moisture below 10%, ensuring shelf stability.

Conclusion:
African palm weevil larvae flour transforms cookies into nutrient-dense snacks without losing quality. This fortification method combines traditional food forms with novel, sustainable ingredients, offering a practical way to combat malnutrition and strengthen food systems.

Keywords: African palm weevil larvae, edible insects, cookies.

Kavindya Samarakoon

Title: Microbial Biotransformation of Grape Seed (poly)Phenols for Functional Food Development

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Abstract:
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Microbial biotransformation is an emerging approach that converts agri-food by-products into value-added functional ingredients to enhance human health. Grape seeds, a major by-product of the wine and juice industries, are rich in (poly)phenols, predominantly proanthocyanidins (PACs), but their bioavailability is limited due to the high polymerization. This study aimed to biotransform grape seed (poly)phenols using selected microorganisms to generate metabolites with enhanced bioavailability and functional potential. Grape seed powder (GSP) was subjected to submerged fermentation with six bacterial species (Lactobacillus acidophilus, Lactiplantibacillus casei, Lactiplantibacillus rhamnosus, Lactiplantibacillus plantarum, Bifidobacterium animalis subsp. lactis, and Akkermansia muciniphila) and two yeast species (Saccharomyces cerevisiae and S. cerevisiae var. boulardii). Two edible mushrooms (Agaricus bisporus and Lentinula edodes) were also used to biotransform using both submerged and solid-state fermentation. Total phenolic content, total PAC, and (poly)phenol profiles were analyzed using ultra-high performance liquid chromatography–mass spectrometry. Biotransformation resulted in 10 compounds which were exclusively detected in biotransformed GSP derived from bacterial biotransformation, while 4 and 6 compounds were exclusively detected with yeast and mushroom fermentations, respectively. These compounds were absent in both microbial and substrate (GSP) controls, suggesting them as postbiotic metabolites generated through microbial biotransformation. Additionally, the concentrations of certain (poly)phenols in GSP were changed during biotransformation, indicating microbial metabolism of these compounds. These results demonstrate that microbial biotransformation of grape seed (poly)phenols can yield diverse bioactive metabolites suitable for incorporation into functional food ingredients. Such postbiotic-rich ingredients have the potential to support chronic disease management while adding value to grape processing by-products.

Keywords: Biotransformation, Functional food, Agri-food-processing byproducts

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