THE 7TH INTERNATIONAL CONFERENCE ON FOOD AND APPLIED BIOSCIENCE 2024

February 8 - 9, 2024

BOOK OF ABSTRACT

FAB 2024

"FOOD AND BIOTECHNOLOGY FOR A SUSTAINABLE & BIO-CIRCULAR-GREEN ECONOMY"

FAB 2024

AGRO CMU | AGRO-INDUSTRY CHIANG MAI UNIVERSITY

CMU CHIANG MAI UNIVERSITY

International Conference on Food and Applied Bioscience

February 8-9, 2024

Kantary Hills Hotel, Chiang Mai

BOOK OF ABSTRACTS

Organizer

Co-Hosts

Preface

Welcome to a conference on Food and Applied Bioscience 2024: Food and Biotechnology for a Sustainable and Bio-Circular-Green Economy, which was organized from 8-9 February 2024. This is the 7th Food and Applied Bioscience conference organized by the Faculty of Agro-Industry, Chiang Mai University and held at the Kantary Hills Hotel, Chiang Mai, Thailand.

This biennial conference has been jointly organized by ten of academic partners: Yamagata University; Korea University; Yonsei University; Qingdao Institute of Bioenergy & Bioprocess Technology, Chinese Academy of Sciences; Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences; Nong Lam University; Universitas Brawijaya; Agro-Industry Academic Council Association (AIAC); Food Science and Technology Association of Thailand (FoSTAT); and College of Maritime and Management, Chiang Mai University.

The conference aims to provide an opportunity for academics, researchers, and graduate students in the field of food and applied bioscience as well as related fields from national and international institutions to present their works, exchange ideas and build up a network with scholars from all over the world to future research development and collaboration. The Bio-Circular-Green (BCG) Economy concept aims to contribute to the global efforts of comprehensively addressing all environmental challenges for a sustainable planet. It emphasizes on applying science, technology, and innovation to promote the efficient use of resources, maintain and restore our ecosystems, and reduce waste to build a system where government and business can thrive.

This conference addresses the Sustainable and Bio-Circular-Green Economy research related to food and applied bioscience in a number of the major societal challenges such as health, food science and technology, product development, packaging technology, biotechnology and applied sciences while searching for innovation opportunities at the multi facets of scientific disciplines.

On behalf of the organizing committee, I would like to take this opportunity to express our sincere appreciation the members of the Editorial Board/Scientific Advisory and Steering Committee, Distinguished keynote speakers, Chairpersons and Co-chairpersons of the technical sessions as well as cooperating organizations for hosting the conference. Special thanks to all authors and reviewers without whom this conference would not have been possible. We also owe our gratitude to all individuals who contributed to the conference and the book of abstracts. Grateful acknowledgement is made to our conference sponsors and our supporters from Journal of Food Processing and Preservation and Food and Applied Bioscience Journal for the special issues.

(Asst. Prof. Sujinda Sriwattana, PhD)
Chairman of the Organizing Committee

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Conference Committee

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Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences
Universitas Brawijaya

Schedule and Program Sessions

Thursday February 8, 2024	
08.00 – 09.00	Registration
Moderator	**Asst. Prof. Dr. Thanyaporn Siriwoharn** **Asst. Prof. Dr. Yongyut Chalermchat**
09.00 – 09.45	Opening Ceremony and Welcome **Introductory Remark** By Asst. Prof. Dr. Sujinda Sriwattana Dean of Faculty of Agro-Industry, Chiang Mai University, Thailand **Opening Remark** By Prof. of Practice Dr. Charin Techapun Vice President, Chiang Mai University, Thailand
09.45 – 10.15	**Plenary 1:** Professor Masanori Watanabe, Ph.D. Possibility of Stable Supply of Rice-Derived Protein Concentrate and Development of Plant-Based Meat
10.15 – 10.45	**Plenary 2:** Professor Amin Mousavi Khaneghah, Ph.D. Vegetable's Waste as a Source of Value-Added Compounds: Perspectives and Future Challenges
10.45 – 11.00	**Coffee Break**
11.00 – 11.30	**Plenary 3:** Mr. Sansin Sriphiromrak Thailand Vertical Farming Sector and How Can It Reduce Greenhouse Gas Emissions
11.30 – 12.00	**Poster Presentation**
12.00 – 13.00	**Lunch**

Room	Division A DOI SUTHEP 1	Division B+F DOI SUTHEP 2	Division E DOI LUANG & DOI NANG 1	Division F DOI LUANG & DOI NANG 2
Chairman	Prof. Amin Mousavi Khaneghah, Ph.D.	Prof. Dr. Yusuf Hendrawan	Prof. Dr. Wei Qi	Assoc. Prof. Dr. Kittisak Jantanasakulwong
Co-Chairman	Dr. Sudarat Jiamyangyuen	Dr. Tabkrich Khumsap	Dr. Kridsada Unban	Dr. Wisuwat Wannamakok
13.00 – 13.15	Invited Speaker Prof. Dr. Wan Aida Wan Mustapha O-040 An *In Vivo* Study Investigating The Potential Anti-Obesity Properties of Fucoidan Derived from Malaysian Brown Seaweed (*Sargassum* spp.)	Invited Speaker Prof. Dr. Yusuf Hendrawan O-162 Application of Bio-Artificial Intelligence for Identification and Quality Evaluation of Bioproducts	Invited Speaker Prof. Dr. Wei Qi O-054 Hydrolysis of Lignocellulosic Biomass Into Reducing Sugar and Its Utilization	Invited Speaker Asst. Prof. Dr. Endrika Widyastuti O-161 Development of Thin Films Materials as Antimicrobial Coating
13.15 – 13.30	O-044 Adzuki Bean and Mung Bean Hydrolysates as a Source of Bioactive Peptides: Action of Alcalase and Flavouzyme Asst. Prof. Dr. Kiattisak Duangmal	O-034 Computational Fluid Dynamics Modeling for Optimizing UV-C Treatment in Postharvest Orange Preservation: Enhancing Safety and Sustainability Assoc. Prof. Dr. Jakia Sultana Jothi	Invited Speaker Assoc. Prof. Dr. Changjiang Yu Multifaceted Roles of Duckweed in Aquatic Phytoremediation and Bioproducts Synthesis	O-013 Efficient Process for Synthesis of a Green Plastic Monomer (FDCA) for PEF Bioplastic in Packaging Application Ms. Kunnipa Suktong

13.30 – 13.45	O-018 Melatonin Content and Antioxidant Activities of Soy Milk-Based Yogurt as Affected by Co-Culture of Yogurt Bacteria and Probiotic Ms. Treechada Utaida	O-041 Influence of Thermal Processing Conditions on the Physicochemical Properties, Stability and Antioxidant Activities of Rice Milk containing a Co-Encapsulated Powder of Black Rice and Green Tea Mrs. Nuttinee Salee	O-017 Green Synthesis Silver Nanoparticles by Xanthone and Their Activity for Biotechnology Applications Mr. Syahfakhrul Haidhar Putra	O-016 Development of Recycled Paper Biofoam for Sustainable Food Packaging through a Simple Method Mr. Pontree Itkor
13.45 – 14.00	O-047 Evaluation of Antioxidant Activity, Total Phenolic Content, and Total Flavonoid Content of Betong Watercress Ms. Praporn Kijkuokool	O-045 Production of Cellulose Nanofiber from Lime Residue using Thermal Pretreatment Coupled with High-Shear Homogenization Mr. Pitikorn Soonoue	O-026 Fermented *Moringa oleifera* Seed-Cassava Mahewu Inclusion Modulates Selected Biochemical Indices of Alloxan-Induced Diabetes Model Mr. Paul Ndubuisi Anyiam	O-021 Influence of Biodegradable-Based Films on the Thermochromism of Time-Temperature Indicator from Polydiacetylene-Silver Nanocomposite Mr. Aphisit Saenjaiban
14.00 –14.15	O-075 The Impact of Heat Treatments on Protein Content, Bioactive Compounds, and Antioxidant Activity in Three Selected Mushroom Ms. Pakjira Yawong	O-049 Preparation of Soy Protein-Based Meat Analogs by Freeze Alignment Technique: A Relationship between Preparation Conditions and Textural Properties Mr. Ratchanon Chantanuson	O-038 Bacterial Cellulose Produced from Empty Fruit Bunch Hydrolysate (EFB) as Potential Biomaterial for Active Packaging Dr. Nurul Aqilah Mohd Zaini	O-062 Citral Encapsulation Using Hydrophobic Modified Starch for Indirect Contact Active Packaging in Shrimp Preservation Mrs. Yeyen Laorenza

14.15 – 14.30	O-082 Comparison of Protein Isolated from Germinated and Fermented Mung Bean (*Vigna radiata* L.) in Extraction and Characterization Ms. Kanokwan Promjeen	O-065 Optimization of Perilla Seed Oil Extraction Using Supercritical CO_2 Ms. Suwajee Pothinam	O-042 Enhancing the Functional Properties of Okara through Fermentation with *Rhizopus oligosporus* TISTR 3138: A Study on Total Phenolic Compounds and Antioxidant Activity Ms. Thanancha Sumalai	O-064 Pregelatinized Cassava Starch Films as Carrier for Probiotic Ms. Laily Dwi Rahma
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Chairman	Dr. Juan Manuel Castagnini	Asst. Prof. Dr. Suphat Phongthai	Assoc. Prof. Dr. Wen Wang	Prof. Dr. Pornchai Rachtanapun
Co-Chairman	Asst. Prof. Dr. Wannaporn Klangpetch Ueno	Dr. Pipat Tangjaidee	Assoc. Prof. Dr. Thanongsak Chaiyaso	Dr. Sarinthip Thanakkasaranee
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15.15 – 15.30	O-095 Accelerated Extraction of Flavonoids, Polysaccharides, and Triterpenes from Lingzhi (*Ganoderma lucidum*) Using Microwave-Assisted Extraction Ms. Threethip Chuensun	O-146 Effects of Pre-treatment and Temperature of Screw Press Extraction on Physical and Thermal Properties of Tiger Peanut (*Arachis hypogaea*) Crude Oil Mr. Tolani Nlondiwa	O-078 Screening of Lignocellulosic Biomass and *Candida* spp. strain for Optimal Xylitol Production Based on Score Ranking Strategy Ms. Su Lwin Htike	O-079 PLA-Based Sheets and Trays Incorporating ZnO and Trans-Cinnamaldehyde as Active Food Packaging Mr. Sovankongkea SOM
15.30 – 15.45	O-099 Development of Non-Alcoholic Beer from Malted Barley Added with Kumjao CMU-107 Rice Bran Ms. Jitlada Na Lamphun	O-157 Effect of Hydrocolloid Type Concentration Levels on the Enhanced Shape of 3D Food Inks Ms. Pusacha Phongdet	O-086 Investigation on the Effect of Resistant Starch Modified from Ducasse Banana Encapsulating *Lactiplantibacillus plantarum* CMUB-N14 in Supplementary Yogurt Ms. Pattarapa Pummara	O-080 Blown-extrusion of TPS/PBAT/Ascorbyl Palmitate Films as Antioxidant Packaging Ms. Rosi Andini Arumsari
15.45 – 16.00	-	O-147 Division F Exploring Theoretical Catalysts for Future Food Entrepreneurship: The Mediating Roles of Prosocial Motivation and Personal Norms Dr. Wisuwat Wannamakok	O-105 Exopolysaccharide Production from *Halomonas* sp. SS3 : Cultural Optimization and *In Vitro* Antioxidant Activity Mr. Worraprat Chaisuwan	O-121 Study of Distribution Behavior of Treated Plant Extract Suspensions on Hydrophobic Spray Coating Solution Ms. Kitae Park

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16.30 – 16.45	-	-	O-151 A Thermostable Alkaline Protease for Bioactive Peptide Production from Sericin Dr. Kamon Yakul	O-139 Thermal Mechanical Morphological and Barrier properties of PLA/EVA Blended Composite by adding Hemp Carboxymethyl Cellulose (CMC_H) Ms. Miangkamol Duangrin

Friday February 9, 2024			
08.00 - 08.30	**Registration**		
Moderator	**Dr. Sudarat Jiamyangyuen** **Asst. Prof. Wachira Jirarattanarangsri**		
08.30 - 09.00	**Plenary 4:** Professor Fuli Li, Ph.D. Microbial Lipid Production from Renewable Feedstocks		
09.00 – 09.30	**Plenary 5:** Professor Youn Suk Lee, Ph.D. Study of Cellulose Based Polymeric Hydrogels for Sustainable Food		
09.30 – 10.00	**Plenary 6:** Professor Pornchai Rachtanapun, Ph.D. Agro Bio-Circular-Green (Agro BCG) Research		
10.00 – 10.15	**Coffee Break**		
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Chairman	Assoc. Prof. Dr. Supatra Karnjanapratum	Asst. Prof. Dr. Rajnibhas Sukeaw-Samakradhamrongthai	Assoc. Prof. Dr. Tri Indrarini Wirjantoro
Co-chairman	Asst. Prof. Dr. Thanyaporn Siriwoharn	Asst. Prof. Dr. Pavalee Chompoorat Tridtitanakiat	Dr. Phatthanaphong Therdtatha
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10.45 – 11.00	O-132 Gene Discovery of Medicinal Plant *Chloranthus erectus* through RNA-Seq Transcriptomics Dr. Nurhamimah Zainal Abidin	O-085 Valorization of Asian Seabass By-products from Ko Yo Island, Songkhla, Thailand Dr. Karnjapan Janthawornpong	O-077 Effect of High Pressure Processing on the Quality of *Oryza sativa* L., Kum Doi Saket Variety Grass Juice Ms. Uyen Ha Uyen
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11.45 – 12.00	-	O-155 The Effect of Date Palm (*Phoenix dactylifera* L.) Powder Addition on Gluten-Free Cake Ms. Jitsupa Intawong	-
12.00 – 12.30	**Best Poster Awards & Closing Ceremony**		
Moderator	**Asst. Prof. Dr. Kanyasiri Rakariyatham and Dr. Pipat Tangjaidee**		
12.30	**Lunch**		

Remark:
(A) Food Chemistry, Nutrition, and Analysis
(B) Food Processing and Engineering
(C) Food Product Development, Sensory, and Consumer Research
(D) Food Microbiology and Food Safety & Quality
(E) Food Biotechnology, Fermentation
(F) Related Food Topics (Food Packaging, Food Laws & Regulations, Food Policy, etc.)

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Abstracts of Keynote Speakers and Invited Speakers

Keynote Speaker

Possibility of Stable Supply of Rice-Derived Protein Concentrate and Development of Plant-Based Meat

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Abstract

A combination of isoelectronic precipitation and electrolyzed water treatment (IP-EWT) process was use for simultaneous recovery of protein and phosphorus compounds from heat-stabilized defatted rice bran (HSDFRB). IP-EWT can produce highly nutritious and allergen-free proteins and phosphorus compounds from HSDFRB with high concentration and high recovering efficiency. Water and oil absorption capacity of HSDFRB protein concentrate were varied with the concentration of sodium hydroxide in the protein extraction and the pH value (pI) in the isoelectric precipitation, and the oil absorption capacity were significantly varied as the pI value changes in the protein recovering. Moreover, FTIR analysis of the secondary structure of the protein (deconvolution analysis) showed that extracted spectrum pattern of rice bran protein was similar with the grain-based proteins such as wheat and soybean. Since the β-structure (sheet, turn) shifts that affect the hydrophobicity level are dependent on the pI value, the change in oil absorption capacity was inferred from the change in hydrophobicity of HSDFRB protein concentrate. The results of the dynamic viscoelastic properties of the defatted rice bran protein obtained by the IP-EWT method to investigate its applicability as an alternative meat ingredient, and found that the storage modulus (G1) was higher than the loss modulus (G2) under various temperature conditions, indicating that the gel state was maintained. The viscoelasticity values indicated that the HSDFRB protein concentrate possessed both gel properties and elasticity comparable to those of soybean protein. Furthermore, a Top-down method was used to prepare an alternative meat from the HSDFRB protein concentrate, and it was successfully prepared with elasticity and firmness similar to those of the alternative meat prepared from soybean protein.

Keywords: HSDFRB; IP-EWT; Deconvolution analysis; Alternative meat

Keynote Speaker

Vegetable's Waste as a Source of Value-added Compounds: Perspectives and Future Challenges

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Abstract

This study explores the potential of vegetable waste as a sustainable source of value-added compounds, underscoring its significance in a circular economy and environmental conservation. We delve into the current state of vegetable waste management, highlighting the vast quantities generated globally and the environmental impacts associated with traditional disposal methods. The focus then shifts to innovative approaches for extracting valuable compounds from this waste, including bioactive molecules, dietary fibers, antioxidants, and natural dyes. The study outlines various techniques for extraction and purification, emphasizing eco-friendly and cost-effective methods. We discuss the challenges faced in the valorization process, such as technological limitations, economic feasibility, and regulatory hurdles. Case studies showcasing successful implementations of these practices in different industries provide practical insights. Future perspectives emphasize the need for integrated approaches combining technological innovation, policy support, and consumer awareness. The potential for creating new market opportunities and fostering sustainable development by valorizing vegetable waste is a key takeaway. This study aims to inspire stakeholders across various sectors to recognize the untapped potential of vegetable waste and encourage collaborative efforts towards its sustainable utilization.

Keywords: Vegetable waste valorization; Sustainable waste management; Bioactive compounds extraction; Environmental conservation; Eco-friendly technologies; Waste-to-weal; Agricultural by-products

Keynote Speaker

Thailand Vertical Farming Sector and How Can It Reduce Greenhouse Gas Emissions

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Abstract

Sansin, a passionate advocate for sustainable agriculture, is an indoor vertical farmer in Thailand dedicated to "Cultivating Change." In the verdant landscapes of Thailand, traditional vegetable farming poses environmental challenges, notably contributing to greenhouse gas emissions due to the extensive use of chemical pesticides and herbicides. In Sansin's upcoming session, the spotlight will be on how indoor vertical farming serves as a revolutionary and sustainable alternative. By creating a controlled and pest-free environment, this innovative farming method eliminates the need for harmful chemicals, significantly reducing the carbon footprint. The session will not only address the immediate greenhouse gas reduction but also touch upon the broader sustainability benefits, such as decreased water usage, a smaller land footprint, the prevention of food waste, and the potential for carbon credits by measuring carbon dioxide usage in indoor systems. Moreover, Sansin will emphasize the impeccable cleanliness and safety of produce from indoor vertical farms, in stark contrast to concerns associated with traditional farming practices. Join Sansin in "Cultivating Change" as the session explores the transformative potential of indoor vertical farming, offering a promising vision for eco-friendly and sustainable agriculture in Thailand.

Keywords: Emerging trend; Food packaging Innovation; Food quality & Product life extension; Sustainability; Digitization

Keynote Speaker

Microbial Lipid Production from Renewable Feedstocks

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Abstract

China has announced that it will peak carbon dioxide emissions by 2030 and achieve carbon neutrality by 2060. To achieve this strategic goal, the Chinese government has put forward specific task requirements for various regions and industries. Key industries such as coal, electricity, steel, and chemical account for over 70% of China's total greenhouse gas (GHG) emissions, which are facing tremendous pressure to reduce CO_2 emissions. In this talk, I will present the development and challenges of microbial lipid production from CO2 and renewable feedstocks. High-level production of functional fatty acid, for example, nervonic acid in the oleaginous yeast *Yarrowia lipolytica* by metabolic engineering will also be presented.

Keywords: Feedstocks; *Yarrowia lipolytica;* Microbial lipid

Keynote Speaker

Study of Cellulose Based Polymeric Hydrogels for Sustainable Food

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Abstract

Recently, there has been an increasing engagement from governmental bodies, policymakers, manufacturers, and the public to present packaging solutions that align more closely with sustainability principles due to a rapid increase of a critical environmental pollution issue with the petroleum-based plastics. This issue poses imminent threats to marine life and even jeopardizes our human well-being. The presentation will contain examples as the driven effort towards sustainable packaging solutions in Korea. The alternatives with the recycled molded pulp have come increasingly recognized as an eco-friendly packaging option for delivering fresh food products. With the features including ease of use and environmental considerations, this adaption meets the rising demand for sustainable packaging in the food industry. However, conventional molded pulp packaging possesses limitations in terms of water resistance and thermal insulation, which have hindered its broader adoption and application in various industries. The presentation also introduces the results of the experimental study for the substantial improvements in both water resistance and thermal insulation and may lead towards exploration of innovative materials, such as integrating hydrophobic agents or additives. Improved attributes include enhanced mechanical strength, barrier, and thermal stability of the developed pulp composites.

Keywords: Cellulose; Polymeric hydrogels; Sustainable food

Keynote Speaker

Agro Bio-Circular-Green (Agro BCG) Research

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Abstract

Agro Bio Circular Green (Agro BCG) Research establishes an integrated approach for sustainable agriculture, indicating a comprehensive and innovative research paradigm aimed at fostering sustainability in the agricultural sector. This approach harmoniously integrates bioeconomy, circular economy, and green technologies to address contemporary challenges in agriculture, food, pharmaceuticals, and packaging, while promoting environmental stewardship. The components of the bioeconomy include emphasizing the sustainable use of biological resources, investigating bio-based materials as alternatives to traditional petroleum-based materials, encouraging the development of bioenergy, and promoting the use of biodegradable products or packaging. The design of closed-loop systems is guided by circular economy concepts, focusing on resource efficiency, waste minimization, and the recycling of agricultural byproducts. Green technologies are crucial for optimizing resource management and increasing agricultural output, particularly in relation to precision farming, data analytics, and Internet of Things (IoT) applications. Furthermore, green technologies are convinced to be applied in nanotechnology research based on eco-friendly and sustainable development, such as plasma technology for increasing the worth of nanomaterial obtained from agricultural waste resources as source materials. Nano quantum dot materials from green technologies are classified as high-end feature nanomaterials, presenting promising properties of materials with multi-fluorescence, biocompatibility, low toxicity, surface functionalization capability, and high stability. The outstanding properties of nano quantum dot materials are functionalized in various fields, such as the bioimaging application to monitor the fluorescent properties of cells and organic molecules, utilizing further development as a biosensor.

Keywords: Agro; BCG; Sustaianable; Biopolymers; Bio-based materials

Invited Speaker

An *In Vivo* Study Investigating the Potential Anti-Obesity Properties of Fucoidan Derived from Malaysian Brown Seaweed (*Sargassum* spp.)

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Abstract

Sargassum spp is one natural source of fucoidan, a polysaccharide with intriguing bioactivities. The objective of this study was to examine the anti-obesity effects of fucoidan (Fsar) extracted from Malaysian brown seaweed (*Sargassum* spp.) using an *in vivo* model. Five groups of male Sprague Dawley rats with body weight (BW) of 190-200 g were fed a normal diet (ND), a high-fat diet (HFD), an orlistat-supplied HFD (HFD-O; 50 mg/kg BW), a low-fucoidan HFD (HFD-LF; 200 mg/kg BW), and a high-fucoidan HFD (HFD-HF; 400 mg/kg BW) for 28 days. Body weight gain, visceral fat mass, fecal fat content, and various blood serum biochemical parameters including total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL), low-density lipoprotein cholesterol (LDL) as well as obese-related hormones (insulin, leptin, and adiponectin) were examined to evaluate the anti-obesity potential. The results demonstrated a significant reduction ($P<0.05$) in both body weight gain (25-30%) and visceral fat mass (2.1-2.2%) in rats administered with both low (HFD-LF) and high (HFD-HF) doses of Fsar, compared to those on an HFD with a body weight gain of 38% and visceral fat mass of 2.6%. Besides, there was a significant hormone reduction ($P<0.05$) of insulin (2-3-fold) and leptin (1.3-fold) by Fsar treatment compared to HFD. Without harming the kidneys or liver, Fsar treatment also showed improvements in biomarkers linked to obesity with a reduction of approximately 1.1-1.4-fold in blood lipid profiles of TC, TG, and LDL. Proton nuclear magnetic resonance (^{1}H-NMR) spectra detected the presence of significant metabolites such as glutamine, acetate, and others in blood serum treated with Fsar. This study indicated that fucoidan from Malaysian *Sargassum* spp. has potential anti-obesity characteristics that can be employed as a functional ingredient for human health.

Keywords: Polysaccharide; Fucoidan; *Sargassum* spp.; *In vivo*; Anti-obesity

Invited Speaker

Hydrolysis of Lignocellulosic Biomass Into Reducing Sugar and Its Utilization

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Abstract

Lignocellulosic biomass is a kind of renewable organic resource which can be converted into gas, liquid and solid bio-fuel. The bio-refinery of lignocellulosic biomass is based on the reducing sugar, so how to obtain the high standard sugar is the quality sugar becomes the key foundation. My presentation is combined by pretreatment of lignocellulose and the enzymatic hydrolysis of lignocellulose. In order to carried out an environmental friend pretreatment process, serious kind of solid acid catalysts were carried out, which can directly convert the hemicellulose in lignocellulose into xylose with high yield and selectivity. During the subsequent enzymatic hydrolysis of cellulose process, the enzymatic digestibility of the pretreated residue can reach above 90% only in 48 h. Based on these researches, the conversion of xylose, separating the main component of lignocellulose and cellulase were carried. This research has an excellent hydrolysis of lignocellulose results, which can establish a solid technical support for the industrial utilization.

Keywords: Lignocellulosic; Hemicellulose; Biomass

Invited Speaker

Biorefinery of Crop's Straw for Producing Ethanol, Fertilizer and Animal Feed

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Abstract

Lignocelluloses like waste crop straw and sawdust, chiefly composed of cellulose, hemicellulose and lignin, have been gained more and more attention to replace fossil fuels for producing biofuels and/or biochemicals due to their wide distribution, easy availability and low-carbon emission. Lignocellulosic biorefinery for biofuels and/or valuable products from cellulose has challenges associated with the intricate valorization of lignin and hemicellulose. A simple biorefinery way was developed to concurrently produce ethanol, liquid fertilizer and animal feed from rice straw based on KOH-urea pretreatment. The Box-Behnken model was applied to optimize KOH-urea pretreatment, and the optimum condition was solid-to-liquid ratio of 1:15, KOH-to-urea ratio of 1.5:1, 80°C for 60 min. After pretreatment, the black liquor (BL) was collected and adjusted to be neutral. It showed that 5-time diluted neutral BL could maximally stimulate the growth of rice plant. The diluted neutral BL could be directly used as liquid fertilizer. The enzymatic hydrolysis of KOH-urea-treated rice straw attained to 92.02% at solid concentration of 20% with cellulase loading of 10 FPU/g substrate. The ethanol concentration after 72-h fermentation reached to 37.02 g/L at a yield of 93.16%. The solid residue after fermentation contained 42.40% dietary fiber and 16.70% protein, which is suitable as animal feed.

Keywords: Lignocellulose; Alkaline pretreatment; Bioethanol; Bio-recycling; Enzymatic saccharification

Invited Speaker

Recovery of Bioactive Compounds from Waste from The Preparation of Vegetable Drinks

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Abstract

Innovative technologies like accelerated solvent extraction (ASE) mark a significant step forward in enhancing the recovery of bioactive elements and promoting greater sustainability in comparison to traditional extraction methods. To evaluate the efficacy of both approaches in extracting bioactive compounds, four by-products from vegetable beverage production−Yellow Soybeans, Tigernuts, Wheat, and Buckwheat−were specifically chosen. Under consistent conditions of 113.48 bar pressure, 40 mL volume, 40°C temperature, and a 20-min extraction time, both ASE and conventional methods using a water-ethanol solvent (50:50, v/v) were employed. The findings indicate that ASE proved to be the more efficient extraction method for recovering bioactive components. Moreover, across the four vegetable matrices, Yellow Soybeans exhibited superior performance in three out of the four analyzed aspects within the study−antioxidant capacity (172.3 μmoL TE/g DM), total carbohydrates (20.1 mg glu/g DM), and total proteins (48.3 mg BSA/g DM) in ASE, while in the conventional method, it excelled only in antioxidant capacity (188.3 μmoL TE/g DM) Buckwheat, under ASE, displayed the highest value in total phenols (168.4 mg GAE/g DM), while in the conventional method, it showed elevated levels in both total phenols (140.6 mg GAE/g DM) and total proteins (33 mg BSA/g DM). Tigernuts, however, only demonstrated the maximum value for total carbohydrate content (3.9 mg glu/g DM) using the conventional method.

Keywords: ASE, Plant-based beverages; Innovative extraction; Sustainability; Fermentation

Invited Speaker

Multifaceted Roles of Duckweed in Aquatic Phytoremediation and Bioproducts Synthesis

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Abstract

Duckweed (Lemnaceae) is a fast-growing aquatic vascular plant. It has drawn an increasing attention worldwide due to its application in value-added nutritional products and in sewage disposal. In particular, duckweed is a promising feedstock for bioenergy production. In this review, we summarized applications of duckweed from the following four aspects. Firstly, duckweed could utilize nitrogen, phosphorus, and inorganic nutrition in wastewater and reduces water eutrophication efficiently. During these processes, microorganisms play an important role in promoting duckweed growth and improving its tolerance to stresses. We also introduced our pilot scale test using duckweed for wastewater treatment and biomass production simultaneously. Secondly, its capability of fast accumulation of large amounts of starch makes duckweed a promising bioenergy feedstock, catering the currently increasing demand for bioethanol production. Pre-treatment conditions prior to fermentation can be optimized to improve the conversion efficiency from starch to bioethanol. Furthermore, duckweed serves as an ideal source for food supply or animal feed because the composition of amino acids in duckweed is similar to that of whey protein, which is easily digested and assimilated by human and other animals. Finally, severing as a natural plant factory, duckweed has shown great potential in the production of pharmaceuticals and dietary supplements. With the surge of omics data and the development of CRISPR technology, remodeling of the metabolic pathway in duckweed for synthetic biology study will be attainable in the future.

Keywords: Bioenergy; Duckweed; Eutrophication; Protein; Synthetic biology

Invited Speaker

Development of Thin Films Materials as Antimicrobial Coating

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Abstract

Semiconductor-based photocatalytic techniques have been fascinating for a promising technology that relies on the interaction between light and solid semiconductor particles. Zinc oxide (ZnO) and titanium oxide (TiO_2) have been acknowledged as the most crucial photocatalysts. Hence, thin films were developed via the magnetron sputtering technique through thermal oxidation. Magnetron sputtering integrates the advantages of uniformity, controllability, and conformity in the thin layer formation. The influence of oxidation temperature and sputtering power on the structural, morphological, and optical features of thin films is thoroughly characterized by X-ray Diffraction (XRD), Scanning Electron Microscope (SEM), UV-Visible Transmission Spectra, and Transmission Electron Microscopy (TEM). *Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans* will be employed to determine the antimicrobial ability of thin films. The finding highlights the new progress of various approaches toward the synthesis of thin films and their applications in antimicrobial technology. The film phase structure and morphology are significantly affected by sputtering power, and high sputtering power could promote whisker formation. Furthermore, thermal oxidation temperature in thin films is crucial for generating good photocatalytic activity and antimicrobial performance in thin films. ZnO thin films have shown great potential, with the photocatalytic activity of thin films observed at around 90% and the highest antimicrobial activity against three types of pathogenic microbes (97.5%). Therefore, developing thin films gives a simpler, more efficient, and better cost-effective method and has a promising antimicrobial coating with a good opportunity for industrial scaling up.

Keywords: Zinc oxide (ZnO); Titanium oxide (TiO_2); Thin films; Antimicrobial

Invited Speaker

Application of Bio-Artificial Intelligence for Identification and Quality Evaluation of Bioproducts

Yusuf Hendrawan*, Muhammad Syukri Sadimantara, Amirah Zulfa Musyaffa, Romzi Izzuddin Aufa, Wahyu Kristianingsih, Bambang Dwi Argo, La Choviya Hawa, Sandra, Musthofa Lutfi, and Dimas Firmanda Al-Riza

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Abstract

Artificial intelligence has been widely implemented and proven to be effective in modeling, classifying, and predicting the characteristics of bioproducts. In this research, examples of artificial intelligence applications for authentication, quality control, and identification of coffee, cocoa, and citrus fruit products are explained. The use of the convolutional neural network (CNN) method has succeeded in classifying four types of coffee bean purity levels (high, medium, low, and very low) with an accuracy of 89.65%. The use of commercial visible light cameras and pre-trained CNN has also succeeded in authenticating several types of local Indonesian coffee beans with a testing data accuracy of 99.6%. The use of the CNN classification method and support vector machine (SVM) has also succeeded in authenticating local Indonesian fermented cocoa dry beans i.e. Aceh, Bali, Banten, Yogyakarta, East Borneo, West Sulawesi, and West Sumatra with classification accuracy using CNN of 99.93% and SVM of 93.49%. Deep learning is also used to classify three types of cocoa bean fermentation index i.e. well-fermented, partly-brown, and partly-purple with a classification accuracy of between 90% and 92%. The use of you-looks-only-ones (YOLO) using reflectance and fluorescence images has also succeeded in detecting cocoa beans contaminated with aflatoxins in real-time. The accuracy of reflectance and fluorescence images is based on mean average precision values of 0.818 and 0.95 respectively. The Faster R-CNN method has also been developed to identify citrus fruit objects in real-time during the harvesting process. The results of comparing actual data and predicted data show the highest R-square value of 0.68. From several examples of the application of artificial intelligence, an accurate detection system has been produced to be applied in the characterization of bioproducts for several purposes i.e. detection, identification, quality control, and authentication.

Keywords: Bio-artificial intelligence; Bioproducts; Fluorescence imaging; Reflectance imaging

Invited Speaker

The Use of Porang Flour as Texture Modifier and Stabilizer for Food Product Development

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Abstract

Porang flour is derived from the tubers of Amorphophallus muelleri Blume, known as porang in Indonesia, and it contains a high level of water-soluble glucomannan. Glucomannan possesses various biological activities, such as anti-diabetic, anti-obesity, laxative, and prebiotic activities, indicating its potential health advantages. Due to its effective water absorption, stability, film-forming ability, thickening, and emulsifying properties, glucomannan is employed as a food additive. We have developed various food products by utilizing porang flour as a texture modifier. The use of porang flour in the production of noodle and fruit leather improves the physical characteristics of the resulting product. Porang flour combined with carrageenan can be used to enhance the physical properties of restructured meat products. Porang flour can also function as a stabilizer and thickener for product development. Our research results indicate that adding porang flour to tomato sauce and soy milk products can improve product stability. Glucomannan has the ability to bind water effectively, restricting molecular movement and thereby improving the stability of the products. The addition of porang flour for product development, besides those contributed to the physical modification and stabilization, may also enhance health benefits.

Keywords: Porang flour; Glucomannan; Food product

Abstracts of Oral Presentation

O - 013

Efficient Process for Synthesis of a Green Plastic Monomer (FDCA) for PEF Bioplastic in Packaging Application

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Abstract

The utilization of natural resource and agricultural waste into valuable chemicals has gained numerous interests according to bio-circular economy (BCG). In particular, 2,5-Furandicarboxylic acid (FDCA) is a promising renewable platform chemical because of its potential as a substitute for petroleum-based terephthalic acid (TPA). FDCA serves as the key monomer in the production of polyethylene furanoate (PEF), an intriguing bioplastic for the substitution of PET, especially in packaging applications. However, efficient process for synthesis of FDCA is still a great challenge to date due to some drawbacks of the conventional reactor, such as high pressure, long reaction time and low productivity. In this study, the process for synthesis of FDCA monomer via the oxidation of 5-Hydroxymethylfurfural (HMF) with 5% Pt/C is developed in a flow packed bed reactor with an outer diameter of 1/8 inch and a length of 15 cm. The effects of HMF/NaOH ratio (1:4, 1:8, 1:12, 1:16) and volumetric flow rate of HMF (0.01, 0.03, 0.05 mL/min) on the product yield are studied. The reactor performance of conventional batch and flow reactors is also compared in terms of the yield and productivity of FDCA as well as reaction time. The optimal condition for quantifying HMF, FDCA and other related compounds, including 5-hydroxymethyl-2-furancarboxylic acid (HMFCA), 2,5-diformylfuran (DFF), and 5-formyl-2-furancarboxylic acid (FFCA) are determined using HPLC method. The reaction mechanism occurred via the oxidation of aldehyde group in HMF, resulting in the formation of an intermediate molecule HMFCA. Thus, no DFF compound is found in the system. As amount of NaOH increased, FDCA yield increased due to the greater basic sites of catalyst, which facilitated the formation of more intermediate compounds. As compared to conventional batch reactor, FDCA yield in flow reactor increased up to five times due to greater mass transfer across the interphase between phases. As the flow reactor is used, the productivity of 0.533 kg FDCA kg cat^{-1} h^{-1} is achieved with the reaction time of 3.16 min. This reaction time is considerably shorter compared to the 6-hour observed in conventional reactor. These findings can be used as guideline for improving FDCA production on an industrial scale.

Keywords: 2,5-furandicarboxylic acid (FDCA); Flow packed bed reactor; Reactor performance; Poly(ethylene furanoate) (PEF); Bio-based polymer

O - 016 Development of Recycled Paper Biofoam for Sustainable Food Packaging through a Simple Method

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Abstract

Packaging plays a vital role in the global food supply chain, with polystyrene commonly employed as a packaging foam. However, the nonbiodegradable nature of polystyrene causes massive environmental problems. In response, biofoams derived from biodegradable resources have emerged as a sustainable alternative. Recycled paper (RP) stands out as a promising eco-friendly material due to its cost-effectiveness, biocompatibility, and recyclability. However, conventional methods for producing bio-foam with desirable properties often require specialized equipment and are time-consuming, such as the freeze-drying process. This study aims to develop RP bio-foam through a cost-effective and straightforward approach. Citric acid (CA) was incorporated in the ratios of 0 and 0.5 per mass of RP as a crosslinking agent to enhance the stability of the biofoam. The RP foams were fabricated using a simple method involving the blending of RP with CA, followed by mechanical water foaming and simple oven drying at 60°C. Subsequently, the obtained biofoams were analyzed for their overall properties. The results demonstrated that the incorporation of CA preserved the foam structure and significantly enhanced the physical properties of the biofoam, in contrast to the control biofoam (without CA). Consequently, employing CA provides an enhancement of foam properties, presenting an economically viable and sustainable solution for foam packaging within the food supply chain.

Keywords: Biofoam; Cost-efficiency; Citric acid-crosslinking; Sustainability; Recycled paper

O - 017 Green Synthesis Silver Nanoparticles by Xanthone and Their Activity for Biotechnology Applications

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Abstract

Green synthesis of nanoparticles or biological pathway is gaining spotlight because of its environmentally friendly, safe from toxic chemicals in preparation and the possibility of large-scale up production. Based on the usage of fungi, algae, bacteria and moreover plants to obtain nanoparticles. Nowadays, silver nanoparticles have been widely used in many sectors such as agriculture, textile, medicine, and biotechnology needs. This present study was to develop a simple Phyto-assisted method for the synthesis silver nanoparticles (AgNPs) using alpha-xanthone from *Garcinia mangostana* as reducing and capping agent. Plant extracts have a rich phytochemical composition including phenolics, saponins, terpenoids, flavonoids, catechins, tannins, enzymes, proteins, and others. While xanthone or *9H*-xanthen-*9*-ones (dibenzo-γ-pirone 1) comprises an important class of the oxygenated heterocycles and as phenolic compounds xanthone have been described for their properties. They contain oxygen atoms within its heterocyclic ring where the structure of xanthone consists of a heterocyclic ring resembling a phenone with two oxygen embedded within it. The xanthone ring comprises five carbon atoms and two oxygen atoms that are arranged alternately (these oxygen atoms are part of the ketone and hydroxyl groups). Due to that condition xanthone has potential to act as a metal chelator and exhibit specific biological properties and ability to form bonds with metal ions (chelating properties) which can contribute to various chemical reactions in biotechnology. The formation of AgNPs was confirmed by surface plasmon resonance, as determined by UV-visible spectra at 430 nm. The morphology (TEM), diffraction pattern (XRD), and visible absorption spectroscopy confirmed the reduction of silver ions to AgNPs, as indicated by the above-mentioned characterizations. The XRD analysis predicted the diffraction peaks of elemental silver, and the TEM images showed monodispersed nanoparticles with a specific shape. Anti-bacterial assessment of silver nanoparticles was analyzed using inhibitor zone measurements.

Keywords: Green approach; Silver nanoparticle; Xanthone; Antimicrobial

O - 018 Melatonin Content and Antioxidant Activities of Soy Milk-Based Yogurt as Affected by Co-Culture of Yogurt Bacteria and Probiotic

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Abstract

Functional foods related to sleeping quality are currently gaining attention widely in which the key component is melatonin (*N*-acetyl-5-methoxytryptamine). It is a biologically active substance that controls mood-related behaviors and circadian rhythms in humans. However, the study on the melatonin content in yogurt product is rare. Yogurt is a popular functional food product that is normally produced from cow's milk. Currently, the consumption of plant-based milk is increasing. Soy milk is one of the most popular plant-based milk because it contains high protein and has an appropriate chemical composition for the growth of lactic acid bacteria. Therefore, this study was carried out to investigate the impact of the co-culture of yogurt bacteria with probiotics on the melatonin content, antioxidant properties, and quality characteristics of soy milk-based yogurt. Four different combinations of yogurt bacteria and probiotics (freeze dried-direct vat set yogurts) including (1) *Lactobacillus delbrueckii subsp. bulgaricus* and *Streptococcus thermophilus* (SB-YC, control), (2) *Bifidobacterium lactis, Lactobacillus acidophilus, L. bulgaricus* and *S. thermophilus* (SB-ABY), (3) *B.lactis, L. acidophilus* and *S. thermophilus* (SB-ABT) and (4) *L. acidophilus, L. bulgaricus* and *S. thermophilus* (SB-LA) were used to ferment soy milk yogurt. The results revealed that the pH of all treatments was decreased while the content of lactic acid was increased with fermentation time (6 h). The syneresis (%), color values (*L**, *a**, *b**), and texture profile analysis compared among all four soy milk yogurts obtained were non-significant differences. The highest content of melatonin and tryptophan (18.55 and 303.10 ng/g dry weight, respectively) was observed in the SB-ABY sample fermented by co-culture of both probiotics and yogurt bacteria. The strongest antioxidant activity evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonate) (ABTS), and ferric reducing antioxidant power (FRAP) assay was observed in soy milk yogurt fermented by SB-ABY. The results of this study presented the successful co-culture of probiotics yogurt and yogurt bacteria to produce soy milk-based yogurt containing high melatonin content and strong antioxidant activity.

Keywords: Soy milk based yogurt; Melatonin; Antioxidant activity; Yogurt cultures; Probiotic

O – 021 Influence of Biodegradable-Based Films on the Thermochromism of Time-Temperature Indicator from Polydiacetylene-Silver Nanocomposite

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Abstract

Novel biodegradable-based time-temperature indicators (TTIs) are beneficial for controlling the quality of food and non-food products and distinguishing product deterioration by time and temperature during transportation, storage, and distribution. TTIs are expected to monitor the overall parameters of product deterioration by temperature tracking. In this work, TTIs were prepared on the biodegradable-based films, using carboxymethyl cellulose (CMC), polyvinyl alcohol (PVOH), chitosan, and carboxymethyl chitosan (CMCh) on thermochromism using polydiacetylene (PDA) – silver nanoparticles (AgNPs; 10% w/w of PDA). As a result, the vesicle and core-shell contents for the film structures were formed in chitosan and PVOH-based films. Because the chitosan (amine group) and PVOH (hydroxyl group) functional groups did not trap to interact with the PDA monomers-coated AgNPs surface during film production. Vesicles and core-shell form are small in size, which increases the surface area of PDA when that contacts with various temperatures. The developed films exhibited the changing color depending on temperature within 14 d at 35°C via the total color difference (TCD) measurement, indicating the color changing of the PDA-AgNPs embedded based film for temperature tracking of the product as the TTI devices. Particularly, the PDA-AgNPs in chitosan and PVOH-based films demonstrated the critical features of TCD, tracking the changing color from blue to reddish-purple and blue to reddish-brown, respectively. Consequently, PDA-based films can be potentially used for temperature tracking in fresh products at low temperatures, which is influenced by the core-shell structure of PDA-AgNPs embedded in chitosan and PVOH-based films.

Keywords: Intelligent packaging; Time-temperature indicator; Biodegradable polymers; Silver nanoparticles; Film formation.

O - 026 Fermented *Moringa oleifera* Seed-Cassava Mahewu Inclusion Modulates Selected Biochemical Indices of Alloxan-Induced Diabetes Model

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Abstract

Despite the availability of many pharmacological interventions for diabetes management, current evidence shows an alarming rising trend in the occurrence of undesirable complications. This confirms that other complementary approaches are required. Cassava *Mahewu* is a fermented product of cassava, widely consumed in many parts of Africa. This study evaluated the effect of fermented *Moringa oleifera* seed (MOS)-cassava mahewu inclusion on fasting blood sugar, oxidative stress, lipid profile and renal function biomarkers in rats induced with diabetes. Portions of cassava flour was replaced with MOS at 100:0 (control), 80:20 (unfermented:T1), 80:20 (fermented;T2) and 70:30% (fermented:T3). Fermentation was achieved using starter culture obtained from previously fermented mahewu containing Lactic acid bacteria *(L. lactis).* Each formulation was manually pelletized into rat feed. The effect of MOS inclusion and fermentation on proximate and selected biochemical indices of diabetic rats were evaluated. Thirty-six (36) albino rats were randomly divided into six groups. Groups B-F were rendered diabetic by a single intraperitoneal injection of alloxan (150 mg/kg b.w). Group A served as the normal control while group B-C served as diabetic and drug control groups (5mg/kg b.w metformin) respectively. Groups D-F were the diabetic rats fed T1, T2 and T3 diets. All control and test diets were given *ad libitum* for 21 days. Inclusion of *M. oleifera* seed and fermentation improved ($P<0.05$) protein (2.43-20.44g/100g dw) content while reduced the carbohydrate content (81.02 to 42.4 g/100g) after 36 h of fermentation in T3 compared with control and unfermented diet (T1). All test diets (especially T2) counteracted the alloxan-induced diabetic effects in rats by reducing ($P<0.05$) the elevated serum levels of glucose (249.0-105.6 mg/dl), Cholesterol (6.73-4.13mmol/L), TAG (2.43-1.99mmo/L), LDL (3.72-2.66mmol/L), Urea (35.3-23.2mmol/L) and malondialdehyde (2.34-1.29mg/dl) compared with diabetic group. It also improved ($P < 0.05$) glutathione (2.69-3.76mg/dl) and Catalase enzyme activity (1.52-2.90U/mg). No significant effect was recorded for HDL ($P>0.05$). Histological outcomes of pancreas and kidney corroborated these findings. Food–based approach incorporating fermented *M. oleifera* seed could be considered an effective strategy to reduce the menace of protein malnutrition and manage the complications that might arise from diabetes.

Keywords: Biochemical indices; Diabetes mellitus; Fermentation; Functional food; *Moringa oleifera* seed; Cassava

O- 034 Computational Fluid Dynamics Modeling for Optimizing UV-C Treatment in Postharvest Orange Preservation: Enhancing Safety and Sustainability

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Abstract

Ensuring the safety and quality of fresh produce demands effective decontamination methods. Traditionally, chemical preservatives have been used, but concerns about potential toxic residues on food have raised health risks. Therefore, there is a growing demand for non-chemical alternatives such as UV-C treatment, which provides safe and residue-free decontamination for fruits. However, when it comes to treating complex shapes like oranges, achieving a uniform distribution of UV-C dosage presents challenges. To address this issue, this study undertakes a comprehensive exploration, utilizing Computational Fluid Dynamics (CFD) techniques to simulate uniform UV-C treatment for oranges and estimating the time required to inactivate green mold (*Penicillium digitatum*) spores on orange surfaces through the proposed models. Five distinct UV-C configuration models were formulated, varying in lamp arrangement and the presence of covers and reflectors. Mold inactivation was simulated by combining the inactivation kinetic model with a radiation transfer model. The CFD simulations revealed that the arrangement of UV-C lamps and reflectors played a significant role in ensuring uniform UV-C dose distribution on the orange surface. Model E, comprising two pairs of UV-C lamps, covers, and reflectors, demonstrates the highest level of uniformity in incident of UV-C dosage and requires just 69 seconds to achieve 99.9% inactivation of Penicillium digitatum on oranges. Therefore, optimizing UV-C treatment protocols using CFD-based simulations can significantly reduce postharvest losses, enhance global food availability, and improve microbial inactivation processes.

Keywords: Computational Fluid Dynamics (CFD); Modeling; UV-C treatment; Postharvest Losses; *Penicillium digitatum* (green mold); Optimization

O - 036

Synbiotic and Protein-Enriched Low-Fat Sao Hai Rice Ice Cream

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Abstract

This study aimed to develop a healthier version of traditional high-fat and high-sugar ice cream by fortifying low-fat Khao Sao Hai ice cream with synbiotics, soy protein, and chicken breast protein. Incorporating Sao Hai rice milk, the objective was to transform the conventional ice cream composition. The research meticulously determined various properties of the ice cream, encompassing both physical and chemical aspects. Extensive analyses included assessments of viscosity, hardness, dissolution rate, color, pH, and microbial content. Notably, the incorporation of synbiotics, represented by *Lactobacillus acidophilus* LA5, showcased a robust probiotic survival rate exceeding 98% during storage at -20°C for 21 days. This finding underscores the successful encapsulation of probiotics with Konjac glucomannan and soy protein isolate, ensuring their viability throughout ice cream production and storage. The study further revealed that the addition of soy protein and chicken breast protein significantly influenced not only the nutritional composition but also the textural and sensory characteristics of the ice cream. Interestingly, the ice cream fortified with soy protein exhibited elevated viscosity and hardness but a lower percentage of fluffiness and melting rate compared to other formulations. Additionally, the sensory testing indicated that the control formula, without protein fortification, garnered the highest consumer acceptance, followed by soy protein-fortified ice cream, while chicken breast protein-fortified ice cream received the least acceptance. These outcomes contribute valuable insights for developing healthier and consumer-preferred ice cream formulations, promoting the utilization of Sao Hai rice and innovative protein sources in the food industry.

Keywords: Low-fat ice cream; Sao Hai rice; Synbiotics; Probiotics; Protein enrichment

O - 038 Bacterial Cellulose Produced from Empty Fruit Bunch Hydrolysate (EFB) as Potential Biomaterial for Active Packaging

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Abstract

The use of active food packaging can guarantee food quality and extend the shelf life of food. The combination of natural antimicrobial agents made from plants and biodegradable polymers is the latest trend in the field of active packaging. Empty fruit bunches (EFB) can potentially be used to produce bacterial cellulose which is a type of cellulose produced by Komagataeibacter xylinus. The objective of this study is to produce food pads from bacterial cellulose that can extend the food shelf life. In this study, EFB was used as a carbon source to produce bacterial cellulose. EFB hydrolysate was produced through alkaline pre-treatment (5% NaOH) and enzymatic saccharification (5% Accellerase®1500 enzyme, 6% substrate) for 24 h at 50°C, 200 rpm. The resulting EFB hydrolysate then went through a fermentation process for 14 days to produce bacterial cellulose. Wet and dry weight of bacterial cellulose, pH, concentration of glucose and protein produced during the bacterial cellulose fermentation process were recorded. The results showed that the optimal day for the production of bacterial cellulose was on the 10th day of fermentation, where it recorded a maximum production of 97.3 g/L for the wet weight of bacterial cellulose. The pH value decreased from 5.78 on day-0 to 4.47 after 14 days. The results show that the water holding capacity (WHC) of bacterial cellulose is 106.10 (g water/ g cellulose). Antimicrobial activity tests were then carried out against *E. coli*, and *S.* Typhi. As a positive control, ciprofloxacin (10 mg) was used. The resulting bacterial cellulose was immersed in commercial antimicrobial agent (potassium sorbate) and natural antimicrobial agents such as lemongrass extract, star anise extract and cinnamon extract. Immersion time varied to 0.5, 6, 12, 18 and 24 h. The results showed that cinnamon extract (11.3 mm, 10.6 mm) showed an inhibition zone almost comparable to potassium sorbate (12.6 mm, 13.0 mm) against both types of bacteria after 24 hours immersion time. Bacterial cellulose incorporated with cinnamon extract was subjected to biodegradation test using black soil and sand. Result showed that > 95% of bacterial cellulose immersed in cinnamon extract were decomposed in black soil (96.09%) and in sand (94.79%) on day-8. SEM analysis shows that the surface of bacterial cellulose has organized regions that are crystalline and random fibrous regions produced by fibrils. Apart from reducing pollution from the disposal of EFB, this study shows that bacterial cellulose produced from EFB is able to absorb antimicrobial agents and has potential as an active packaging.

Keywords: Bacterial cellulose; Biodegradable; Active packaging; Antimicrobial; Biodegradable

O - 041 Influence of Thermal Processing Conditions on the Physicochemical Properties, Stability and Antioxidant Activities of Rice Milk containing a Co-Encapsulated Powder of Black Rice and Green Tea

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Abstract

This research explored the effect of heating conditions on the physicochemical properties, total phenolic compounds (TPC) and antioxidant activities of Jasmine rice milk with co-encapsulated powder (CEP). The production of base Jasmine rice milk involved a two-step enzymatic process, utilizing Amylase to hydrolyze starch and a combination of Alcalase and Flavourzyme for exopeptidase and endo-peptidase activities. The suitable CEP concentration to be incorporated into the milk was studied first. Even though higher CEP concentrations resulted in elevated TPC and antioxidant activities, particularly against DPPH and ABTS free radicals, the sensory attributes like color and aroma acceptance declined at higher CEP concentrations, influencing overall acceptability. From the result, the 2% CEP concentration was chosen for investigation into the impact of thermal processing. Heating to higher temperatures and for longer durations altered the color attributes and reduced viscosity, pH, as well as the sedimentation stability of the rice milk. Furthermore, heating led to a reduction in TPC and antioxidant activities, with low temperatures and long-term pasteurization (LTLT) being more effective at preserving TPC and antioxidant activities than at the use of higher temperatures. Principal Component Analysis (PCA) was used to assess the relationships between different variables, revealing distinct groupings based on heating conditions and their impact on physicochemical properties, TPC, and antioxidant activities. Overall, the use of lower temperatures was found to be effective in maintaining TPC and antioxidant activities, whereas higher temperatures tended to prolong shelf life, whilst resulting in the development of some undesirable characteristics. The study provides valuable insights into the optimal CEP concentration in rice milk and the effects of various heating processes on its quality and bioactive properties, with implications for potential future applications in the production of plant-based beverages by adding plant extract with health benefits.

Keywords: Rice milk; Co-encapsulated powder; Pasteurization; Ultra-high temperature; In-container sterilization

O - 042 Enhancing the Functional Properties of Okara through Fermentation with *Rhizopus oligosporus* TISTR 3138: A Study on Total Phenolic Compounds and Antioxidant Activity

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Abstract

Okara, or soybean pulp, is a by-product from the soymilk production process. To enhance its value, it should be developed as a functional food. The purpose of this research was to study the changes in total phenolic compounds and antioxidant activity of fermented okara by Rhizopus oligosporus TISTR 3138. The fermented okara was used to enhance the functional properties in porridge products. Okara was fermented with R. oligosporus TISTR 3138 for 72 h at 35°C. The fermented okara was then processed into porridge products using the foam-mat drying method. The experiments consisted of four conditions: 1) rice porridge, 2) fermented okara porridge, 3) porridge from rice mixed with fermented okara 75% (w/w), and 4) porridge from rice mixed with fermented okara 50% (w/w). Analysis of the samples included determination of total phenolic content (TPC), 2,2-diphenyl -1-picrylhydrazyl (DPPH) scavenging activity. The results revealed that the fermented okara had a total phenolic content of 331.48 mg GAE/g extract and antioxidant activity against DPPH of 46.27 ± 3.14%, which were higher than those in unfermented okara, which were 2.68 mg GAE/g extract and 2.95 ± 0.16%, respectively. The porridge made from fermented okara exhibited the highest total phenolic content at 458.68 mg GAE/g extract, with an antioxidant activity of 66.82 ± 1.33%. These values were notably higher compared to rice porridge, by 30 times for total phenolic content and 6 times for antioxidant activity. These results indicate that incorporating fermented okara can improve the functional properties of porridge products. Consequently, the utilization of fermented okara as a functional ingredient in food products presents an intriguing prospect.

Keywords: Okara; Fermentation; Functional food; Porridge; *Rhizopus oligosporus*

O - 044 Adzuki Bean and Mung Bean Hydrolysates as a Source of Bioactive Peptides: Action of Alcalase and Flavouzyme

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Abstract

Enzymatic hydrolysis is considered the most common method to generate biologically-active peptides showing a broad spectrum of biological activities as well as health-promoting activity. Numerous studies have shown that extensive hydrolysis of proteins from various sources provides peptides with small molecular size, exhibiting antioxidant and health-promoting properties. In this study, protein isolates from adzuki bean (*Vigna angularis*) and mung bean (*Vigna radiata*) were used as substrates for enzymatic hydrolysis using two peptidases (Alcalase and Flavourzyme). Antioxidant, Angiotensin I-Converting Enzyme (ACE) inhibitory, and Dipeptidyl Peptidase 4 (DPP-IV) inhibitory activities of all hydrolysates, a degree of hydrolysis about 53-56%, revealed that both the type of peptidase and bean protein influenced the biological properties of the hydrolysates. Alcalase hydrolysate showed more potent activity in ABTS radical scavenging and metal ion chelating than Flavourzyme hydrolysates while Flavourzyme had a greater effect on producing peptides with higher FRAP value. These findings were due to the difference in the specificity of peptidases and the amino acid sequence in proteins. The results also indicated that Alcalase hydrolysates were more involved in ACE-inhibitory activity than Flavourzyme hydrolysates. IC_{50} of Alcalase bean protein hydrolysate was 48.7 ± 2.5 µg/mL. Flavourzyme had a higher capacity for generating active peptides from both mung bean and adzuki bean proteins with higher levels of DPP-IV inhibitory activity. Bean hydrolysates were fractionated using size exclusion-HPLC and the results showed that peptides with small molecular size, 1 kDa or below, had higher antioxidant, ACE-inhibitory, and DPP-IV inhibitory activity. It was demonstrated that each peptidase showed specific selectivity in cleaving the designated substrate at a specific site, generating specific peptides with specific function. Using proteomics and bioinformaticstechniques, it was found that the biological activity of bioactive peptide was dependent on the position and presence of certain amino acid in the peptide sequence.

Keywords: Bioactive peptides; Mung bean; Adzuki bean; Peptidase

O - 045 Production of Cellulose Nanofiber from Lime Residue Using Thermal Pretreatment Coupled with High-Shear Homogenization

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Abstract

The production of cellulose nanofiber (CNF) via the use of chemical-free techniques was proposed. Lime (*Citrus aurantifolia* Swingle) residue after juice extraction was pretreated in hot water at 95°C for 2 h. The pretreated sample was then washed using distilled water for up to 2 cycles to remove non-cellulosic components. Defibrillation was conducted by high-shear homogenization at 26,000 rpm for 10-40 min. Note that all defibrillation conditions could provide nanoscale fiber (8-41 nm); extended defibrillation time gave a narrower diameter distribution. The viscoelasticity of the sample was measured in terms of storage modulus (G') and loss modulus (G''). The results showed that all samples exhibited gel-like behavior, which was a unique property of nanocellulose. An increase in washing cycles and defibrillation time led to improved G' and G'' values. CNF having a diameter in a range of 8-28 nm could be obtained for the sample undergone thermal pretreatment and washing for 2 cycles followed by high-shear homogenization for 30 min.

Keywords: Lime residue; Cellulose nanofiber; Thermal pretreatment; High-shear homogenization

O - 047 Evaluation of Antioxidant Activity, Total Phenolic Content, and Total Flavonoid Content of Betong Watercress

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Abstract

Antioxidants play an important role in mitigating various diseases. Watercress (*Nasturtium officinale* R.Br.), a member of the cruciferous vegetable family, contains various nutrients and phytochemicals. However, the antioxidant information of the watercress cultivated in Thailand, Betong watercress, is insufficient. The purpose of the current study was to determine the levels of phenolic and flavonoid compounds and evaluate the antioxidant properties of Betong watercress. Aqueous and ethanolic extracts of Betong watercress were prepared for the *in vitro* experiments. The total phenolic content and total flavonoid content of watercress extracts were evaluated. The antioxidant activities of the extracts were measured using the ferric reducing antioxidant power (FRAP) assay, the 2,2-diphenyl-1-picrylhydrazyl hydrate (DPPH) free radical scavenging assay, and the 2,2'-azino-bis (3-ethylbenzthiazoline-6-sulphonic acid) (ABTS) free radical scavenging assay. The results demonstrated that the amounts of total phenolic and total flavonoid in the ethanolic extract, 41.14 ± 0.66 mg gallic acid equivalent/g extract and 13.94 ± 0.44 mg quercetin equivalent/g extract, respectively, were significantly higher than those in the aqueous extract, 33.98 ± 1.56 mg gallic acid equivalent/g extract and 7.87 ± 0.59 mg quercetin equivalent/g extract, respectively. The antioxidant activities of the aqueous extract, as analyzed by FRAP, DPPH, and ABTS assays, were 52.60 ± 0.64, 43.73 ± 3.53, and 95.36 ± 4.16 mg trolox equivalent/g extract, respectively. In comparison, those of the ethanolic extract were 62.55 ± 3.18, 66.48 ± 3.81, and 119.09 ± 1.31 mg trolox equivalent/g extract, respectively. Similarly to the results on total phenolic content and total flavonoid content, the ethanolic extract of Betong watercress showed significantly higher antioxidant properties than the aqueous extract. Moreover, the antioxidant activities of watercress extract had strong correlations with the total phenolic content and the total flavonoid content. In conclusion, the antioxidant potential of Betong watercress might be due to its polyphenol compounds. Nevertheless, further studies are required to confirm the health benefits of Betong watercress consumption.

Keywords: Betong watercress; Antioxidant activity; Total phenolic content; Total flavonoid content

O - 049 Preparation of Soy Protein-Based Meat Analogs by Freeze Alignment Technique: A Relationship between Preparation Conditions and Textural Properties

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Abstract

Growing global demand for sustainable and healthier food has boosted the market for plant-based meat analogs (PBMA). Concerns about meat shortages, the environmental impact of livestock production, and evolving consumer preferences drive this growth. Livestock agriculture's negative environmental effects, such as greenhouse gas emissions, water usage, and land use, underscore the need for more sustainable alternatives. Despite rising interest in PBMA, gaining consumer acceptance remains a challenge, necessitating the development of products replicating meat's taste, appearance, and flavor. Researchers focus on texturizing techniques to improve PBMA quality, with fibrous texture requiring advanced processing and suitable formulations. Soybean is a recognized, high-quality alternative to animal protein. This study used the freeze alignment technique, involving freezing protein gels and removing ice crystals to create a porous microstructure resembling meat's textural properties. This study aims to investigate the impact of freezing conditions and temperatures on the porous microstructure and aligned structure formation of soy protein-based meat analogs. The freezing conditions were varied between 4-direction freezing (4-D) and 1-direction freezing (1-D), with a temperature range from -10 to -80°C. The samples were cut perpendicular to the freezing direction, and their microstructures were observed using a digital microscope to determine the average pore size at different positions within the samples. The results reveal that 4-D freezing exhibits a higher freezing front rate and temperature gradient compared to the 1-D freezing condition. Consequently, the size of ice crystals varies accordingly. In the case of 4-D freezing, there is no significant difference in pore size based on position. Conversely, the pore size structure of samples subjected to 1-D freezing tends to be larger in farther positions. Additionally, lower freezing temperatures lead to a smaller pore size structure. In summary, the structure of soy protein-based meat analogs by freeze alignment technique is significantly influenced by the freezing front rate and temperature gradients of the freezing conditions.

Keywords: Meat analogs; Plant-based meat; Freeze alignment; Structure formation

O - 062 Citral Encapsulation using Hydrophobic Modified Starch for Indirect Contact Active Packaging in Shrimp Preservation

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Abstract

Citral essential oil is easily volatilized at room temperature limiting the long-term release for antimicrobial food preservatives. Encapsulation using a proper wall matrix such as hydrophobic modified thermoplastic starch (TPS) namely octenyl succinic anhydride starch (OS) and acetylated starch (AS) possibly controls the release behavior. This research developed a citral (≥96%, FCC, FG grade) encapsulation granules using hydrophobic TPS (AS and OS) via extrusion for indirect contact of shrimp preservation. Effects of different TPS and ratio (AS10:EO1, AS10:EO2, OS10:EO1, and OS10:EO2) on physical and chemical structure, and antibacterial efficacy of TPS encapsulated citral (TPS-Ecit) were determined. Additionally, quality of packaged shrimp during storage with TPS-Ecit granules were monitored. Scanning electron microscope images revealed the presence of citral in globular shape embedded inside the TPS matrix. Moreover, Infrared spectra suggested that the citral was immobilized in the TPS-glycerol matrix, involving the stretching vibration of aromatic ring. TPS-Ecit had lower density and water solubility than TPS due to the presence of hydrophobic nature of oil embedded inside the matrix as water hindrance. OS-Ecit demonstrated higher encapsulation efficiency compared to AS-Ecit. The TPS-Ecit effectively inhibited the *Bacillus cereus* in direct contact and vapor phase method. The ability of citral to release from the encapsulation granular system reduced the microbial growth in fresh shrimp, which further prevented the formation of melanosis. In conclusion, hydrophobic modified OS and AS serve as successful wall matrices for delivering the volatile

Keywords: Antimicrobial; Citral; Encapsulation; Hydrophobic modified starch; Shrimp preservative

O - 064 Pregelatinized Cassava Starch Films as Carrier for Probiotic

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Abstract

Edible film is produced using food-grade, sustainable, biodegradable polymers which have a high potential to carry bioactive compounds. This study aimed to prepare and characterize bio-edible film based on three different types of pregelatinized cassava starch that can be a carrier for probiotic supplements. The films were produced using the solution casting method and the solutions were dried at low temperature. The films obtained were characterized by Fourier transform infrared spectrometer (FTIR), Ultraviolet-Visible spectroscopy (UV-Vis), solubility, water vapor permeability (WVP) and surface hydrophobicity. FTIR revealed the presence of C-O stretching and O-H stretching vibration, with varied intensity which attributed to different levels of hydrogen bonding in starch. Films with less surface hydrophobicity are likely affected by surface roughness. All films showed a high degree of solubility. However, different rates of water dissolution were observed in different types of starch, probably due to fast absorption and penetration of water. Moreover, different strains of probiotics (*Lactiplantibacillus plantarum* HM04-88, *Limosilactobacillus fermentum* KUB-D18 and *Limosilactobacillus reuteri* KUB-AC5) were added into pregelatinized starch mixtures and produced for edible films. *Lactiplantibacillus plantarum* HM04-88 was the only probiotic that can survive after the drying process and the viability reduced from 1.45×10^7 CFU/g to 6.4×10^4 CFU/g. These findings show that pregelatinized starch film has a potential edible packaging material as the carrier for probiotics in a novel edible packaging.

Keywords: Food packaging; Pregelatinized starch; Edible film; Probiotic; Carrier

O - 065 Optimization of Perilla Seed Oil Extraction Using Supercritical CO_2

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Abstract

In this work, extraction of perilla oil from perilla seeds using supercritical carbon dioxide was studied. Response surface methodology was used to investigate the optimum conditions of perilla oil extraction at pressures of 200, 225 and 250 bar and temperatures of 40, 50 and 60°C. Fatty acid composition was also investigated. The result show that the optimal condition was obtained at 60°C under a pressure of 215 bar. Under this extraction condition, the predicted value of % oil yield, TPC, DPPH (IC_{50}), ABTS (IC_{50}), AV, PV, IV and SV were 36.44%, 12.61 mg GAE/100 g, 10.82 mg/mL, 153.67 mg/mL, 1.19 mg KOH/g, 0.91 mEq O_2/kg, 198.87 g I_2 /100 g and 196.30 mg KOH/g oil respectively.

Keywords: Perilla seed oil; Supercritical carbon dioxide; Response surface methodology

O - 068 Extrusion of Maltol and Biodegradable Polyester Blends as Antifungal Active Food Packaging

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Abstract

Active packaging can reduce, retard, and inhibit microorganism. The incorporation of volatile antimicrobial compounds into the vapor-released film possibly inhibits the growth of microorganisms in packaged food and baked goods. The aim of this study was to create active packaging that can extend the bakery's shelf life by introducing volatile compound into the biopolymer films. Films containing 40% polybutylene adipate terephthalate (PBAT) and 60% polybutylene succinate (PBS) were produced via cast film extrusion with 0, 3, and 6% maltol contents. The introduction of volatile flavoring chemicals into polymer blends caused a decrease in oxygen permeability due to the formation of network interactions. PBAT/PBS films with maltol showed high antimicrobial efficacy against *Staphylococcus aureus* and *Aspergillus niger*. The film is converted and heat-sealed into bags for butter cake packaging. The PBAT/PBS films with maltol were used to package butter cake, which effectively delayed fungal growth for almost three times during storage at 25°C. As a result, a volatile substance i.e., maltol is effectively utilized in active packaging to maintain the quality, delaying fungal growth of packaged butter cake.

Keywords: Active packaging; Volatile compound; Antimicrobial; Food packaging; Butter cake

O - 069 Poly (Lactic acid) Film Incorporating Polyethylene Glycol and EDTA Produced by Extrusion

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Abstract

Antibacterial food packaging is one of the technologies to improve food safety and quality by reducing the growth of bacteria. The antimicrobial performance of poly (lactic acid) (PLA) material may be enhanced by using a plasticizer and an antimicrobial with a chelating agent. Antibacterial PLA films were produced by incorporating varying amounts of polyethylene glycol (PEG) (5 and 10 wt%) and EDTA (2 and 5 wt%) via the melt-extrusion process. The addition of EDTA increased surface roughness and discontinuities in the PLA/PEG matrix, that affected the films' swelling, water solubility, and wettability. The formation of hydrogen bonds between the functional groups of PLA and PEG/EDTA affected the amorphous and crystalline peak intensities as measured by Fourier transform infrared spectroscopy (FTIR). The combination of PEG and EDTA affected the movement of PLA chains, which slightly reduced the T_g, T_c and T_m of the films. The thermogravimetric analysis (TGA) showed the onset temperature of the blend films was higher, suggesting that adding PEG and EDTA increased the thermal stability of films. Moreover, the PLA incorporated PEG and EDTA film, resulting in a strong reduction in total viable cell counts for *Staphylococcus aureus*. The antibacterial performance of PLA/EDTA blend films can be enhanced by the plasticizing effect of polyethylene glycol.

Keywords: Food packaging; Food safety; *Staphylococcus aureus*; Antibacterial; Poly (lactic acid)

O - 071 Development of Functional Packaging Film to Improve the Texture of Plant-Based Meat

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Abstract

Transglutaminases is an enzyme used to crosslink the structure of proteins. Plant-based meat products have limitation on textural properties, requiring firmer structures for consumer interest. Utilization of texture enhancer possibly improve the texture characteristics of the products. This research aimed to develop functional packaging to improve the texture of plant-based meat. Transglutaminases were incorporated into cassava starch film incorporated with transglutaminases were fabricated by a solution casting. The films were analyzed using Fourier Transform infrared spectroscopy (FTIR), solubility, water vapor permeability (WVP) and transparency properties. Plant-based meats were packed with active films and analyzed for appearance and texture attributes. FTIR bands indicated an evident of interaction between starch and transglutaminases through N-H were increase intensity at 1650 cm^{-1}. All films have low water solubility and incompletely soluble water. There was no significant difference in the WVP among the edible films. The contact angle was increased after incorporating the Transglutaminase into cassava swash, indicating an improvement of hydrophobicity. Moreover, the texture of plant-based meat patties was effectively improved by packing with edible films containing transglutaminase, which increased the hardness. Results suggested the release and interaction between transglutaminase in the films which caused the cross-linking of protein networks in plant-based meat. Accordingly, the cassava starch proved to be a suitable film material for carrying transglutaminases, leading to a firmer texture in plant-based meat

Keywords: Packaging film; Cassava Starch; Transglutaminase; Plant based meat

O - 072 Cultivation Kinetics Analysis of Xylitol Production Using 10:1 Mass Ratio of Xylose/Glucose Co-substrates by *Candida tropicalis*

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Abstract

Xylitol (Xytl), an interesting candidate of high valued bio-based chemicals, is widely applied in food and pharmaceutical industries. Lignocellulosic biomass is one of the most abundant organic and renewable materials in nature with annually production of 181.5 billion tons. Biological xylitol production through xylose (Xyl)-rich hemicellulosic fractions is considered a less laborious and more economical alternative compared to chemical counterpart. Hemicellulosic hydrolysate with low glucose (Glu) concentration could facilitate the xylitol production pathway. Higher xylitol accumulation was previously reported with optimal Xyl and Glu mass ratio of 10:1. Three cultivation kinetics parameters, namely, xylitol concentration ([Xytl]), mass yield of xylitol produced over xylose consumed ($Y_{Xylt/Xyl}$), and xylitol productivity (Q_{Xytl}), were evaluated from batch cultivation system of *Candida tropicalis* using initial overall sugars concentration in the range of 11 (10 Xyl + 1 Glu) -110 (100 Xyl + 10 Glu) g/L. The range of [Xytl], $Y_{Xytl/Xyl}$, and Q_{Xytl} were between 3.55-64.5 g/L, 0.32-0.64 g/g, 0.05-0.90 g/L/h, respectively. Both evaluation of the sums of two ($Y_{Xytl/Xyl}$, Q_{Xytl}) and three ([Xytl], $Y_{Xytl/Xyl}$, Q_{Xytl}) factors resulting in the optimal initial overall sugars concentration for xylitol production of 100 g/L. This optimal initial substrate concentration provides useful information in bioconversion of hemicellulosic hydrolysate experimental design.

Keywords: Co-substrate; Xylitol; Sustainability; *Candida tropicalis*

O - 075 The Impact of Heat Treatments on Protein Content, Bioactive Compounds, and Antioxidant Activity in Three Selected Mushroom

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Abstract

King Oyster mushroom (*Pleurotus eryngii*), Shimeji mushroom (*Hypsizygus commune),* and Split Grill mushroom (*Schizophyllum commune*) were analyzed protein content, bioactive compounds, and antioxidant activities after treated by heat treatments including; boiling (100°C for 20 min), steaming (100°C for 20 min), and grilling (180°C for 3 min). The results revealed that steaming was the most effective method for color and nutritional preservation among the heat treatments and the control. Steaming maintained the protein content of King Oyster, Shimeji, and Split Grill mushrooms at 15.44, 19.79 and 29.38 g/100 g dry weight basis of mushroom sample, respectively. Steaming significantly increased total phenolic compounds of the three mushrooms to 42.99, 46.80, and 20.80 mg GAE/100g, respectively. Steaming also significantly increased β-glucans to 26.40, 31.99, and 47.86%, respectively for the three selected mushrooms when compared to the other heat treatments. In contrast, boiling and grilling significantly decreased the content of protein, phenolic, and β-glucans in the samples. The results of antioxidant activities indicated that different heat treatments had distinct effects on 1,1-diphenyl-2-picrylhydrazyl free-radical scavenging (DPPH) and ferric reducing antioxidant power (FRAP) assay for the three mushrooms in this study. The boiling process significantly increased DPPH in three mushrooms from 24.90 to 38.40, 28.60 to 43.51, and 12.58 to 20.81 mmoL TE/100g dry weight basis whereas DPPH was significantly decreased in the grilling process and non-significant in the steaming process. The FRAP result showed non-significant in King Oyster mushroom (*Pleurotus eryngii*) whereas it was significantly decreased in Shimeji mushroom (*Hypsizygus commune)* from 33.02 to 24.28 in boiling process and 33.02 to 8.90 mmoL $FeSO_4$/100g dry weight basis in grilling process. Whereas it was significantly increased in Split Grill mushroom *(Schizophyllum commune)* from 25.41 to 36.43 mmoL $FeSO_4$/100g dry weight basis in boiling process and significantly decreased from 25.41 to 14.81 mmoL $FeSO_4$/100g dry weight basis in grilling process, and it was non-significant in steaming process. This study could provide insightful information regarding suitable heat treatments for these three mushroom species that could be utilized by the food industry, based on their impact on nutritional compounds and antioxidant activities.

Keywords: Bioactive compounds; Edible mushroom; Heat treatment; Antioxidant activity; Nutritional composition

O - 077 Effect of High Pressure Processing on the Quality of *Oryza sativa* L., Kum Doi Saket Variety Grass Juice

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Abstract

Kum Doi Saket (KDS) is a black purple glutinous rice cultivar (*Oryza sativa* L.) that is widely grown in the north and north-east of Thailand. Juice squeezed from KDS rice grass harvested at the jointing stage exhibited the considerable levels of phenolic compounds, antioxidants, and anthocyanin. However, the limitation of rice grass juice is that it is perishable and has a short shelf-life. Therefore, it is necessary to develop appropriate preservation strategies to enhance the shelf life of rice grass juice while maintaining its phytochemical properties and guaranteeing product safety. The objectives of this research were to find out the conditions of high pressure processing (HPP) and heat treatment (HT) which can inactivate pathogenic bacteria up to the target of 5 log reduction and to evaluate the influence of HPP and HT on phytochemical properties of KDS rice grass juice. In this study, KDS rice grass harvested at day 9 after planting was used to make the juice. The juices with the inoculation of *Escherichia coli* K12 ATCC 10798 and *Listeria innocua* JCM 32814 were treated by HPP (400-600Mpa / 25ºC / 5-15 min) and HT (80°C / 2-8 min), respectively. The results of HPP treatment showed that the elevation of pressure from 400MPa to 600MPa remarked the significant increase in microbial reduction. At the pressure of 600MPa, the bacterial inactivation increased significantly as the holding treatment time was extended from 5min to 10min. Overall, HPP at 600MPa for 10 min and HT at 80°C for 8 min could significantly inactivate both strains of bacteria for more than 5 log reduction. However, compared to control sample, the sample treated by HT (80°C, 8 min) resulted in the significant decrease in total phenolic content (45.96% reduction); antioxidant activity (46.34% reduction), and anthocyanin content (48.46% reduction) while the HPP (600MPa, 10min) did not significantly change the properties of rice grass juice. In conclusion, HPP can be considered as a potential innovative technique to eliminate the targeted bacteria in KDS juice while maintaining the bioactivities similar to those of the fresh juice.

Keywords: High pressure processing; Kum Doi Saket rice grass juice; Log reduction; Phytochemical properties

O - 078

Screening of Lignocellulosic Biomass and *Candida* spp. strain for Optimal Xylitol Production Based on Score Ranking Strategy

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Abstract

The production of xylitol, a valuable sugar alcohol derived from various lignocellulosic biomass, is a promising and sustainable method. This study aims to screen a single yeast strain and a corresponding type of lignocellulosic biomass for statistical significantly highest ($P \leq 0.05$) xylitol production through score ranking strategy by assessing weighed yields and productivity. The cultivation time course of *Candida magnoliae* TISTR 5664 (CM), *C. tropicalis* TISTR 5306 (CT), and *C. guilliermondii* TISTR 5068 (CG) were assessed using xylose-rich hemicellulosic hydrolysates from Corn Cob (CC), Sugarcane Bagasse (SCB), and Rice Straw (RS) without additional detoxification steps. The pretreatment involved using optimized dilute sulphuric acid for each substrate, resulting in 19.4 ± 0.13g/L of xylose for CC, 13.4 ± 0.12 g/L for RS, and 11.7 ± 0.05 g/L for SCB. CT cultivated in CC medium exhibited the statistical significantly highest ($P \leq 0.05$) xylitol concentration at 5.56±0.09 g/L while CG in SCB had the highest $Y_{p/s}$ of 0.37 g/g. For $Y_{x/s}$, CT and CM in RS had statistically significant highest ($P \leq 0.05$) values between 0.29-0.30 g/g. The score ranking of CM and CT in RS as well as CT in CC are statistical significantly higher ($P \leq 0.05$) than others with corresponding descending scores of 272 ± 4.9, 258 ± 3.4, and 252 ± 3.2 respectively. RS should thus be prioritized as the primary substrate in xylitol production for cultivation of CM and CT. Future works to optimize xylitol production may include scale-up investigation as well as search for optimal cultivation conditions and nutrient composition.

Keywords: Hemicellulosic hydrolysates; Kinetic parameters; Lignocellulosic biomass; Xylitol; Productivity; Yield

O - 079 PLA-Based Sheets and Trays Incorporating ZnO and Trans-Cinnamaldehyde as Active Food Packaging

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Abstract

Packaging is essential in the food industry, as it provides protection against both intrinsic and extrinsic factors leading to food deterioration. Light exposure and microbial contamination are the major causes of deterioration processes. Zinc oxide nanoparticles (ZnONPs) and trans-cinnamaldehyde (CIN) have been reported to possess UV-shielding properties while they exhibit antimicrobial activities. This study aimed to evaluate the effects of ZnONPs and CIN on the antibacterial activity and UV-shielding properties of bioplastic sheets. In this study, ZnONPs and CIN were incorporated into biodegradable poly (lactic) acid (PLA) using cast-sheet extrusion. Optical properties, surface wettability, Fourier transform infrared (FT-IR) spectroscopy, mechanical, and barrier properties were investigated. PLA/ZnO sheets had superior UV-shielding properties higher than PLA/CIN sheets. Moreover, the addition of ZnONPs and CIN decreased surface wettability, corresponding to a smoother surface morphology. The microvoids formed by ZnONPs and the plasticizing effects of CIN resulted in a decrease in PLA's elongation at break (EB) and tensile strength (TS). Insignificant differences in water vapor permeability (WVP) values were found in all PLA-based sheets. It was probably due to the hydrophobicity of CIN, while the ZnONPs effectively limited the transfer of water vapor through the PLA matrix. Additionally, ZnONPs also limited the diffusion and permeation of gases. Besides, the oxygen permeability (OP) of PLA/CIN decreased due to a reduction in the non-polar phase. Thermoforming produced PLA/ZnO and PLA/CIN trays that showed slight shrinkage after storage for 30 days. Increasing levels of CIN in PLA trays increased the degree of structural deformation. Accordingly, ZnONPs and CIN provide an improvement in barrier properties with minimal changes in chemical characteristics, while mechanical properties and dimensional stability are drawbacks to full utilization.

Keywords: Food packaging; Active packaging; Nanoparticles; Essential oil; Biodegradable

O - 080 Blown-extrusion of TPS/PBAT/Ascorbyl Palmitate Films as Antioxidant Packaging

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Abstract

Thermoplastic starch (TPS) and poly (butylene adipate-co-terephthalate) (PBAT) are bioplastic materials as alternatives to produce environmentally friendly food packaging, replacing conventional proteleum-based and non-biodegradable packaging. Ascorbyl palmitate (AP), also known as vitamin C palmitate, has been used as an industrial antioxidant compound. This study aims to develop TPS and PBAT incorporated with AP that can possibly be an antioxidative food packaging. TPS was blended with PBAT and the AP (up to 3%wt) was compounded using twin-screw extrusion. Films were produced by blown film extrusion and investigated for Fourier transform infrared spectroscopy (FTIR), mechanical, barrier, and surface hydrophobicity properties. The results indicate that the addition of AP increased the mechanical strength, while increasing the contact angle values. The concentration of AP modified the hydrophobicity of the matrices, influencing the water vapor and oxygen permeability of films. Based on DPPH assays, the addition of AP increased the antioxidant capacity of TPS/PBAT film. Accordingly, the TPS/PBAT/AP blown films can be a suitable materials for limiting the oxidative degradation in packaged products.

Keywords: Active packaging; Thermoplastic starch; PBAT; Ascorbyl palmitate; Biodegradable

O - 082 Comparison of Protein Isolated from Germinated and Fermented Mung Bean (*Vigna radiata* L.) in Extraction and Characterization

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Abstract

Mung beans are sources for their high protein content and diverse amino acid profile, offering health benefits. This study focused on the characterization of mung bean flour, as well as the extraction and preparation of protein: hulled mung bean (HMB), germinated mung bean (GMB), and fermented mung bean (TMB). Proximate analysis of mung bean flour encompassed assessments of protein, fat, fiber, ash, carbohydrate, moisture content, and water activity, revealing varying from 25% to 33%, 21% to 24%, 1.23% to 3.60%, 2.71 to 4.74%, 33% to 34%, 4.20% to 7.26% and 0.36 to 0.57, respectively. Furthermore, mung bean protein extraction was performed using alkaline (pH 9.5) and acid (pH 4.6) conditions, resulting in the highest protein content (78.35 ± 0.66 mg/g) observed in the HMB isolate. Solubility assessments indicated that protein isolated from hulled mung bean protein (HMBP) and Germinated mung bean protein (GMBP) exhibited solubility within the pH range of 9 to 11. Conversely, fermented mung bean protein (TMBP) displayed increased solubility with elevated pH, reaching its maximum solubility under alkaline conditions. Antioxidation of protein by DPPH and ABTS assay, which ranges from 16.90 to 50.05 mg GAE and 17.35% to 28.18%, respectively. An analysis of the functional groups of mung bean protein revealed a prominent amide I (~1640 cm^{-1}) and amide II (1535 cm^{-1}). The amide I band was characterized by protein secondary structures like β-sheet structure. These discoveries provided valuable insights into the nutritional composition and protein characteristics of different mung bean preparations, underscoring their potential applications in the food and health industries.

Keywords: Mung bean protein; Germinated mung bean; Tempeh; Protein isolate; Extraction

O - 085 Valorization of Asian Seabass By-Products from Ko Yo Island, Songkhla, Thailand

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Abstract

Asian seabass (*Lates calcarifer*) is largely cultured by residents of Ko Yo Island located in the Songkhla Lake, Songkla, Thailand. Commercialization of Asian seabass is under the operation of Rak Ko Yo Community Enterprise. The fish is mainly sold in fresh whole fish or smoked fillets. The secondary products, i.e., head, tail, and fish bones with flesh are cheaply sold in a frozen form. One strategy to increase residents' income was to add value to the fish's undervalued parts by turning them into concentrated broth. Bones with flesh and tails were simmered with some vegetables and spices. The filtered concentrated broth was filled in a 300 mL. pouch and sterilized. A sterility test proved that there were no *Clostridium botulinum*, mesophilic and thermophilic flat-sour. The concentrated broth pH was 5.49 ± 0.01. The pH slightly increased after onefold and two-fold dilution. The water activity was 0.99 ± 0.00 at 25℃ and did not change with dilution. A test for heavy metals showed that mercury was detected with less than 0.01 ppm meanwhile there was no detection of cadmium and lead. Accelerated shelf-life testing showed that at 35℃ the product would last 12 months, while at 45℃ it would last 6 months. A product acceptance test using the Just About Right scale revealed that six product attributes, i.e., color, turbidity, aroma, flavor, saltiness, and sweetness were in the range of 70-90 with a net effect of less than 20. Twenty-nine out of 30 consumers (96.67%) accepted the product. The concentrated broth developed from Asian seabass cheaper cuts has the potential to be commercialized.

Keywords: Valorization; Asian seabass; Undervalued fish parts; Concentrated broth; Food product characterization

O - 086 Investigation on the Effect of Resistant Starch Modified from Ducasse Banana Encapsulating *Lactiplantibacillus plantarum* CMUB-N14 in Supplementary Yogurt

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Abstract

Metabolic syndrome has become remarkably serious, especially in Asian people because of an increase in their lifestyle-related disease. A number of studies have suggested that probiotics modulate gut microbiota and improve metabolic syndrome via their metabolic abilities. *Lactiplantibacillus plantarum* CMUB-N14, a potential probiotic for metabolic syndrome management, is isolated from Naem, a Thai sour pork. In vitro study revealed that it produces high short-chain fatty acids (SCFAs) and lactic acid, has high cholesterol assimilation, and shows bile salt hydrolase (BSH) activity, these abilities of which are considered as a probiotic improving the metabolic syndrome. However, probiotics being able to function in the gastrointestinal (GI) tract, must be available in large enough quantities and can tolerate in the digestive system. In this study, we aimed to modify resistant starch (RS) from raw Ducasse banana, a local fruit in Chiang Mai, for encapsulating *L. plantarum* CMUB-N14 and applying it into yogurt. By three steps of gelatinization, debranching, and retrogradation, the results showed that the RS had significantly lower moisture content (7.34 ± 0.18%) and whiteness index (59.86 ± 0.01%), compared to unmodified starch (10.72 ± 0.18% and 73.41 ± 1.26%, respectively). On the other hand, the RS significantly showed RS content at 55.97 ± 19.10% higher than unmodified starch at 29.09 ± 8.16%, but not significantly different in amylose content (28.58 ± 0.47 and 31.88 ± 1.10, respectively). *L. plantarum* CMUB-N14 encapsulated by the RS could maintain its viable cells (log 8.897 cfu/g) at 4°C for six months. Yogurt supplemented with the CMUB-N14 strain encapsulation at 1% w/w (~ log 7.000 cfu/g) indicated the total taste score at 6.5 ± 1.2, while the control (original yogurt) indicated a little bit higher at 6.6 ± 1.4, analyzed by the 9-point hedonic scale. This supplementary yogurt could be a functional food promoting health in the future.

Keywords: Probiotic; Prebiotic; Resistant starch; Lactic acid bacteria; Yogurt

O - 089 Comparison of Quality Characteristics of Different Tea Types

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Abstract

The study assessed the presence of bioactive components and the antioxidant capacity of four different types of tea waste derived from *Camellia sinensis*, including Pu-erh tea (raw and ripened), green tea, and black tea. Each of the qualities was compared to those of dried butterfly pea flower, a well-known product derived from different plants. The study revealed the amount of total phenolic (TPC), total flavonoid (TFC), and total polysaccharides (TPS) in all samples, as well as their antioxidant capacities. It was shown that waste generated from raw Pu-erh and green tea had comparable characteristics in terms of their TFC and TPC levels. The aforementioned characteristics resulted in the most elevated antioxidant activity as evaluated by the DPPH and ORAC assays in raw Pu-erh and green tea. The waste generated from Ripen Pu-erh tea and black tea exhibited a marginally reduced concentration of bioactive chemicals and bioactivity in comparison to other samples obtained from *Camellia sinensis*. Furthermore, the dried butterfly pea flower had the highest total phenolic content, but the caffeine level was minimal, as seen by its lowest values from DPPH and ORAC assay

Keywords: Fermented tea; Green tea; Antioxidant capacity

O-090 Optimization of Sliced Garlic Using Vacuum Drying by Response Surface Methodology

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Abstract

Optimizing conditions for vacuum drying of sliced garlic were investigated to control the water activity and study the properties of vacuum dried garlic such as moisture content, color, texture, and the amount of allicin. The experimental design was determined using Box-Behnken with the Response Surface Methodology (RSM). The factors include temperature (50-70°C), pressure (5-25 inHg), and time (2-6 h). It was found that the optimum conditions for vacuum drying of sliced garlic were 69°C, 20 inHg, and 3.5 h. The predicted water activity value and the observed value of the vacuum-dried garlic at the optimum conditions were 0.3003 and 0.3547, respectively, which are in the range that can inhibit microbial growth and reduce the rate of lipid oxidation. The properties of vacuum dried garlic were studied including moisture content at 5.23%, color value L^* a^* b^* at 86.67, 11.81, and 40.91, respectively, hardness at 25056 (g) force and allicin concentration at 3.722 mg/g**.**

Keywords: Garlic; Water activity; Response surface methodology; Vacuum drying

O-095 Accelerated Extraction of Flavonoids, Polysaccharides and Triterpenes from Lingzhi (*Ganoderma lucidum*) Using Microwave-Assisted Extraction

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Abstract

The objective of this study was to optimize the conditions for microwave-assisted extraction (MAE) of Lingzhi extract. Response surface methodology was employed to maximize the yield of flavonoids, polysaccharides, and triterpenes extracted from Lingzhi by varying three independent microwave variables. A 33-factorial design was utilised to assess the effects of these microwave variables on the observed parameters. The three factors investigated were the solvent used (0% (water), 50% ethanol, and 95% ethanol), microwave power (400, 600, and 800 W), and extraction duration (30 sec, 1 min, and 1 min 30 sec). The extraction ratio was 1:20 w/v for dried Lingzhi to solvent. The solvent factor had a consistently positive impact on all observed values. In contrast, microwave frequency harmed total flavonoids and total triterpenes. Additionally, extraction time showed a negative impact on all bioactive compounds, possibly due to compound degradation. Regression analysis demonstrated a good fit with the experimental data. The results revealed that the optimal theoretical extraction conditions involved 65.35% ethanol, a microwave frequency of 800 W, and an extraction time of 1 min 30 sec. Under these conditions, the extract values for total flavonoids, total polysaccharides, and total triterpenes were 1.42 mg quercetin Eq/g, 13.08 mg/g, and 9.15 mg ursolic acid/g, respectively. In conclusion, this research highlight that the most efficient MAE condition for Lingzhi extraction involves a short extraction time, resulting in high yields of total flavonoids, polysaccharides, and triterpenes.

Keywords: Lingzhi (*Ganoderma lucidum*); Flavonoid; Polysaccharide; Triterpene; Microwave-Assisted Extraction (MAE)

O-099 Development of Non-Alcoholic Beer from Malted Barley Added with Kum Jao Morchor 107 Rice Bran

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Abstract

The development of non-alcoholic beer is becoming popular due to the increasing health awareness of people nowadays. This research aimed to investigate the effects of Kum Jao Morchor 107 rice bran substituted to malted barley on the qualities of non-alcoholic beer. Malted barley adding with 5, 10 and 15% (w/w) Kum Jao Morchor 107 rice bran was fermented with *Saccharomyces cerevisiae* var. *chevalieri*, a maltose negative yeast strain. The %alcohol by volume (%ABV), pH, total soluble solids (TSS) and color were measured during 6 days of fermentation at 20°C. The samples at day 3 of fermentation were chosen since the %ABV did not exceed 0.5% (requirement of non-alcoholic beer), to further analysis in ethanol concentration by high performance liquid chromatography, reducing sugar, total phenolic content (TPC), total flavonoid content (TFC), total anthocyanin content (TAC), and antioxidant capacities (DPPH and FRAP assay). The results showed that increasing amount of Kum Jao Morchor 107 rice bran increased the amount TPC, TFC and TAC of the products. The pH value and TSS were decreased with increasing fermentation time, meanwhile TPC and TFC were decreased. Besides, the antioxidant activities from DPPH and FRAP assay were enhanced with the increasing amount of Kum Jao Morchor 107 rice bran and tended to decrease at day 3 of fermentation. For sensory evaluation of the product fermented for 3 days using 9-point hedonic scale, the acceptance scores showed no significant difference in all attributes except the mouthfeel. Non-alcoholic beer products with 5% and 10% (w/w) Kum Jao Morchor 107 rice bran gained the highest acceptance for mouthfeel with no significant difference. Therefore, the addition of Kum Jao Morchor 107 rice bran substituted to malted barley could improve the TPC, TFC, TAC and antioxidant properties of non-alcoholic beer while retain the sensorial acceptability.

Keywords: Non-alcoholic beer; *Sacharomyces crevisiae* var. *chevalieri*; Kum Jao Morchor 107 rice bran; Total anthocyanin content; Antioxidant activity

O-100 Consumption Pattern on PET−Bottled Beverages and Intention to Recycle PET Bottles

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Abstract

Polyethylene terephthalate (PET) packaging has been influenced by an increase in consumption of PET bottles, both for beverage and non-beverage purposes. Because of the lack of a recycling collection system of PET and the rapid growth in PET bottle consumption, PET-bottled beverages constitute a significant portion of plastic pollution plastic. In accordance with the Bio-Circular-Green economy (BCG economy), recycling of PET bottles has become an important aspect of the circular economy goals. The objective of this study is to analyze the relationship between socio-demographic factors and consumption of PET beverage bottles using descriptive statistics and Pearson Correlation Coefficient. The data were collected from 200 participants through the questionnaires on consumption of five types of PET-bottled beverages including drinking water, soft drink, vegetable and fruit juices, ready-to-drink tea, and functional drinks. Findings showed that the consumption of PET beverage bottles was estimated at 442.9 g per week or 35 PET bottles (600 mL) per week. Drinking water (55.8%) exhibited the highest consumption of PET bottles followed by soft drink (19.9%), vegetable and fruit juices (10.6%), ready-to-drink tea (9.6%) and functional drink (4.1%). The young age group (18-35 years old) demonstrated a higher consumption of PET beverage bottles compared to the adult group (above 35 years old), accounting for 61 percent more than the adult average. The results showed that the intention to recycle PET bottles in young group is higher than the adult group. However, both groups were insignificant difference in the tendency to recycle PET beverage bottles. Therefore, it is crucial for stakeholders in the beverage industry to promote the benefits of recycling PET bottles and encourage the development of collection.

Keywords: PET bottles; Beverages; Consumption pattern; Recycle PET; BCG economy

O-101 Plant-Based Seasoning as Umami Ingredient: Process, Free Amino Acid Profile and Application in Traditional Thai Fermented Fish Sauce

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Abstract

Phong nua, or traditional umami ingredients originated by *Isan* ethnic wisdom for home use, is made by mixing various vegetable and herb paste, subsequently sun-drying to powder. The cost-availably hot air drying (HA) process at drying temperature of 50, 60, and 70°C was proposed compared with the current time-consuming solar drying (SD) (3 days). The drying time was obtained for 10, 9, and 7 h at drying temperature of 50, 60, and 70°C, respectively**.** The HA sample at 60°C (HA60) gave the highest overall acceptance score (7.06) and flavor liking (7.02) when sensorially tested in soup medium ($P \leq 0.05$). As a result, monosodium glutamate (MSG)-like free amino acids (FAA) (glutamic acid and aspartic acid) was found in the greatest amount in the HA60 sample (82.44 μg/g DW). On the other hand, the sample at lower temperature (50°C) released the highest FFA group linked to sweet taste (351.66 μg/g DW). The physicochemical properties of the selected sample (HA60) showed low moisture (5.81% DW) and low a_w (0.238), acceptable dissolvability (63.24%) and dispersibility (0.325), with pH (4.59) and color value (L^* 59.48, a^* -4.10, and b^* 23.98). When applying the HA60 sample to *nam-pla-ra* products, it generated the higher liking score than regular recipe ($P \leq 0.05$), with well-accepted in *som-tum* menu. Due to the presence of umami compounds in local plant-based seasoning, it can be a potential alternative as a newly natural flavor enhancer and HA process was high-throughput and cost-effective for better production.

Keywords: Flavor enhancer; Free amino acids (FFA); Hot air drying; Monosodium glutamate; Plant-based seasoning; Umami taste

O-102 Influence of Sucrose Levels on Bitterness and Turmeric Flavor Masking on Encapsulated Combination Extracts of Instant Drink

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Abstract

Taste plays a crucial role in determining food preferences and acceptance. For instance, humans typically favor sweetness, whereas bitterness often renders food unpalatable, leading to its rejection by consumers. Considering the remaining turmeric flavor and bitterness in the encapsulated combination of green tea and turmeric extracts (COE) as functional ingredients are not accepted by consumers, the direct incorporation into the development of an instant peach drink might render the product unacceptable to consumers. This study investigated the incorporation of sugar levels on masking bitterness and turmeric flavor of different concentrations of COE as functional ingredients in the development of instant peach drinks using generic descriptive analysis (GDA) and consumer acceptance. The preference mapping was applied to group the variables to select one formula as the final product. A factorial experiment was conducted by varying sugar levels at 5, 10 and 15% and COE levels at 1.0, 1.5, 2.0% and 8% peach freeze-dry powder in 100 mL of water solution. The physiochemical properties and masking undesirable flavor and taste using GDA and consumer acceptance of green tea and turmeric extracts, which limit consumer acceptance, were analyzed. The results found that different concentrations of sugar significantly ($P<0.05$) affected the physical, chemical, and sensory properties of instant drinks. An increase in sugar level significantly increased pH, TSS, and consumer acceptance of the drink (e.g., turmeric aroma, turmeric flavor, sweet, bitter, astringent, overall liking) while decreasing the color and intensity of sensory attributes from GDA (e.g., turmeric aroma, turmeric flavor, bitterness). An increase in combination extract significantly increased color, catechin, curcuminoid content, and intensity of sensory attributes from GDA (e.g., turmeric aroma, turmeric flavor, bitterness) while decreasing consumer acceptance (e.g., bitterness, astringent, overall liking). The considering consumer acceptance found that the acceptance score of turmeric flavor at 2.0% was significantly lower compared to 1.0% and 1.5% , which did not have significant differences in acceptance. Preference mapping explained that 79.59% of variance experiment data revealed the final formula at 15% sugar and 1.5% COE as the functional drink final product with a 7.6 ± 1.0 overall liking score.

Keywords: Masking; Bitterness; Turmeric flavor; Instant drink; Generic descriptive analysis

O-105 Exopolysaccharide Production from *Halomonas* sp. SS3: Cultural Optimization and *In Vitro* Antioxidant Activity

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Abstract

Microbial exopolysaccharides (EPS) have gained increasing attention due to the growing demand for natural polymers. Halophilic bacteria, particularly those from solar saltern environments, are a promising source of novel EPS with unique functional properties. This study investigated the production, optimization, and antioxidant activity of EPS from halophilic bacteria isolated from solar saltern soil in Phetchaburi province, Thailand. Out of the eight EPS-producing halophilic isolates obtained, *Halomonas* sp. SS3 demonstrated the highest EPS yield (0.51 $g \cdot L^{-1}$). The optimization of EPS production was performed using the one-factor-at-a-time (OFAT) approach in a malt-yeast extract (MY) medium cultivation system. Results indicated that sucrose at a concentration of 100 $g \cdot L^{-1}$ served as a suitable carbon source for EPS production. Moreover, the most effective cultural condition was under 15% (w/v) NaCl, medium pH of 8.0, an incubation temperature of 30°C, an agitation speed of 200 rpm, an inoculum size of 20% (v/v), an incubation time of 7 days, and an extraction ratio of 1:1 (supernatant:EtOH). Under this optimized condition, the maximum EPS yield was 1.29 $g \cdot L^{-1}$, representing a remarkable 153% or 2.5-fold increase (from 0.51 $g \cdot L^{-1}$ to 1.29 $g \cdot L^{-1}$) compared to the EPS yield from a screening step mentioned above. Furthermore, the EPS from *Halomonas* sp. SS3 exhibited noteworthy antioxidant activity. The EPS demonstrated antioxidant activity, with DPPH and ABTS scavenging activities of 79.50% and 43.94%, respectively, at a concentration of 5 $mg \cdot mL^{-1}$. The FRAP assay indicated a Fe^{2+} equivalent of 41.40 µM $FeSO_4$ at the same concentration. Total antioxidant activity revealed that 5 $mg \cdot mL^{-1}$ EPS was equivalent to 432.25 µM ascorbic acid. The EPS produced by *Halomonas* sp. SS3 exhibited notable antioxidant activity, suggesting its potential as a promising antioxidant agent in foods, nutraceutical, and pharmaceutical applications. Further exploration of the EPS's structure and detailed analysis of its antioxidant mechanisms will be investigated.

Keywords: Exopolysaccharide; Halophilic bacteria; Fermentation optimization; Antioxidant activity; *Halomonas* sp.

O-121 Study of Distribution Behavior of Treated Plant Extract Suspensions on Hydrophobic Spray Coating Solution

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Abstract

Polyvinyl alcohol (PVA) surfaces pose challenges in food packaging, particularly in high humidity conditions. Coating PVA with hydrophobic polymers like tetraethyl-orthosilicate (TEOS) is a known solution. However, achieving compatibility and dispersibility between hydrophobic polymers and hydrophilic PVA often requires intricate protocols or the use of specialized chemicals to overcome their inherent incompatibility. In this study, we a novel and straightforward approach to enhance the compatibility and dispersibility of the hydrophobic coating by changing the solvent. Three distinct aqueous suspensions were prepared, utilizing pure distilled water, plant extracts, and treated plant extracts. Hydrophobic coating solutions were then formulated by incorporating TEOS and Hexadecyltrimethoxysilane (HDTMS) into colloidal silica suspensions. The three aqueous suspensions underwent analysis for particle size and chemical structure, while the coating layers, formulated with different solvents, underwent a comprehensive analysis of their chemical structures using techniques such as FT-IR, XRD, and XPS. Film properties for packaging applications, including universal testing machine (UTM), oxygen transmission rate, water vapor transmission rate, transparency, and water contact angle (WCA), were also examined. FTIR data confirms a change in the chemical structure from hydrophobic to hydrophilic by reducing the number of OH groups. Additionally, the coated films exhibit high barrier properties against oxygen and water, with OTR and WVTR values of 1.4 and 1.1, respectively. Significantly, the use of a treated plant extract solvent exhibited a measured WCA of over 100°C and enhanced dispersibility, resulting in improvements in hydrophobicity, morphology, and transparency of the resulting film. This study introduces a simple yet effective method for enhancing the compatibility and dispersibility of hydrophobic coatings on hydrophilic materials. The preparation of a dispersed hydrophobic coating solution through a simple change in the solvent holds promising advantages for potential applications in industrial film production.

Keywords: Hydrophobic coating; PVA; TEOS/HDTMS; Spray coating; Dispersibility; Morphology

O-122 Recycling of PET via Reactive Extrusion to Improve Recycled PET Properties Using pMDI

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Abstract

Polyethylene terephthalate (PET) is one of the widely used semi-crystalline polymers in the manufacture of fibers, films, and beverage bottles. In packaging industries, the main application of PET is bottle for water, carbonated drinks, and juice. The steady increasement of PET bottle consuming has been induced the PET waste problems. Additionally, these mismanaged PET wastes end up in soils, rivers, and ocean, posing the environmental pollution. To overcome these environment pollutions, post-consumed PET can be recycled thorough mechanical recycling method. However, this method induces negative results on the recycled PET (rPET) properties such as reduction of molecular weight (Mw), intrinsic viscosity (IV), mechanical and gas barrier properties. To apply rPET as bottle-to-bottle approach, rPET requires high Mw, IV, gas barrier, and mechanical strength. Especially, the improvement of IV is essential to produce beverage bottles. In this study, reactive extrusion of rPET was conducted to enhance the rPET properties. Additionally, poly (phenyl isocyanate)-co-formaldehyde (pMDI) was employed to increase rPET property as a chain extender (CE). IV values and chain extending reaction of rPET were determined by IV tester and Fourier transform infrared (FTIR), respectively. Additionally, the thermal properties were measured by differential scanning calorimeter (DSC) and thermogravimetric analyzers (TGA). To analyze the film properties rPET pellets were formed into films using hot-press. The mechanical properties, barrier properties, and morphology were measured by universal testing machine (UTM), oxygen transfer rate (OTR), and x-ray diffraction (XRD) respectively. And high performance liquid chromatography (HPLC) was also proceeded to confirm the possibility as food contact materials. The resultant showed significant improvement in the IV of rPET by chain extending reaction between rPET and pMDI. As the pMDI content was increased from 0 to 2.0%, the IV values and tensile strength increased from 0.56 to 0.90 dL/g and 1.5 to 3.4 kg_f/mm^2, respectively. Thus, reactive extrusion of rPET using pMDI can be versatile method to bottle-to-bottle recycling of rPET.

Keywords: PET recycling; Mechanical recycling; Reactive extrusion; Molecular weight; Intrinsic viscosity

O-123 Comparison of Three Different Plant Proteins in Oil-in-Water Emulsion System

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Abstract

This study investigated the emulsifying properties of three plant-based proteins−soy protein isolate, mung bean protein isolate, and cassava leaf protein concentrate−across varying concentrations in oil-in-water emulsion system. The emulsions were prepared using a sodium phosphate buffer at pH 7, incorporating 3.5% corn oil and 0.01% (w/v) NaN_3 for microbial control. The emulsification process involved a high speed mixture (10,000 rpm for 1 min) followed by a high-pressure homogenizer (20 MPa for 3 cycles). Model emulsion systems were established with soy protein isolate and mung bean protein isolate at concentrations of 1.5%, 2.5%, and 3.5% w/v, and cassava leaf protein concentrate at concentrations of 2.5%, 3.5%, and 4.5% w/v. The droplet characteristics were examined, including the Creaming Index (CI) during a 14-day storage period at 20°C and the mean particle diameters (d_{32}) on days 1, 5, and 10. Results showed stable soy protein isolate emulsions, maintaining mean particle diameters between 0.490-0.570 μm without cream layer formation. In contrast, mung bean protein isolate emulsions at concentrations of 1.5% and 2.5% exhibited cream layer formation after 3 and 9 days, respectively. Emulsion containing 3.5 % mung bean protein isolate showed no cream layer formation and mean particle diameters were 0.494 ± 0.021 μm. Cassava leaf protein concentrate emulsions at 2.5% and 3.5 % exhibited cream layer formation after 7 and 11 days, respectively. Emulsions containing 4.5 % cassava leaf protein showed no cream layer formation with mean particle diameters of 0.732 ± 0.127 μm. The data revealed that increasing mean particle diameter of unstable mung bean protein isolate and cassava leaf protein concentrate emulsions were found with increasing storage time. The results showed that cassava leaf protein concentration exhibited good emulsifying properties at higher concentrations compared to soy protein isolate and mung bean protein isolate. These findings contribute valuable insights into the formulation of stable emulsion systems using plant-based proteins, offering future use of cassava leaf protein concentrate in food emulsion.

Keywords: Oil-in-water emulsion; Soy protein isolate; Mung bean protein isolate; Cassava leaf protein concentrate; Emulsion stability

O-125 Physicochemical, Bioactivities and Sensorial Characteristics of Stingless Bee Honey Pastilles

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Abstract

Stingless bee honey is the nectar produced by the stingless honeybees and has various bioactive components that can provide health benefits to humans. Pastilles made from stingless bee honey have the potential to be a functional food for humans. However, heat arises from processing may affect the bioactivity of the active compounds present in the pastilles. Therefore, the objective of this study is to determine the effect of different processing temperatures (45 and 65°C) on the physicochemical, antioxidant and sensorial properties of stingless bee honey pastilles. Honey, gelatin powder and water were mixed and heated at 45 and 65°C for 10 min. Then, the mixture was poured into mould and cooled at room temperature. Analysis of physicochemical characteristics was carried out on the pH value, colour, texture and water activity. In addition, total phenolic content (TPC) and analyses of antioxidant activities (DPPH and FRAP) were also carried out. The pastilles processed at 45°C had significantly ($P<0.05$) higher lightness (L^*), yellowness (b^*), chewiness, pH value and water activity as compared to those processed at 65ºC. However, the different processing temperature (45 and 65°C) did not significantly ($P>0.05$) affect the TPC, antioxidant activity (DPPH and FRAP) and the sensorial (colour, texture, taste, sweetness, sourness and overall acceptance) properties of the stingless bee honey pastilles. In conclusion, increasing the processing temperature of stingless bee honey pastilles influences some physicochemical characteristics but has no significant effect on bioactivity and sensorial properties. Therefore, the processing temperature of 65°C is still suitable to be used in the production of high-quality stingless bee honey pastilles.

Keywords: Bioactivity; Processing; Heat; Physicochemical; Sensory

O-128 Microbiological Analysis of High Value Vegetables Grown on Biodegradable Cellulose Hydrogel

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Abstract

In recent decades, vegetables have been increasingly involved in outbreaks of foodborne pathogens which cause substantial economic damage and continued concern regarding the safety of fresh produce. Hence, effective alternative agriculture system such soilless cultivation can be practice to avoid the risk of contamination. The aim of this study was to assess the microbiological quality of high value vegetables (tomato, chili, cucumber, lettuce and kale) cultivated using biodegradable cellulose hydrogel. Fresh vegetable samples from 24 different hydrogel formulation; hydrogel (0%, 20%, 40%, 60%, 80% and 100%), (ii) with combination of hydrogel (HG) and top soil (TS) (HG0%+ 100%TS, HG20%+ 80%TS, HG40%+ 60% TS, HG20%+ 80%TS, and HG100%+ 0% TS) and different water frequency (1, 2, 4 and 6 days) were collected and analyzed. Result showed that, the mean counts of aerobic mesophilic bacteria ranged from 0.33 and 4.67 log CFU/g in all vegetables cultivated in hydrogel treatment. *Salmonella* spp. and *Staphylococcus aureus* were found to be absent in all samples. Maximum coliform count was observed in lettuce followed by kale and cucumber. A combination 40% hydrogel + 60% top soil with 4 times water frequency was recorded the best formulation for all vegetable crops with low presence of microbial pathogens. Our findings suggested that application of biodegradable cellulose hydrogel showed a minimal microbiological contamination in all vegetables crop studied. Therefore, biodegradable cellulose hydrogel can be used as an alternative soilless cultivation method to growth high vegetable crops with minimal usage of water.

Keywords: Contamination; Foodborne pathogen; Hydrogel; Microbial safety; Vegetables

O-129 Biochemical, Microbiological, and Sensory Profiles of Flower Kombucha: A Comparative Study of Jasmine, Rose, and Butterfly Pea

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Abstract

Kombucha is a fermented tea beverage obtained through the fermentation of yeast and acetic acid bacteria. This research focused on investigating the physiological, biochemical, microbiological, and sensory evaluations of flower-infused kombucha (jasmine, rose, and butterfly pea). In the initial batch fermentation, the study revealed a progressive increase in acetic acid bacteria, peaking on the 15th day at 13.30 log CFU/mL, while yeast reached its maximum concentration on the 9th day at 7.26 log CFU/mL. The total phenolic content displayed a significant surge on the 12th day of fermentation, measuring 805.45 µg GAE/mL, corresponding to the radical scavenging activity of DPPH and ABTS, indicating that increasing fermentation time led to a rise in antioxidant activity. The second fermentation process involved enriching characteristics and floral aroma from different flowers. The total phenolic compounds in flower kombucha demonstrated a slight decrease. Jasmine kombucha led with the highest amount (716.90 µg GAE/mL), followed by rose kombucha (699.76 µg GAE/mL), and butterfly pea kombucha (600.24 µg GAE/ml). In terms of sensory evaluation, rose kombucha obtained the highest overall score, followed by jasmine kombucha and butterfly pea kombucha, respectively. According to statistical analysis, rose kombucha achieved significantly higher scores for color and sweetness, while jasmine kombucha excelled in flower and tea scents. Conversely, butterfly pea kombucha received the lowest scores in multiple attributes. This could be attributed to butterfly pea imparting a purple color to the beverage, resulting in a darker hue compared to other flowers, and its distinct and strong aroma contributing to a lower sensory score. The results of this study revealed that flowers could enhance the characteristics of kombucha beverages and also provide health benefits.

Keywords: Kombucha; Flower kombucha; Biochemistry; Microbiology; Fermented beverage

O-131 Integrated Ethanol, Xylitol, and Phenylacetylcarbinol Co-Production Processes: Xylose-Rich and Glucose-Rich Hydrolysates Potential

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Abstract

Cellulosic bioethanol production process generally has a high operating cost. To ensure economic viability, the production of other high-value chemicals such as xylitol - a low calorie sweetener, and phenylacetylcarbinol (PAC) - a precursor of anti-asthmatic and nasal decongestant compounds, are thus necessary. The bottlenecks of the process such as pretreatment and enzymatic hydrolysis were optimized using the response surface methodology via central composite design to improve process efficiency. Top three agricultural wastes, namely, sugarcane bagasse, rice straw, and corn cob were employed as substrates. The suitable respective xylose-rich and glucose-rich hydrolysates obtained from the optimal conditions of diluted sulfuric acid pretreatment and enzymatic hydrolysis were used as carbon sources for xylitol and ethanol production using the wild type of *Candida magnoliae* TISTR 5664. The maxima ($P \leq 0.05$) xylitol and ethanol yields of (0.58-0.60) ± 0.01 g xylitol / g xylose ((64-66) ± 1% of the theoretical yield) and (0.43-0.45) ± 0.01 g ethanol / g total sugars ((84-88) ± 2% of the theoretical yield) were achieved. The whole cells harvested from xylitol and ethanol productions were used as a biocatalyst for PAC biotransformation in a two-phase (aquas/organic) emulsion system. The overall PAC concentration of 59.7 ± 0.2 mM was improved which was a 2-fold higher when compared to our previous report of single-phase emulsion system.

Keywords: Sustainability; Ethanol; Xylitol; Phenylacetylcarbinol; Optimization; Response Surface Methodology; *Candida magnoliae*

O-132 Gene Discovery of Medicinal Plant *Chloranthus erectus* through RNA-Seq Transcriptomics

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Abstract

The natural diversity of plant metabolism has long been a source of human medicines. Despite being a country with rich natural and herbal sources, the Malaysian medicinal plants have not yet been fully discovered to date. Among them, *Chloranthus erectus,* is an erect shrub which locally known as *sambau paya, rami hutan* or *sigueh putih*. *C. erectus* is a popular folklore medicine used by the native people or 'Orang Asli' in Malaysia to treat localised swelling, joint pain, skin inflammation, fever and body ache. Previous studies have shown that the methanol extract of *C. erectus* leaves exhibited anti-inflammatory, anti-bacterial and anti-pyretic in a mouse model. The overall objective of the research was to establish the transcriptome dataset for *C. erectus* by RNA seq which will provide a fundamental basis for the identification of potential therapeutic and commercial value of certain metabolic pathways. About 101 million reads were generated from different tissues (one leaf and one stem) of *C. erectus* using Illumina platform. Optimization of *de novo* assembly resulted in a total of 63, 560 unique transcripts of which 49.3% could be annotated based on homology search with sequences available in various public repositories, while remaining 50.7% unigenes may be considered as *C. erectus* specific. Comprehensive functional annotation and gene ontology (GO) analysis revealed the representation of many genes involved in different biological processes and molecular functions. Expression analysis showed that leaves and stem to be actively participating in various terpenes and alkaloid biosynthesis pathways such as terpenoid backbone synthesis (74 genes), phenylalanine, tyrosine and tryptophan biosynthesis (52 genes), ubiquinone and other terpenoid-quinone biosynthesis (41 genes), tryptophan metabolism (26 genes). Analysis on transcriptional factors identified 1336 transcripts representing 90 transcriptional factor families including those are essential in these pathways namely basic helix-loop-helix (bHLH), APETALA2/ethylene-responsive factor (AP2/ERF) and WRKY. This large-scale transcriptome study revealed potential metabolic pathways that are pharmaceutical interest and more growing research towards production of plant-derived pharmaceuticals.

Keywords: Transcriptomics; Terpenoid; Alkaloid; *Chloranthus*; plants

O-136 Effect of Sodium Periodate Concentration on Dialdehyde Carboxymethyl Cellulose ($DCMC_B$) Properties from Bleach Bagasse Pulp

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Abstract

Bagasse is a bast fiber from agricultural waste and a significant byproduct of sugar production. They mainly consist of cellulose, which can modify its molecular structure to cellulose derivatives cross-linking chemicals such as dialdehyde carboxymethyl cellulose (DCMC) by oxidation reaction. The synthesizing DCMC from bleached bagasse pulp by varying the sodium periodate ($NaIO_4$) concentrations (5%, 10%, and 15%, w/v). A 10% w/v concentration of sodium periodate (NaIO4) was determined using the DCMC properties such as production yield, aldehyde content (AC%), and degree of oxidation (DO). The results revealed that synthesis conditions are a pH of 3.0, a reaction temperature of 40°C, and reaction time of 4 h. The AC (%) and DO can unexpectedly increase under these conditions at 77.40 and 38.40, respectively. The thermal degradation temperature and molecular weight of optimal synthesis DCMC is 239.62°C and 2.99×10^6 g/mol. The DCMC determines its molecular weight, crystallinity, thermal stability, and structure by gel permeation chromatography, x-ray diffractometry, thermogravimetric analysis, and scanning electron microscopy. Finally, Fourier-transform infrared spectroscopy was employed to verify that CMC had undergone oxidation, which resulted in a modification of the functional groups.

Keywords: Dialdehyde carboxymethyl cellulose (DCMC); Carboxymethyl cellulose (CMC); Bleached bagasse pulp

O-137 Optimization of Bacterial Cellulose Production from Hempseed Meal and Preliminary Studies on Nanocellulose Synthesis

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Abstract

Hemp fiber is an emerging crop in Thailand's economy. More than half of the hempseed used for agricultural waste comprises carbohydrates, which can be produced into cellulose by bacteria using glucose and fructose. This study aims to identify the optimal medium conditions for producing bacterial cellulose (BC) from hempseed meal by A. *xylinum.* The experiment determined the effectiveness of hempseed meal as a carbon source using various media, including boiled hempseed meal water (control), boiled hempseed meal water with added sugar (10, 12, 14, and 16°brix), and boiled coconut juice with added sugar (14°brix - commercial). The highest yield of bacterial cellulose (206.84 g/L) was observed in hempseed meal boiled water with 10°brix sugar, and it exhibited a ribbon-like 3D network structure. Hempseed meal BC had a crystallinity index of about 70%, with good water-holding capacity, low oil-holding capacity, high emulsifying activity, and high emulsion stability (11.21, 2.71, 34.33%, and 39.11%, respectively). Furthermore, a preliminary study on nanocellulose synthesis from hempseed meal BC by enzymatic hydrolysis and ultrasonication revealed that the Z-average was 486.8 nm, and the polydispersity index (PI) was 0.6494.

Keywords: Hempseed; Bacteria cellulose; *Acetobacter xylinum*

O-139 Thermal Mechanical Morphological and Barrier properties of PLA/EVA Blended Composite by Adding Hemp Carboxymethyl Cellulose (CMC_H)

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Abstract

The extensive utilization of conventional petroleum-based polymers in recent years has raised serious apprehensions over sustainability and environmental pollution. As a result, new biodegradable polymers are being developed to replace petroleum-based plastics. This study presents an innovative approach producing polylactic acid (PLA) blended with ethylene-vinyl acetate (EVA) composite at different amounts of 0.5-4%wt of hemp carboxymethyl cellulose (CMC_H) and 10% (w/w) plasticizer were added. The blending process involved an extruder, followed by hot compression. The addition of hemp carboxymethyl cellulose 2%wt enhanced the thermal and mechanical properties of the PLA/EVA composite. This addition altered composite properties and tended to increase water vapor barrier properties. In conclusion, the study shows that hemp carboxymethyl cellulose function properties as a nucleating agent and plasticizer in PLA/EVA composites. The obvious CMC_H molecules as a dispersed phase in the PLA/EVA blended matrix was confirmed by scanning electron microscopy (SEM).

Keywords: Polylactic acid; Ethylene-vinyl acetate; Composite; Carboxymethyl cellulose

O-143 Synthesis of Zirconium Oxide Nanoparticle from *Chloranthus erectus* for the Evaluation of the Antibacterial and Antiviral Activity

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Abstract

Zirconium oxide (ZrO_2) nanoparticles (NPs) as a smart material to inhibit bacteria activities were prepared using *Chlorentus erectus* (*C. erectus*) leaf extract as an effective capping agent. The produced *C. erectus*-ZrO_2 NPs exhibited the highest absorbance band at 214 nm analysed by UV-Visible spectroscopy under optimised conditions namely pH 5, the concentration of plant extract at 5g/50 mL, and 6 hours of incubation times. Aqueous leaf extract containing phytochemical compounds was greatly capable of controlling the size and shape of the NPs. Using Scherrer Debye's equation, the average crystallite size of the *C. erectus*-ZrO_2 NPs was found to be 10.42 nm, indicating the effectiveness of the phytochemical compound to diminish the aggregation of the particles. The morphology of *C.erestus*-ZrO_2 NPs was found to cluster with a spherical shape examined by Transmission Electron Microscopy. Elemental analysis using Energy Dispersive X-ray Spectroscopy reveals a high percentage of zirconium and oxygen indicating the phytochemical compound in the leaf extract did not alter the purity of the *C.erestus*-ZrO_2 NPs. The NPs were found to effectively inhibit the bacteria *Klebsiella pneumoniae* at a concentration of 200 µg/mL. Meanwhile, *C. erectus*-ZrO_2 NPs exhibited low antiviral properties against the DENV-2 virus when introduced to cells after infection. In addition, the higher concentrations of *C. erectus*-ZrO_2 NPs (up to 300 µg/mL) were found non-toxic to Vero cells.

Keywords: Capping agent; *Chlorentus erectus*; Nanoparticles; Synthesis; Zirconium oxide

O-146 Effects of Pre-treatment and Temperature of Screw Press Extraction on Physical and Thermal Properties of Tiger Peanut (*Arachis hypogaea*) Crude Oil

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Abstract

Peanut oil is regarded as quality oil due to its high smoking point, oxidation and thermal stability, the ratio of saturated fatty acids, mono-unsaturated fatty acids and poly-unsaturated fatty acids, and the essential fatty acid ratio. Different varieties and extraction methods have shown variation in physical and chemical properties of oil. Therefore, efficient and economic extraction methods are essential for oil recovery without compromising the quality and efficacy of the extracted oil for desired application. In this study, Tiger peanut (Kalasin 2) was used, which is mainly consumed as raw snack in Thailand due to its richer flavour and unique buttery texture for alternative application. The optimum extraction factors and their interaction for screw press extraction were investigated using complete factorial design with two factors of pretreatment (pre-heated and unheated) and extraction temperature (80°C, 120°C, 180°C and 200°C). Viscosity, density, colour and thermal stability of extracted crude oil were measured. The optimum condition for screw pressing was obtained from pre-heated kernels at extraction temperature of 120°C with a yield of 32.05%, the viscosity and density of 0.0568 Pa.s and 0.86465g/mL respectively and the desirable colour of L^* value of 87.52, a^* value of -6.33 and b^* value of 28.57. The extraction temperature had a significant effect on the extraction yield and physical properties of oil ($P \leq 0.05$). Increase in the extraction temperature had an impact on thermal behaviour of oil. Pre-treatment did not significantly affect the extraction yield and properties of oil ($P > 0.05$). Using differential scanning colorimeter (DSC), oil extracted at 80°C had the lowest freezing temperature of -3.06°C and melting temperature of 0.93°C. Extracted oil at 200°C had various endotherms from peak temperature of -37.36°C, -13.44°C and 0.93°C. As the temperature increased other peaks were identified at 117.13°C, 159.68°C and 170.77°C. Rheological properties of optimized extracted oil provides alternative use of tiger peanut oil in food industry such as for salad dressing formulation and frying process. The study on application of Tiger peanut in salad dressing will also be conducted.

Keywords: Oil extraction; Temperature; Physical and rheological properties

O-147 Exploring Theoretical Catalysts for Future Food Entrepreneurship: The Mediating Roles of Prosocial Motivation and Personal Norms

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Abstract

Based on the recent objectives of the United Nations (2021) to address global challenges, urging all nations to take action to protect the environment and the planet, the focus on maintaining food security and sustainability has become more prominent. Previously, the concept of food security gradually evolved to explicitly cover the accessibility of food both physically and economically. This implies that food sustainability is crucial for ensuring future food security while also sustaining nutritional well-being and health. In this sense, entrepreneurship may be considered a key player in driving economic growth and the food supply chain, thereby mitigating food insecurity. This research thus aims to provide a theoretical framework and proposition concerning future food entrepreneurship. The study conducts a systematic literature review using Theories, Context, Characteristics, and Methods (TCCM). The study reviews journal papers from the Scopus database to formulate a theoretical framework. Understanding the underlying behaviors of future food entrepreneurs by exploring theoretical catalysts through the lens of the mediating roles of prosocial motivation and personal norms is found intriguing. Given the socioeconomic benefits associated with entrepreneurship, numerous academic institutions, governments, and policymakers are eager to explore the factors influencing entrepreneurial endeavors. It is essential to accurately examine personal and social determinants in cultivating intrinsic attitudes toward entrepreneurial paths to enhance the interconnectedness of factors related to entrepreneurial intentions. Specifically, there is a positive correlation between environmental awareness and the potential entrepreneurial intention to embrace sustainable behaviors or practices. This establishes an intrinsic personal norm and prosocial motivation within. Prosocial motivation refers to the desire to benefit others for the greater good, while personal norms involve internalized standards and beliefs about what is right or socially acceptable. Adhering to personal norms leads individuals to a moral commitment to environmentally friendly conduct, potentially motivating them to participate in sustainable activities and embark on future food entrepreneurship. The study concludes that prosocial motivation and personal norms serve as mediating factors in fostering individuals' entrepreneurial intentions, driving a socially responsible and sustainable industry. Entrepreneurs aligning their values with societal concerns will likely significantly shape the future of food businesses. Policy implications are also presented.

Keywords: Future food; Entrepreneurship; Prosocial motivation; Personal norms; Sustainability

O-151 A Thermostable Alkaline Protease for Bioactive Peptide Production from Sericin

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Abstract

Thailand is one of the world's major silk producers. So, large amounts of sericin are annually generated from silk manufacturing, leading to an environmental problem and unsustainable development. Nowadays, bioactive peptides from different sources of proteins have been intensively studied for a potential application as an active ingredient in functional food products. Sericin is a protein synthesized by *Bombyx mori* silkworm, so it can be a good substrate for production of bioactive peptides. The objective of this study was to valorize sericin as bioactive peptides using a biotechnological process. Screening and isolation of protease producing bacteria from nature were carried out. Based on protease activity in sericin medium, isolate SE5 was found to be the most promising strain with protease activity of 8,240 U/mL, and it was identified as *Bacillus halodurans* SE5 (97% identity). Protease from *B. halodurans* SE5 (protease_SE5) was characterized as a thermostable alkaline protease with optimal pH and temperature at 10.5 and 70°C, respectively. Interestingly, protease_SE5 showed a high specificity to sericin, but not to fibroin (silk fiber). The application of protease_SE5 to produce bioactive sericin hydrolysate and fibroin film was demonstrated and compared to the traditional method (boiling in 0.5% Na_2CO_3) and high temperature-high pressure (HTHP). A biotechnological process by protease_SE5 not only produced bioactive peptides, but also improved the mechanical properties of the fibroin film. Moreover, to maximize the capability of protease_SE5, protein engineering was applied for the functional modification. The structure-functional relationships between low-affinity calcium binding site and sericin hydrolysis were found. After two rounds of site-directed mutagenesis, S166E variant was obtained with a higher efficiency on hydrolysis of sericin. Peptide produced by S166E was 12% higher than wild type at 60 min. Furthermore, bioactive sericin hydrolysate displayed an inhibitory effect on angiotensin-I-converting enzyme (ACE) activity, a key enzyme in blood pressure regulation. At 60 min, ACE inhibition activity of S166E-derived sericin hydrolysate was 40.2%, while a lower ACE inhibition activity was observed for r_SE5-derived sericin hydrolysate (29.5%). Overall, this study demonstrates the way stepping into a sustainable development and the Bio-Circular-Green (BCG) economy model through a biotechnological process using a biocatalyst.

Keywords: BCG; Fibroin; Protein engineering; Sericin; Thermostable alkaline protease

O-155 The Effect of Date Palm (*Phoenix dactylifera* L.) Powder Addition on Gluten-Free Cake

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Abstract

Approximately 30% of date palm production was discarded in 2021 due to low quality. Significant quantities are also wasted at both the retail and consumption levels, indicating issues related to food waste. In this investigation, date palms characterized by suboptimal quality were subjected to improvement through a transformation process, specifically converted into powder utilizing the spray-drying method. The current challenges faced by gluten-free cakes revolve around achieving a denser texture, particularly when compared to cakes formulated with wheat flour. Thus, gluten-free cakes will undergo fortification with date palm powder (DPP) with the aim of augmenting the properties of gluten-free cakes and adding value to low-grade date palm. Therefore, the objective of this study was to investigate the impact of date palm powder (DPP) addition on the physical and sensory properties of gluten-free cakes. Five treatments were conducted for DPP addition: control cake (0%DPP), 5% DPP, 10% DPP, 15% DPP, and 20% DPP. The findings indicated that the inclusion of 20% date palm powder (DPP) resulted in the darkest crust color, lightest crumb color, highest volume, moisture content, water activity, and springiness value. Additionally, it led to a reduction in hardness, adhesiveness, and cohesiveness. A 9-point hedonic test was employed to assess color, aroma, texture, taste, and overall acceptability scores of the cakes. No significant differences were observed between the control cakes and gluten-free cakes fortified with DPP concerning organoleptic properties, except for color. Furthermore, just-about-right testing indicated that the control sample was perceived as the most favorable in terms of hardness, sweetness, and mouthfeel. Overall, the incorporation of DPP into gluten-free cakes did not have a substantial impact on their sensory attributes.

Keywords: Date palm; Food waste; Gluten-free cake

O-156 Conjugation Factors Screening for Conjugated Compound of Rice Bran Peptides and Resveratrol using Plackett and Burman Design

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Abstract

The purpose of this study was to investigate factors affecting the conjugation of rice bran peptides (RBPs) with resveratrol (RSV), and the biological activities of conjugated compounds. Using mild-subcritical alkaline water extraction, peptides were isolated from rice bran and then hydrolyzed by proteases G6 and GN. Peptides were fractionated to obtain three fractions with molecular weight < 3, 3-10, and > 10 kDa. The conjugate is prepared from RBPs MW < 3 kDa and RSV using Plackett and Burman design under a variety of conditions, including pH (3-9), oxygen flushing (0-10 cm^3/s), temperature (25-45°C), RSV concentration (0.10-1.00 mg/mL), and conjugation time (30-120 min). A total of 15 experiments were conducted to determine the significance of five factors on conjugation. According to the results of the regression analysis: pH, RSV concentration, and conjugation time were significant. The alkaline condition of pH increases DPPH radical scavenging activity and the conjugation of RBPs and RSV. Increasing RSV concentration directly affects the biological activity of the conjugated compound. Extended conjugation time increases conjugation between RBPs and RSV. For further optimization by the central composite design (CCD), the following factors were chosen: pH, RSV concentration, and conjugation time; these were set at 25°C and 10 cm^3/s, respectively, for the temperature and oxygen flushing.

Keywords: Rice bran peptides; Resveratrol; Conjugation; Plackett and Burman design

O-157 Effect of Hydrocolloid Type Concentration Levels on the Enhanced Shape of 3D Food Inks

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Abstract

Study of Physico-chemical, rheological properties, printability 3D food, and 3D geometries of soy protein isolate (SPI) containing Compound Concentration Levels and gelatin investigation. SPI and their mixtures exhibit pseudoplastic fluid (shear thinning) behavior of Materials suitable for 3D printing. While the flow viscosity increases when the temperature decreases to 25°C, which supports the deposited layer and can maintain the designed shape. The SPI-20 mixture with gelatin can print excellent geometries and the addition of sodium alginate. Gelatin to the SPI did not establish a chemical cross-link between the protein subunits during mixing and 3D printing at 35°C. It is seen that the food structure of SPI-20, sodium alginate and gelatin will be promising materials in 3D food ink.

Keywords: 3D food inks; Hydrocolloid type; Galatin; Sodium alginate; Shape of 3D food inks

O-158 Effects of Pretreatment and Drying Temperatures on Physicochemical and Antioxidant Properties of Dried Duku (*Lansium domesticum)* Fruit

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Abstract

Duku (*Lansium domesticum*) originates from Southeast Asia. Duku is a fruit that is only available during certain seasons and is highly perishable due to its high moisture content of over 80%. As a result, it is challenging to market and sell due to its limited shelf life. The process of converting fresh fruit into dried fruit not only enhances its commercial worth but also serves as a means to mitigate fruit wastage. The purpose of this study was to determine the effect of pretreatments and drying temperatures on the physicochemical and antioxidant properties of dried duku fruit. The duku fruits, including the complete fruit, flesh, peels, and seeds, underwent pretreatment using solutions of ascorbic acid, sodium metabisulfite, sodium erythorbate, and blanching. Subsequently, the samples underwent drying processes at temperatures of 50°C, 60°C, 70°C, and 80°C, respectively. The Folin-Ciocalteau method was applied to determine the total phenolic content (TPC). The antioxidant activities were evaluated using ABTS [2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid)] and DPPH (2,2-diphenyl-1-picrylhydrazyl). As the drying temperature increases, the pH values of every part of duku decrease. The seed, which was pretreated with sodium metabisulfite and dried at 80°C, had the highest total phenolic content value of 116.84 ± 0.31 mg gallic acid equivalents per g fruit extract (GAE/g). While the flesh, which had been treated with ascorbic acid and dried at 50°C, had the lowest total phenolic content value. The seed, which had been treated with sodium metabisulfite and dried at 50°C, exhibited the greatest antioxidant capacity. It had an IC_{50} value of 41.15 µg/mL for ABTS free radical scavenging and 121.35 µg/mL for DPPH free radical scavenging. In comparison to other fruit parts, pretreatments, and drying temperatures, the seed had the highest antioxidant capacity. The study's findings suggest that all components of the duku fruit have the potential to serve as a valuable source of nutrients. The nutritional and antioxidant qualities of this seasonal fruit from Malaysia indicate its potential for commercialization in various food and beverage products.

Keywords: Duku; Fruit; Pretreatment; Drying; Antioxidant

Abstracts of Poster Presentation

P - 009 Effects of Dried Oyster Mushroom on the Property of Cake and Quality Change during Storage

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Abstract

The cultivation of edible mushrooms such as oyster mushrooms in Thailand has been gaining attention. It can grow on several lignocellulosic residues such as agro-forestry wastes and agro-industrial wastes. Mushrooms are the fruiting bodies of certain types of fungi. It is well appreciated for its exquisite taste and flavor and rich in fiber. The study aimed to observe the effect of different levels of dried oyster mushroom on physicochemical properties and sensory characteristics of cakes. Wheat flour was replaced with dried oyster mushrooms at 0% (as a control), 10%, 20% and 30 % by weight. Results demonstrated that the increase in dried oyster mushroom tends to decrease water activity of cakes but increase 1.54 to 2.41 folds in fiber content compared to control. Increasing the level of dried oyster mushrooms significantly increased specific volume and redness (*b**) of cakes meanwhile decreased in lightness (*L**) of crumb. The cake containing 20% dried mushroom was found to be similarly acceptable to control. The quality change during storage 0, 2, 4, 6 days was evaluated. Moisture content of mushroom cake decreased during storage. Meanwhile, water activity and sensory score values of dried oyster mushroom cake presented similar qualities during 6 days. The presence of total plate count and yeast and mold were lower than Thai Community Product Standard (459/2549). Additionally, consumer acceptance and factors affecting consumer's purchase decisions are also investigated. The overall acceptance of the final product was 4.16 from a total score of 5 indicating like slightly. The results revealed that the most important factor for a purchase decision was a taste of the product. It can be concluded that the cake replacement wheat flour with 20% dried oyster mushroom could be used for cake preparation to achieve higher fiber content and acceptable cake quality to produce an alternative product for consumers.

Keywords: Dried mushroom; Cake; Physicochemical properties; Storage; Consumer

P - 014 Effect of Combination of pH-Shifting and Ultrasound Treatment on Physico-Chemical and Functional Properties of a Protein Concentrate from *Lentinula edode*

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Abstract

The use of pH-shifting and ultrasound technology in mushroom protein concentrate production could enhance protein extraction and its functionality. Ultrasound can be employed as a valuable tool in the extraction of proteins from plant materials. The process involves the application of high-frequency sound waves, typically ultrasonic waves, to disrupt cellular structures and enhance the release of proteins into the extraction solvent. This investigation delved into the impact of the combined pH-shifting (pH 2-12) and ultrasound treatment (at 40 kHz for 1 and 2 h) on the physico-chemical and functional attributes of a protein concentrate derived from *Lentinula edodes*. Examination of the pH influence on protein solubility revealed an escalating trend in solubility with increasing pH levels. Optimal protein solubility occurred at pH 12, while lower pH levels (pH 4) resulted in precipitation. Through the examination of the combination process results, it was determined that a pH-shifting and ultrasound treatment for 2 h showed the significantly highest protein content ($P \leq 0.05$), measuring at 52.85 ± 5.25 g/100 g sample. Ultrasound technology demonstrated enhanced mushroom protein extraction capabilities by facilitating improved solvent penetration into the extracted material. The emulsion stability (ES) revealed that soy protein isolate (commercial) exhibited the highest ES (82.47 ± 3.94), followed by the mushroom protein concentrate (MPC) (82.03 ± 3.83), while dried MPC powder had the lowest emulsion stability (70.30 ± 4.45) ($P \leq 0.05$). For water holding capacity (WHC), soybean protein isolate demonstrated the highest WHC (95.19 ± 3.84), followed by dried MPC powder (55.80 ± 7.63). MPC exhibited a lower WHC (21.78 ± 5.41) ($P \leq 0.05$). The combination of pH shifting and ultrasound created a synergistic effect. pH shifting prepared the proteins for extraction by altering their solubility, and ultrasound further aided in the disruption of cell walls, allowing the proteins to be released more effectively. Thus, this combined approach was a promising method for obtaining high-quality protein extracts from mushroom sources.

Keywords: pH-shifting; Ultrasound; Mushroom; Protein concentrate

P - 022 Phenolic Profile of Serbian Old Wheat Local Landraces and Locally Adapted Varieties

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Abstract

Wheat is one of the most important staple crops in Serbia and plays an important role in food security and nutrition. Phenolic compounds are dominant antioxidants in whole grains and are essential quality traits in future breeding programs as they are known for their beneficial effects on health. With the aim of analyzing local wheat diversity in terms of phenolic compounds, 33 local landraces and old locally adapted varieties and 3 modern wheat varieties were grown in 2021/2022. So, the objective of this work was to optimize the extraction of phenolic compounds and analyze them by HPLC/DAD method and compare old with modern cultivars. As it is known that cereal grains contain different phenolic compounds, mainly phenolic acids in bound form, the extraction of phenolic compounds was done from wholemeal flour samples after hydrolysis. Alkaline hydrolysis conducted at 25°C for 12 h using a 2 M NaOH solution in water demonstrated greater efficiency compared to employing solutions of up to 10 M KOH in methanol under the same temperature and duration. HPLC-DAD analysis revealed that ferulic acid presents the major phenolic compound both in old and modern wheat samples ranging between 14 and 149 mg/kg in old and 51 and 61 mg/kg in modern varieties. Apart from ferulic acid, vanillic acid (3.1-11.5 mg/kg), syringic acid (1.4-5.5 mg/kg) and *p*-coumaric acid (1-6.9 mg/kg) were identified and quantified in old, but not in new varieties. Our results indicate that the genetic potential of old varieties in terms of polyphenolic compounds is not fully utilized because the content of ferulic acid in whole grains in some samples is almost three times higher than in modern varieties that do not differ significantly among themselves.

Keywords: Wheat; Phenolic profile; Ferulic acid; HPLC

P - 024 Breadmaking Potential of Sourdoughs Made with Wholegrain Flour Derived from Old Wheat Landraces and Varieties

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Abstract

Wheat breeding efforts, which have been focused narrowly on crop yield increases, have caused a reduction in genetic diversity. Namely, old wheat landraces have been unfairly neglected and reduced to small quantities in gene banks and, at lesser extent, in farm private collections for a long time. However, the local landraces and the traditional old varieties of wheat have gained new attention, presumably owing to the increased public awareness of the need to preserve genetic diversity and the increased consumers' demand for genuine and traditional foods. The aim of this study was to evaluate the rheological properties of wholegrain flour from three different wheat species (*Triticum aestivum* subsp. *aestivum*, black grain bread wheat variety; *Triticum turgidum* subsp. *durum*, durum wheat; and *Triticum aestivum* subsp. *spelta*, spelt wheat) and to test their suitability to produce spontaneously fermented sourdough as an adequate leavening agent in wheat bread production. Spontaneous fermentation of flours was carried out for 5 days with back-slopping every 24 h (dough yield of 200) at 25°C. After achieving mature sourdough, the bread was prepared by replacing refined wheat flour at a 20% level with sourdough samples. Bread with the addition of sourdough made of modern wheat varieties and bakery yeast-fermented bread were used as controls. The technological properties of the wholegrain flours estimated by means of Mixolab indicated rather good protein quality and the ability to form doughs with good stability in all tested samples. The black grain wheat variety showed significantly longer dough development times and higher mixing and dough stability, while the GlutoPeak parameters obtained for this variety were comparable to those of modern wheat. The addition of sourdough from old wheat landraces resulted in breads of similar specific volume and texture. Regarding the sensory evaluation, the most prominent differences were obtained for the textural, odour, and flavour properties. Breads with the addition of old wheat sourdough stood out from the control samples in terms of yeast and vinegar odour and flavour notes. The results reported herein showed that the technological performance of old wheat flour, especially when combined with sourdough processes, could be successfully exploited for the production of breads comparable to those of modern wheat varieties.

Keywords: Old wheat landraces; Sourdough; Rheology; Breadmaking

P - 025 Total Phenolic Content and Antioxidative Potential of Serbian Old Wheat Local Landraces and Locally Adapted Varieties

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Abstract

Content of total phenolics and antioxidative potential were determined in 33 local landraces and old locally adapted varieties grown in Serbia in 2021/2022, among them 3 varieties are modern. Wholemeal flour was analyzed. Total phenolics were determined according to spectrophotometric assay. Antioxidative potential was measured as DPPH radical scavenging activity and the results expressed as IC_{50} values. The lower the IC_{50} value, the more potent is the extract at scavenging DPPH and this implies a higher antioxidant activity. Total phenolics in 18 old locally adapted varieties and 12 local landraces were in the range of 351-963 µg GAE/g of flour, while average value of total phenolics in 3 modern varieties was 390 ± 7.3 µg GAE/g of flour and was lower than in majority of all local landraces and varieties. Only one third of 30 old local varieties and landraces showed lower IC_{50} values (150-230 mg/mL) than modern varieties (232-280 mg/mL). Average IC_{50} value for 30 tested wheat samples was 286 ± 104 mg/mL. Correlation of -0.616 was obtained for total phenolic content and scavenging activity expressed as IC_{50}. Yield and thousand kernel weights for old local varieties and landraces were 5.5-8.1 t/ha and 270-480 g, respectively. Measurements significant in assessing the yield and quality of a wheat such as thousand kernel weight in correlation with the antioxidative potential can be an important consideration in selecting and improving crop varieties, according to the literature data, however this parameter was not measured in this study.

Keywords: Antioxidative potential; Old wheat landraces; Total phenolics; DPPH

P - 027 The Effects of Different Cooking Methods on Lipid Oxidation Profiles of Cooked Goat Meat

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Abstract

Due to its low lipid content (≤ 2%), goat meat has been recognized as a healthier alternative meat source. Lipid is susceptible to oxidation, which contributes to the development of meat flavor. Different cooking methods induce varying degrees of lipid oxidation, resulting in meat with desirable qualities. Therefore, this study aimed to investigate the lipid oxidation profiles of raw Thai native (TN) x Anglo Nubian (AN) crossbred goat meat (RW), one of the popular breeds in Thailand known for its high productivity, and their changes as affected by various cooking methods including conventional grilling (CG), sous vide cooking (SC), and microwave cooking (MC). Compared to the RW, all cooked samples exhibited a higher PV and TBARS at various extents ($P<0.05$), suggesting the development of primary and secondary lipid oxidation at a higher degree induced by high cooking temperatures. The highest PV was found in SC (2.34 mg hydroperoxide/kg) with low TBARS, indicating the highest degree of hydroperoxide formation with low hydroperoxide decomposition. Nevertheless, the highest TBARS was found in CG (1.46 mg malonaldehyde /kg sample). This suggested that high cooking temperature used in CG rendered a faster decomposition of hydroperoxide into the secondary aldehydes, which may be responsible for increased rancidity of the sample. The various levels of lipid oxidation were associated with the formation of volatiles in each cooked product. RW predominantly contained alcohol (26.55%) and aldehyde (20.25%). Notably, the proportion of aldehyde, ketone, and N-containing compounds, increased after cooking. The elevated malonaldehyde levels in the cooked samples coincided with the increased aldehyde proportion after heating, potentially causing a loss of meatiness. Among all volatiles, 2,5 (6)-dimethylpyrazine (roast beef), hexanal (green), and 1-octen-3-ol (mushroom) were the predominant VOCs in CG, SC, and MC, respectively, suggesting distinct flavor/odor caused by cooking methods. SC possessed a meatier flavor than others, whereas CG and MC possessed a similar intensity of rotten eggs. However, this unpleasant odor could possibly be masked by more pleasant aromas, such as roast and caramel. Overall, the findings revealed that cooking methods varied the lipid and volatile profiles leading to various flavor characteristics of cooked goat meat.

Keywords: Goat meat; Lipid oxidation; Grilling; Microwave cooking; Sous vide cooking

P - 029 Physicochemical and Functional Properties of Porous-Cold Water Swelling Maize Starch

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Abstract

This study explores the functional attributes of modified maize starches, including Cold Water Swelling Starch (CWSS), Porous Starch (PS), and a novel form, Porous-Cold Water Swelling Starch (PCWSS), which are increasingly relevant in food and pharmaceutical industries due to their absorption and swelling properties. We compared these modified starches with native starch (NS) to investigate their structural and functional differences. The PCWSS sample exhibited a lower yield than PS. Scanning Electron Microscopy analyses revealed a distorted granular surface morphology. However, the integrity of the granules remained largely intact, with the PCWSS sample, in particular, displaying pronounced granular porosity. Functionally, PCWSS demonstrated superior oil absorption, swelling power, and solubility compared to CWSS and PS. Pasting properties as analyzed by the Rapid Visco Analyzer (RVA) revealed that PCWSS caused the reduction of peak viscosity, final viscosity, and setback while delaying the pasting temperature. These findings reveal that PCWSS modification augments starch porosity and absorption, potentially improving its applicability in industrial applications. The study highlights the critical role of starch alteration in improving its intrinsic qualities, providing novel avenues for product development across various industries.

Keywords: Starch modification; Cold water swelling starch; Porous starch

P - 030 New Product Development: Reduced-Sodium Seasoned Green Mussel (*Perna viridis*)

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Abstract

The non-communicable diseases (NCDs) caused by a long-term, high-sodium diet are a serious global problem. Reducing consumption of salt, specifically sodium, is one of the most effective ways to improve public health. A novel formulation for producing reduced sodium seasoned green mussel (RSSGM) was investigated. In this study, RSSGM was prepared using seasoning flavor (Pad- cha) with reducing sodium levels (0, 30, 70, 100%). Pad-cha seasoning flavor with reducing sodium levels had mean sodium chloride content of 49.42 ± 6.64, 33.65 ± 1.69, 15.60 ± 0.29, and 2.60 ± 0.29, respectively. These results strongly influenced the sodium content in the products. The difference sodium levels of seasoning flavor had no significant effect on the appearance and color of the final product. The green mussel seasoned with 30% sodium reduction of Pad-cha flavor (PC-30%) was shown to be the most acceptable treatment in terms of taste, flavor and overall acceptance. The differences in tastes (saltiness, sourness, and umami) of all seasoned products were confirmed by the electronic tongue (E-tongue). It was therefore concluded that PC-30% could be served as a ready-to-eat (RTE) product that is both healthy and convenient for consumers consumption.

Keywords: Green mussel; Low sodium; Reduced sodium; Seasoning; Ready-to-eat

P - 031 Physical and Antioxidant Properties of Pre-gelatinized Black Jasmine Rice Flour Film Incorporated with Marigold Flower Extract

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Abstract

The development of edible films from black jasmine rice flour pre-gelatinized with marigold flower extract aims to study the physical properties and antioxidant activity of films containing 10-20% marigold flower extract. It was found that the addition of marigold flower extract resulted in darker films (decreased L^* value while increasing a^* and b^* values), increased stretchability, reduced tensile strength, and significantly enhanced antioxidant activity ($P<0.05$). However, it did not affect the moisture content, water solubility, and water vapor permeability of the black jasmine rice flour film. Based on these properties, these films can be applied to extend the shelf life of deep-fried or oily food products by packing them to reduce oxidative reactions. The films made from black jasmine rice flour pre-gelatinized with 10% or 20% marigold flower extract can be a new alternative to biodegradable packaging materials.

Keywords: Pre-gelatinized; Film; Marigold flower; Physical; Antioxidant

P - 033 Improving the Fermentation Rate and Antioxidant Activities of Shrimp Paste by Using an Alternative Hot-Air Oven and *Bacillus subtilis* K-C3 Inoculation

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Abstract

Traditional salted shrimp paste production uses sun-drying, which has an uncontrollable temperature and time resulting in an inconsistent moisture content of shrimp paste. Our previous study successfully utilized a hot-air oven drying at the optimal temperature of 45℃. However, as a result of the slowed fermentation caused by this alternative drying method, the formation of the final product's desired qualities was delayed. *Bacillus subtilis* K-C3, isolated from commercial shrimp paste, had high enzymatic activities, enhancing fermentation. This study, therefore, evaluated the effects of hot-air oven drying with *B. subtilis* K-C3 inoculation on shrimp paste fermentation rate and antioxidant activity compared to sun drying. As fermentation time increased, an increase in proteolytic and lipolytic activities in all samples was observed ($P<0.05$). This increase corresponded to a gradual rise in hydrolysis (DH) from 13.22-20.12% to 18.23-29.66% ($P<0.05$), indicating the breakdown of proteins and lipids during fermentation. Conversely, a decrease in chitinolytic activity was observed at a longer fermentation period. This was plausibly caused by the lack of chitin content as substrate at the later stage of fermentation. Among all samples, the inoculated samples (HO-Inoc and SD-Inoc) had higher DH and proteolytic activity than those of without inoculation (HO-Con and SD-Con), indicating enzymatic hydrolysis enhancement by *B. subtilis* K-C3. Moreover, at the 30th of fermentation, HO-Inoc and SD-Inoc possessed the highest lipolytic activity ($P<0.05$), suggesting a notable rate of lipolysis, leading to the release of free fatty acids and lipid oxidation products. These compounds likely enhance the product's flavor and taste. Also, the higher chitinolytic activity of inoculated samples, particularly at the first 10 days of fermentation, could render a softer texture of shrimp paste with other desirable characteristics. All samples possessed antioxidant capacities including DPPH, ABTS, FRAP, as well as metal chelating activities at various levels, indicating shrimp paste is a good source of antioxidants. HO-Inoc and SD-Inoc exhibited a higher ABTS radical scavenging activity (28.22-30.23 μmoL TE/g sample), compared to shrimp paste without inoculation ($P<0.05$). In conclusion, the combination of hot-air oven drying with *B. subtilis* K-C3 inoculation could accelerate the fermentation rate, along with enhanced antioxidant activities of shrimp paste.

Keywords: Shrimp paste; *Bacillus subtilis* K-C3; Fermented food; Enzymatic hydrolysis; Antioxidant

P - 035 Effects of Material-to-solvent Ratios on *Suaeda maritima* Salt Extraction and Its Characteristics

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Abstract

Salt, a chemical reagent composed of sodium and chloride, is crucial for maintaining osmotic pressure, fluid balance, and neuromuscular functions in both humans and animals. However, excessive salt intake is associated with adverse health effects such as oxidative stress, hypertension, stroke, and decline in kidney function. Recent studies have highlighted low-sodium substitute salts derived from seaweed and halophytes, which are low in sodium yet rich in other minerals and possess antioxidant properties, making them suitable alternatives for hypertensive patients. This study focuses on Suaeda maritima (SM), a salt-tolerant plant indigenous to the saline environments of coastal, lakeside, and swamp regions in Thailand. SM is noted for its salt content, minerals, and bioactive compounds with antibacterial and antioxidant effects. The aim of this study was to investigate the influence of different material-to-solvent ratios on the hot water extraction process and the resulting characteristics of SM salt. Dried SM was extracted using water at various ratios (1:5, 1:10, 1:15 and 1:25) at 100°C for 60 min. The mixtures were then centrifuged and oven-dried at 60°C for 30 h. Parameters such as yield, NaCl content, total phenolic content, mineral composition, and antioxidant activity were analyzed. The findings revealed that a 1:5 solid-to-solvent ratio resulted in the lowest yield, although NaCl content remained consistently similar across all treatments. The SM salt extracted at a 1:25 ratio exhibited significantly lower total phenolic content and a higher IC_{50} in the DPPH assay compared to those extracted at 1:5, 1:10, and 1:15 ratios. Interestingly, the K and Ca contents in SM salts were unaffected by changes in the solid-to-solvent ratio. However, the Mg and Na contents in the SM salt extracted at a 1:25 ratio were higher than those obtained at 1:5, 1:10, and 1:15 ratios. These results indicate that the solid-to-solvent ratio significantly affects the characteristics of SM salt. The ideal solid-to-solvent ratio for SM salt extraction is 1:10. This ratio minimizes the use of solvent, resulting in a shorter drying time while still achieving a proper yield and maintaining antioxidant activity.

Keywords: Salt substitute*; Suaeda maritima*; Solid-to-solvent; Antioxidant activity; Minerals

P - 039

Effects of *Lactiplantibacillus plantarum* and Natural Fermentation on Physicochemical and Rheological Properties of Rice Flours

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Abstract

This study the effects of two different fermentation methods, utilizing *Lactiplantibacillus plantarum* (LF) and natural cultures (NF), on the physicochemical and rheological properties of fermented rice flours compared to unfermented rice flours (control). Fermentation of rice was conducted at different temperatures (25°C and 37°C) for one day and subsequently at 4°C for 5 days under anaerobic conditions using LF and NF. Fermented rice at 85°C showed greater solubility and swelling power compared to 65°C and 95°C. All fermented rice flours displayed similarly water absorption capacity compared to the unfermented control. Fermented rice flours had lower transparency and a lower Browning Index compared to the control, indicating differences in color and clarity. Pasting properties were examined using an RVA analyzer. LF25 and LF37 flours showed higher peak viscosity compared to the control, while NF25 and NF37 flours exhibited lower peak viscosity. LF and NF fermentation resulted in a lower setback value compared to control, suggesting reduced retrogradation. All samples displayed G' greater than G'', indicating more elastic than viscous behavior. Complex Viscosity (η^*), G' and G'' values, along with complex viscosity, decreased from unfermented rice flours, suggesting improved flexibility and reduced retrogradation. All samples exhibited tan δ values below 1, indicating a semi-solid behavior. Physicochemical and rheological properties showed no significant differences between LF and NF fermented rice flours ($P>0.05$). This research implies that both LF and NF fermentation methods offer similar effects on the physicochemical and rheological properties of fermented rice flours, but LF fermentation might have a slight edge in terms of color and viscosity for specific food applications like thickening agents or in rice noodle production.

Keywords: Rice fermentation; Physicochemical properties; *Lactiplantibacillus plantarum*; Rheological properties; Fermented rice flours

P - 043 *In-Vitro* of Cytotoxic and Proliferative Activity of Protein Hydrolysates obtained from The Pigeon Pea (*Cajanus cajan*) on Peripheral Blood Mononuclear Cells

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Abstract

To date, the effects of protein hydrolysates obtained from the pigeon pea (*Cajanus cajan*) on human peripheral blood mononuclear cells (PBMCs) have not been thoroughly assessed. The aim of this study was to evaluate the effects of protein hydrolysate on the proliferative potential of human peripheral blood mononuclear cells. Protein hydrolysates of *Cajanus cajan* seed was hydrolyzed using P6SD enzyme and further fractionated using an ultrafiltration membrane with molecular weight cut off 5 kDa. The human peripheral blood mononuclear cells that isolated from whole blood of healthy volunteers in routine blood donations at the National Cancer Institute (1×10^6 cells/mL) were incubated with protein hydrolysates (62.5, 125, 250, 500 and 1,000 µg/mL) and lipopolysaccharide (LPS, 5 µg/mL) or concanavalin-A (Con A, 5 µg/mL). The basal control for proliferation consisted of cells alone. The cell culture was kept at 37°C in 5% CO_2 for 48 h, and cell proliferation was revealed by MTT assay (statistically significant value *P<0.05 compared with the LPS or Con A group). The results showed that PPH-P6SD permeate < 5 kDa-Con A (pigeon pea hydrolysate in presence of Protease P Amano 6, permeate < 5 kDa and induced with Con A) and PPH-P6SD permeate < 5 kDa-LPS (pigeon pea hydrolysate in presence of P6SD, permeate < 5 kDa and induced with LPS) stimulated dose-dependent induction of cell proliferation, with a significant increase in cell proliferation while PPH-P6SD-Con A (pigeon pea hydrolysate in presence of P6SD and induced with Con A) and PPH-P6SD-LPS (pigeon pea hydrolysate in presence of P6SD and induced with LPS) slightly stimulated lymphocyte proliferation. These findings suggest that protein hydrolysates involve in the cell proliferation activity and should be considered for future study *in vivo* model test of their activities.

Keywords: Cell proliferation; Cytotoxicity; *Cajanus cajan*; Peripheral blood mononuclear cells

P - 048

Development of Vegan Tuna from Plant-Based Raw Materials

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Abstract

Recently, plant-based products are the trendy healthy food, particularly plant-based meat, not only for vegetarian people but also heath concerning consumers. Therefore, this research aims to develop the plant-based meat as vegan tuna by using plant-based raw materials, including textured soy protein, tofu skin and young jack fruit, as main ingredient. All prepared vegan tuna mixes (50% of plant-based raw material, 20% pea protein, 15% water, 5% canola oil, 5% tuna flavor, 4% seaweed flavor, 1% food coloring) were cased and cooked by steaming (100ºC) for 20 min. The resulting vegan tuna products were evaluated on their physicochemical characteristics, texture and sensory properties. The vegan tuna from textured soy protein showed the highest score for sensory acceptance with high in protein content (53.38%), compared with others (41.83-46.32%). This vegan tuna from textured soy protein was then selected for the further study on texture improvement by using texturizing agent, including carboxymethyl cellulose (CMC) and carrageenan. The 6 different formulations prepared using single and mixed texturizing agents were onducted, in which the physicochemical characteristics, texture and sensory properties of the resulting products were investigated. The results showed that mixed texturizing agents (1% CMC + 3% carrageenan) provided the vegan tuna with the highest hardness, adhesiveness and springiness with the most preferred organoleptic properties, compared with other formulations tested. Therefore, the vegan tuna could be successfully prepared from plant-based raw material, especially textured soy protein, with the incorporation of texturizing agent as CMC and carrageenan mix. In addition, this vegan tuna could be useful for further plant-based tuna product development as alternative plant-based meat product.

Keywords: Vegan Tuna; Plant-based food; Plant-based meats; Plant-based protein; Texture property

P - 050 Utilization of *Bauhinia sirindhorniae* Leaves Extract to Improve the Antioxidant Property of Gelatin/Sarcoplasmic Protein Film

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Abstract

The purpose of developing antioxidant properties of gelatin/sarcoplasmic protein film was to determine the antioxidant properties of *Bauhinia sirindhorniae* leaves extract (BLE). *Bauhinia sirindhorniae* leaves were extracted using the maceration method with ethanol, and it was found that the extract exhibited antioxidant properties, phenolic content and flavonoid content of 60.30% and 0.13 mg/ml, and 0.85 mg/ml, respectively. When applied by forming into film sheets with BLE concentrations of 0.2% and 0.5%, the film sheets showed antioxidant properties of 49.22% and 55.10%, respectively. Furthermore, the addition of the extract increased the film's lightness, water permeability, and reduced its hardness. However, the film sheets became water solubility and more flexible. This indicates that BLE can enhance the efficiency of the film in resisting oxidative reactions and has good mechanical properties. It can be used for food preservation.

Keywords: *Bauhinia sirindhorniae*; Extract; Edible film

P - 051 Effect of Extraction Condition for Phenolic Compounds from Petal Red Water Lily (*Nymphaea pubescens* Willd.) using Ultrasound-Assisted Aqueous Two-Phase System

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Abstract

Red water lily (*Nymphaea pubescens* Willd.) is an aquatic herb plant with interesting pharmacological properties. They contain phenolic compounds that play a major role in free radical scavenging. This study aims to determine the effect of ultrasound-assisted aqueous two-phase system (UAE-ATPS) extraction parameters such as temperature (30, 50, and 70°C), time (10, 15, and 20 min), frequency level (12, 24, and 36 kHz) on extraction. After extraction, the bioactive compounds (TPC and TFC) and radical scavenging activity (DPPH and Fe-chelating) were investigated. The experimental results showed that TPC and TFC had the highest amounts at a temperature of 70°C at 20 min with an ultrasonic frequency of 12 kHz which was 9.28 mgGAE/g and 6.63 mgQE/g, respectively. Conversely, DPPH values decreased with increasing temperature. However, no significant differences were found for Fe-chelating values. Thus, to determine the best extraction conditions with complex data was performed using Fuzzy Analytical Method (FAM). The results showed that the temperature, time, and frequency of extraction influenced the extract yield. The best extraction condition was an extraction temperature of 70°C for 20 min with an ultrasonic frequency of 12 kHz, showing the highest overall performance index of 6.774. UAE-ATPS may be an effective alternative technique for the extraction of bioactive compounds from plants.

Keywords: Ultrasound-assisted aqueous two-phase system (UAE-ATPS); Antioxidant activity; Phenolic compounds; Red water lily (*Nymphaea pubescens* Willd.) extraction; Fuzzy analytical method (FAM)

P - 052 Study of Extraction Conditions for Bioactive Compounds from Germinated Black Jasmine Rice Using Aqueous Two-Phase System

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Abstract

Black jasmin rice is rich in bioactive compound such as anthocyanin, phenolic and flavonoid. It can be germinated in order to gain more bioactive compound especially gamma-aminobutyric acid. Generally, the bioactive substances can be extracted using several methods which Aqueous two-phase system (ATPS) is a one of environmentally friendly extraction method. Therefore, this work interested in studying the conditions for extracting bioactive compounds from germinated black jasmine rice using the ATPS by studying ethanol concentrations of 32%, 34%, 36%, 38%, 40%, 42%, and 44% and the extraction proportions of 1:50, 1:40, 1:30, 1:20, and 1:10 using ammonium sulfate salt at 16%. The results found that ethanol concentration of 34% and the extraction rate of 1:40 can extract the amount gamma-aminobutyric acid (GABA) which was 8795.86 mg/mL. After that, the concentration of ammonium sulfate salt was 14%, 16%, 18%, 20%, and 22%, using an ethanol concentration of 34% and an extraction ratio of 1:40 it was found that the ammonium sulfate salt concentration of 14% was able to extract the most GABA, phenolics, flavonoids, and Fe-chelating. It was found that GABA, phenolic, flavonoid, and Fe-chelating activity decreased as the concentration of ammonium sulfate increased, but the amount of anthocyanin increased with the concentration of ammonium sulfate. Moreover, the ability to eliminate DPPH radicals at various concentrations of ammonium sulfate salt was in the range of 87.36 - 82.61%, indicating that ATPS could be an alternative method for extracting bioactive compounds from germinated rice that is environmentally friendly.

Keywords: Aqueous two-phase system; Gamma-aminobutyric acid; Bioactive compounds; Antioxidant Activity; Germinated black jasmine rice

P - 053 Evaluation of Total Phenolic and Flavonoid Contents, Antioxidant, and Antibacterial Activities of Crude Extracts from Roots of *Diospyros gardneri*

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Abstract

Diospyros gardneri is a medium-sized tree thriving in the moist, lowland tropics, known as 'Paya-Fai' or 'Hung Hon' in Thai. This tree has a history of use in traditional medicine. The objective of this study was to extract the roots of *D. gardneri* with different polarity solvents: n-hexane (non-polar), ethyl acetate (semi-polar), and methanol (polar), yielding crude n-hexane, crude ethyl acetate, and crude methanol extracts, respectively. Each crude extract was then assessed for total phenolic and flavonoid contents, as well as DPPH antioxidant activity, through colorimetric methods. Moreover, the crude extracts were tested for antibacterial activity using the disc diffusion method. The results revealed that the crude extracts contained phenolics at concentrations of 0.31, 0.60 and 0.82 mg GAE/mL sample, respectively. Additionally, they contained flavonoids at concentrations of 0.34, 0.65 and 1.38 mg QE/mL sample, respectively. The DPPH antioxidant activity percentages of the crude extracts stood at 47.08%, 79.95% and 75.23%, respectively. The crude extracts exhibited antibacterial activity against *Bacillus cereus*, *Staphylococcus aureus*, and *Escherichia coli*. Furthermore, both the crude n-hexane and ethyl acetate extracts could inhibit *Vibrio harveyi*. Among these, the ethyl acetate extracts demonstrated significant inhibition against *S. aureus* (gram-positive bacteria), with the highest observed inhibition percentage recorded at 33.17 ± 0.02%. These findings imply that the root of *D. gardneri* harbors bioactive compounds potentially beneficial for disease protection. Therefore, it stands as a valuable source of antioxidants and antibacterial elements, paving the way for the development of pharmaceutical applications and health products that capitalize on *D. gardneri*'s properties.

Keywords: *Diospyros gardneri*; Phenolic; Flavonoid; Antioxidant; Antibacterial

P - 057 Impact of Saltwater Crocodile (*Crocodylus porosus*) Bone Bio-Calcium on the Characteristic of Bologna from Salmon (*Salmo salar*) Cuts Blended with Surimi

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Abstract

Calcium is an essential mineral for human health, especially bone and teeth. Lacking calcium is a worldwide problem, resulting from insufficient intake or poor intestinal absorption, and is linked to decreased bone mass and osteoporosis. Therefore, fortifying food products with calcium would be beneficial for enhancing overall calcium intake. Saltwater crocodile (*Crocodylus porosus*) bone, discarded after meat and leather separation, is considered a promising source for bio-calcium (BC) production. The process includes four main treatments: high-pressure heating (autoclaving), alkaline soaking (protein removal), ethanol immersion (lipid removal), bleaching, and grinding to obtain BC powder with a yield of 16.6%. The resulting BC exhibits high calcium (26.25%) and phosphorus (13.72%) contents. The fortification of saltwater crocodile BC (0-10% w/w) on gel characteristics of bologna prepared using salmon cuts (*Salmo salar*)-surimi blends enhanced with microbial transglutaminase (0.05% of minced fish) was studied. BC addition increased breaking force, gel strength and whiteness, while reduced expressible moisture content of bologna gel ($P<0.05$). Shear force, hardness, springiness, cohesiveness, and gumminess of bologna gel increased with increasing BC levels up to 10% w/w ($P<0.05$). Conversely, the increasing BC levels caused a decrease in deformation and adhesiveness. Moreover, the BC incorporation decreased myosin heavy chain band intensity in accordance with the presence of the polymerization protein as visualized by SDS-PAGE. Fortification of bio-calcium at 6% w/w possessed no detrimental effect on sensory attributes of the bologna gel. Based on the microstructure of the resulting gels, 6% w/w bio-calcium incorporation gel showed the highly interconnected network with finer and denser structure than that of BC free gels. Therefore, the incorporation of BC from crocodile bone, especially at 6% w/w, augmented the gel properties without adverse effect on organoleptic properties of the resulting bologna gel.

Keywords: Bio-calcium; Bologna; Saltwater crocodile bone; Gelling property; Salmon-surimi blends

P - 059 Boiled Corn Wastewater Wine Production by *Saccharomyces cerevisiae* TISTR 5019

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Abstract

Sweet corn is widely cultivated and consumed for its notable sweetness and low-fat content. Thailand is a significant areas for corn cultivation, where boiling corn is a common cooking, resulting in substantial amounts of waste-water. The objective of this research was reused boiled corn wastewater to valuable by alcoholic beverage fermentation. Studied of comparison of alcoholic beverage substrates such as boiled corn wastewater, corn juice and corn Juice with pomace. Along with studied of the effect of adding sugar on alcohol production in the alcoholic beverage fermentation, comparing between no sugar-added samples and sugar-added samples, fermented with *Saccharomyces cerevisiae* TISTR 5019 for 12 days. The results showed that the sugar-added samples were more alcohol produced than no sugar-added samples (boiled corn wastewater with added sugar produced ethanol concentration 84.34 ± 1.70 g/L, yield 0.32 g/g) and the sensory test results showed that the samples with the corn pomace adding was favorite by testers because it produced a good aroma. The results of suitable sugar concentration in alcoholic beverage fermentation showed that the boiled wastewater with pomace and added 22 brix sugar concentration was the best sample by ethanol concentration 95.63 ± 0.85 g/L, yield 0.32 g/g and satisfaction of 64% of the testers. It can be concluded that boiled corn wastewater contains a small amount of sugar. It needed to add sugar if there wanted a good tasty and the corn pomace addition made the aroma beverage better.

Keywords: Wine Production; Sweet Corn; Wastewater; Boiled Corn; Pomace

P - 060 Antioxidant Capacity of *Wolffia* Protein Extracts produced via Ultrasound-Assisted Alkaline Extraction

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Abstract

This study aimed to investigate the antioxidant capacity of proteins extracted from *Wolffia arrhiza* using ultrasound-assisted alkaline extraction (UAAE). The duckweed protein extract (DPE) was obtained through a process of mixing rehydrated duckweed powder with a pH 8.5 aqueous solution at a weight ratio of 1:6. Ultrasound energy at an intensity of 107 W/cm^2 was applied to disrupt cells, followed by 2-h stirring and protein precipitation at pH 4.0. The resulting DPE was analyzed for its chemical composition, total contents of amino acids (TAAC), phenolics (TPC), and flavonoids (TFC). The antioxidant activities of the DPE were evaluated using two different extracting solvents: pH 9.0 aqueous buffer and 95% (v/v) ethanol. The results showed that the DPE contained 64.2 ± 0.2% protein and TAA 506.5 mg/g sample, with the essential amino acids (EAA) comprising 46.3% of the TAA. The top three EAAs in the DPE were Leu, Phe, and Lys. Furthermore, the DPE was found to meet the FAO/WHO recommended protein intake for preschool-aged children. The TFC in the DPE increased from 47.5 ± 1.0 in native duckweed to 58.4 ± 2.8 mg.RE/g.sample, while the TPC decreased from 9.5 ± 0.5 to 8.0 ± 0.1 mg.GAE/g.sample ($P<0.05$). The antioxidant capacity of the aqueous extract DPE was 54.3 ± 0.3, in terms of ABTS, while that of the ethanol extract DPE was 15.1 ± 0.3 μM.TE/g.sample. In terms of FRAP, the activity of the aqueous extract DPE was 85.8 ± 1.5, while that of the ethanol extract DPE was 53.9 ± 1.9 μM.TE/g.sample. Both antioxidant activities determined in the aqueous extract DPE were higher than those obtained from the ethanol extract DPE. The study suggested that the antioxidant capacity of the DPE was associated with proteins, phenolics, and flavonoids comprising the DPE. The DPE may have significant implications for the food industry, particularly in the development of functional foods and feed.

Keywords: Alternative proteins; Antioxidant; Duckweed; Plant proteins; Ultrasound-assisted extraction

P - 061 Effect of Foaming Agent Concentration on Properties of Foam-mat Dried Shrimp (*Litopenaeus vannamei*) Powder

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Abstract

Shrimp is one of the most nutritious seafoods, which is a rich source of amino acids, peptides, protein vitamins, and minerals, as well as various extractable and valuable compounds. Due to the highly perishable nature of shrimp, several researchers have been focused on new methods to extend its shelf life such as chilling, freezing, and drying. Among such methods, foam-mat drying is a process that a liquid or semi-liquid is whipped to form stable foam with or without foaming agent, leading to a rapid drying rate at lower temperature. However, using a combination of XG, CMC and GG as foaming agent to form stable foam for shrimp powder production for utilization as ingredients in various food applications, especially dysphagia diet, is limited. Therefore, this research was aimed to determine a suitable combination of those foaming agents for shrimp powder production by foam-mat drying for use as an alternative food with good nutrients and safe to swallow for dysphagia patients. The effect of combined foaming agents namely, xanthan gum (XG), carboxymethyl cellulose (CMC), and guar gum (GG) at the ratios of 0, 0.0833, 0.1667, 0.3333 and 0.5 on properties of shrimp powder was studied. Foaming agent solutions were prepared under eight different conditions (S1, S2, S3, S4, S5, S6, S7 and S8) and were mixed with shrimp puree in the ratio of 7:1 (w/w). Foam density and drainage volume of foam-mat samples were investigated. After drying at 70°C for 4 h, moisture content, water activity (a_w), bulk and tapped density, solubility, sedimentation ratio, and viscosity were evaluated. The results showed that drainage volume of foam, moisture content, a_w, bulk and tapped density, solubility and sedimentation ratio were not significantly different ($P>0.05$). However, the suitable ratio of three foaming agents (XG : CMC : GG) was 0.0833 : 0.0833 : 0.3333 (S2), which showed the lowest foam density and sedimentation ratio, while the highest solubility. Additionally, S2 at concentration of 20% (w/w) exhibited shear-thinning behavior with viscosity of 17.42 Pa·s. This result indicated that foam-mat dried shrimp powder can improve the thin liquid foods into pudding-like consistency correspond thickened liquid foods need for dysphagic patients.

Keywords: Carboxymethyl cellulose; Guar gum; Solubility; Viscosity; Xanthan gum

P - 066 Influence of Protein Concentrations and Protein to Alginate Ratios on Characteristics and Qualities of Spirulina Protein-Spherification

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Abstract

A leftover product called spirulina residue is a by-product generated from phycocyanin extraction. This by-product is rich in protein, containing approximately 30-40% of protein, which offers the potential opportunity for value-added production and effective utilization. A nutritious spirulina protein was successfully prepared from the by-product in our previous work. In this work, the potential use of spirulina protein extracts for non-meat-based food applications was explored in the form of spirulina protein nutritious beads. The amino acid profile of the resulting spirulina protein was also examined. The major aim of this study was to investigate the effects of the concentration of spirulina protein and spirulina protein-to-alginate ratio on the characteristics and qualities of spirulina protein spherification. Two concentrations of spirulina protein, namely 5% and 10% (w/w), were employed, while the concentration of alginate solution was fixed at 2% (w/w). The spirulina protein-to-alginate volume ratio was tested at 1/1, 3/1, and 9/1. The spherification process was carried out in a 2.5 % calcium chloride solution. The results showed that the spirulina protein extracts contained all the essential amino acids (EAA) with a high EAA ratio, accounting for 36.5% of total amino acids. Furthermore, the study exhibited that the sphericity of spirulina protein beads, prepared using 10% protein concentration at the spirulina protein-to-alginate ratios of 1/1 and 3/1, were not significantly different and were in a range of 1.02-1.05. The results of the texture analysis showed that the spirulina protein beads prepared at the ratio of 1/1 were harder than those at the 3/1 ratio. Sensorial results indicated that the spirulina protein beads prepared at the ratio of 1/1 received the highest acceptance scores of 6.95 ± 1.43 which meant that it was liked slightly to moderately. The findings suggest that spirulina protein extracts could be a promising alternative protein ingredient for nutritious protein diet applications.

Keywords: Alternative proteins; *Arthrospira platensis*; Plant-based foods; Spherification; Spirulina

P - 070 Efficiency of Cannabis Flower Oil Extract in β-Cyclodextrin Encapsulation by Freeze-Drying Method

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Abstract

Cannabis sativa L. can be utilized for medicinal and recreational purposes in many countries around the world. Low solubility affects the usage of cannabinoids including cannabidiol (CBD) and tetrahydrocannabinol (THC) in food. THC affects the central nerve and circulatory systems and is psychotropic. Rapid release and difficult to control release of THC and CBD in products have been reported to be connected to health problems. To reduce substance abuse and overdose, encapsulation can be applied to regulate key component release and improve cannabis solubility. A prior study encapsulated CBD in β-cyclodextrin by freeze-drying demonstrated its promise as a coating material. Therefore, this study aimed to investigate the physical properties and encapsulation efficiency of the cannabis flower oil extract encapsulated in the polysaccharide which was β-cyclodextrin as the coating material by freeze-drying method. Cannabis oil extract formed inclusion complex with β-cyclodextrin with ratios of core to wall material at 1:1 and 1:2 (w/w), and different emulsifiers such as Tween 20 and 40% ethanol were employed for the development process by freeze-drying method. Then encapsulated were characterized by SEM and FTIR. SEM image showed that cannabis oil extract encapsulated in β-cyclodextrin exhibited unusual shapes and orientations of different sizes. FTIR confirmed that cannabis oil extract was not completely formed, with no chemical reaction during encapsulation in all coating material at any ratio. Encapsulation efficiency ranges from 23.93% to 85.90%.

Keywords: Cannabis; Cannabinoid; Encapsulation; β-cyclodextrin; Freeze drying

P - 073 Impact of Bio-Calcium from Nile Tilapia Bone as Supporting Material for Probiotic Immobilization

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Abstract

Nile Tilapia bone is considered as low value by product, which affects the environment by difficulty to decompose and provides unpleasant smell. Increase value of this waste by processing as bio-calcium, and developing the bio-calcium as functional food additive is the interesting strategy. The physical and chemical properties of bio-calcium are interesting to develop as supporting material for probiotic immobilization, which can further apply on various food products as multifunctional food additive. This study evaluated the impact of bio-calcium from Nile Tilapia bone, as several formulations, on survivability of probiotic (*Lactobacillus acidophilus* TISTR 1338) in various harsh conditions (freeze-drying and temperature levels). Bio-calcium at three concentrations (5%, 10%, and 15% w/v) mixed with 10% (v/v) of probiotic suspension, supplemented with 10% (w/v) of sucrose were studied at 30, 60, and 90 min of agitation (200 rpm). The result showed that bio-calcium at 15%, agitated for 90 min presented the optimal formulation by providing the highest probiotic survivability after freeze-drying (99.4 ± 0.2%). Whereas the formulation of sucrose alone (without bio-calcium) showed 80.8 ± 0.7% of survivability. Water activity of developed immobilized probiotic formulations as dry powder showed up to 0.19. Stability of probiotic immobilized by optimal formulation was evaluated in various temperature levels (6 ± 2°C, 25 ± 2°C, and 50 ± 2°C). After 3 h of incubation at 6 ± 2°C and 25 ± 2°C, optimal formulation showed probiotic survivability as presented by 95.7 ± 4.6% and 100.0±0.5%, respectively ($P>0.05$). Whereas probiotic as free cell (the control) showed 92.2 ± 1.3% and 97.8 ± 1.5%, respectively ($P<0.05$). In addition, no probiotic could survive at 50 ± 2°C for both optimal formulation and probiotic as free cell. Scanning electron microscope (SEM) revealed the images presenting physical structure of bio-calcium combined with sucrose as supporting material for probiotic immobilization. The result showed that numerous healthy cells of probiotic were immobilized inside the porous structure of bio-calcium (no damaged cell was observed). Overall results indicated that bio-calcium from Nile Tilapia bone presented as remarkable supporting material for probiotic immobilization. Thus, this developed immobilized probiotic could be further improved as multifunctional food additive.

Keywords: Nile Tilapia Bone; Bio-Calcium; Probiotics; Supporting material; Immobilization

P - 074 Application of X-Rays for Eliminating Microorganisms in *Biancaea sappan* Powder (Fang)

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Abstract

Biancaea sappan (Fang) is a commonly known herb that has many medicinal properties such as nourishing the blood, curing diarrhea, treating athlete's foot, etc. Fang powder is normally found to be contaminated with microorganisms. The aims of this study were to assay the effects of X-rays radiation on the microorganism contamination, bioactive substances content, and antioxidant activities on Fang powder. Fang powder samples were exposed to X-rays at doses of 5, 10, 15, and 20 kGy for 2.5, 5, 7.5 and 10 hours, respectively. The study revealed high number of yeasts and molds in non-irradiated sample. The study showed that the X-rays irradiation at dose 5 kGy was able to eradicate the number of total plate count, yeasts and molds, and pathogenic bacteria, *Bacillus cereus* content to below 10 CFU/g. In the evaluation of the bioactive substance content in Fang, which is brazilin, it was found that irradiation of X-rays resulted in a significant decrease on the brazilin content. Irradiation at doses of 15 and 20 kGy caused the greatest reduction brazilin content. In terms of the antioxidant activities, the irradiation at doses 10 – 20 kGy significantly decreased the total phenolic content from 94.21 mgGAE/g of non-irradiated sample to 84.73 mgGAE/g of 20 kGy irradiated sample but had no effect on DPPH (68.67-71.11 mgAAE/g) and FRAP (905.54-940.13 μmol $FeSO_4$/g). In this study, it was concluded that X-rays irradiation of 5 kGy on Fang powder was sufficient to improve the microbial quality and did not change the content of bioactive substances and antioxidant properties. The successful application of X-rays irradiation to improve the microbial quality of Fang powder opens up possibilities for its use in other food products such as spices, herbs, and other powdered ingredients.

Keywords: *Biancaea sappan*; Fang powder; X-rays irradiation

P - 076 X-ray Irradiation Effect on Microbial and Chemical Properties of Sliced Fermented Ground Pork (Naem)

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Abstract

This study investigated the effects of X-ray (XR) irradiation on foodborne pathogens, total viable count (TVC), lactic acid bacteria count (LABC), pH and lactic acid concentration (LAC) of sliced fermented ground pork (SFGP). The irradiation was applied at doses of 0, 2, and 4 kGy and the storage temperatures were 5°C for 2 months and 30°C for 12 days. The results showed that there were no food borne pathogens in SFGP at all XR doses. The TVC and LABC were reduced by following the dose-dependent way. However, no changes in pH and lactic acid content were attained, regardless of the XR dose. The TVC and LABC of the 4 kGy sample were increased by both storage temperatures, whereas 0 and 2 kGy were not altered. In case of sample storage at 5°C, the pH value of non-irradiated reduced from 4.54 to 4.22 and irradiated SFGP decreased from 4.54 to 4.32 at 2 months storage. The lactic acid content of non-irradiated and irradiated samples increased from 2.00 to 2.27 and 2.24, respectively. For 30°C, the pH value of the non-irradiated sample decreased significantly more than the irradiated sample from the beginning day of storage. The pH of non-irradiated decreased from 4.54 to 4.28 and irradiated SFGP decreased from 4.54 to 4.35. In terms of lactic acid content, the values of non-irradiated were higher than irradiated SFPG at day 12. Therefore, the XR at dose of 4 kGy is suitable for extending the shelf-life of SFGP at 5°C and 30°C.

Keywords: X-ray irradiation; Naem; Fermented ground pork; Lactic acid

P - 083 Antibacterial Properties of Recombinant Acidic Latex Protein from *Hevea brasiliensis*

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Abstract

Natural rubber latex, derived from *Hevea brasiliensis*, contains organic substances, particularly proteins. Some of these proteins, known as allergenic proteins, contribute to latex allergy. Thus, proteins need to be eliminated through the processes of leaching and de-proteinization from latex. Acidic latex protein, a major allergen protein in latex classified by the International Union of Immunological Societies (IUIS), is present in the C-serum fraction of latex. The objective of this study was to produce the recombinant protein and explore another function of the Acidic latex protein. The recombinant protein of Acidic latex protein (rHevb5) was over-expressed in *Escherichia coli* strain BL21 star (DE3). Subsequently, the expressed protein was purified using Ni-NTA agarose. The molecular weight of the purified rHevb5 was approximately 36 kDa, as determined by electrophoresis techniques. Bacterial growth was assessed by measuring absorbance and counting colonies. The recombinant protein exhibited the ability to inhibit the growth of both gram-positive bacteria (*Bacillus cereus* and *Staphylococcus aureus*) and gram-negative bacteria (*E. coli* and *Salmonella* Typhi) in LB broth, especially at a concentration of 5 mg/ml rHevb5. Additionally, rHevb5 increased the bacterial clearance zone of *S. aureus* and *S.* Typhi compared to the control group. In summary, it can be inferred that rHevb5 exhibits antibacterial properties. Therefore, the acidic latex protein, a major component in the C-serum that is removed during the production process, could potentially be employed as antibacterial agents in the future.

Keywords: Acidic latex protein; *Hevea brasiliensis*; Antimicrobial activities; Recombinant protein; Hevb5

P - 084 That is My Cup of Tea: Emotion and Sensory Characteristics of Tisane Infusions

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Abstract

Tisanes is a healthy herbal tea considered a functional food rich in antioxidants. This study aimed to survey consumers' behavior and sensory emotions toward tea infusions blended with herbs for relaxation and calmness. The tea was infused with chamomile, lavender, mimosa, rose, and stevia. The survey involved 126 participants, comprising 31.7% males and 68.3% females. Consumer acceptance of Tisane was assessed using 9-point hedonic scale. The results indicated the majority of respondents were company employees with an average income of 10,000–20,000 baht per month. Overall liking was 7.76 ± 1.15 and was unrelated to gender ($P>0.05$). The hedonic scale for various attributes was assessed, including color, clearness, chamomile aroma, sweet aroma, spices aroma, sweetness, chamomile flavor, aftertaste, and astringency. The mean scores for these attributes were 7.52 ± 1.43, 7.72 ± 1.24, 7.72 ± 1.23, 7.52 ± 1.42, 6.79 ± 1.77, 7.02 ± 1.84, 7.52 ± 1.29, 7.07 ± 1.84, and 7.60 ± 1.35, respectively. Age significantly impacts hedonic rating on astringent attributes ($P\leq0.05$). In terms of 'Just About Right' evaluations, participants indicated that color, clearness, chamomile flavor, and aftertaste were perceived as just about right. However, other attributes were reported to be either too low or too high, with spice aroma and astringency specifically leaning towards a too-low level. The sensory emotions, measured through 5 scores, indicated strong feelings of relaxation (3.71 ± 0.83) and calmness (3.36 ± 0.90) toward the tea formulation. In conclusion, consumers most desired the tea that promotes relaxation, promotes sleep, and decreases stress. The findings will benefit developing the formulation of tisanes in the future. It provides more knowledge of herbal tea infusions with medicinal properties for relaxation and calmness.

Keywords: Consumers acceptance; Functional food; Tisanes; Sensory emotional; Lifestyle medicine

P - 087 Size Reduction of Rice Starch Granule by Acid Hydrolsis Combining with Ball Milling

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Abstract

The objective of this work was to develop a method for reducing the size of rice starch granules by acid hydrolysis combined with ball milling. Rice starch was hydrolyzed with 3.16 M H_2SO_4 for every 4 hours up to 24 h at 40ºC. The optimum hydrolysis time at which the amorphous lamellae in the rice starch granule were maximally hydrolyzed was determined by monitoring the changes in the yield weight and the height ratios of the FTIR bands at 1047 and 1022 cm^{-1} of the hydrolyzed starch. The results showed that the yield weight significantly decreased during the first 16 h and slower decreased later. The height ratios of the FTIR bands at 1047 and 1022 cm^{-1} which positively related to the degree of crystallinity of starch granule slowly increased up to 16 h and started to decrease after that. Therefore, 16-hours acid hydrolyzed rice starch was then wet-milled by a ball mill in 96% ethanol with a weight ratio of 1:3 for 3 h. Rice starches were investigated their morphologies by SEM and particle size distribution by particle size analyzer. The acid-hydrolyzed starch granules had a rougher surface than the native starch granules but their granule size was similar with those of native starch. The ball-milled starch granules showed some fracture granules. The acid-hydrolzed combining with ball-milled starch exhibited small, irregular-shaped that tend to aggregate, forming agglomerates. The mean diameters of the particle size based on volume-weighted D[4,3] of native, acid-hydrolyzed, ball-milled, and acid-hydrolzed combining with ball-milled starches were 9.54, 8.92, 6.07, and 5.16 μm, respectively. The study had revealed the synergistic effect of both acid hydrolysis and ball-milling on the size reduction of rice starch granule.

Keywords: Rice starch; Acid hydrolysis; Ball milling; Starch small particle.

P - 088

Another Isoform of Prophenoloxidase from *Fenneropenaeus merguiensis* Involved in Innate Immune Response Against White Spot Syndrome Virus and *Vibrio parahaemolyticus*

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Abstract

Melanization stands as a crucial immune response in shrimp, where prophenoloxidases (proPOs) initiate the oxidation of mono- or o-diphenols, a pivotal step in melanin formation. In this study, we unveil a novel proPO gene from banana shrimp (*Fenneropenaeus merguiensis*) designated *FmHPPO*. The full-length cDNA of *FmHPPO*, spanning 2,576 bp, was validated through the alignment of three cDNA fragments. It encompasses a 2,127 bp open reading frame encoding a 159-amino acid protein, a 5´ untranslated region (UTR) of 32 bp, and a 3´ UTR of 417 bp featuring a poly (A) tail. The deduced protein sequence incorporates a putative 15-amino acid signal peptide and essential domains such as Hemocyanin-N, Hemocyanin-M, tyrosinase, and Hemocyanin-C. Noteworthy, there are two specific positions conducive for copper (Cu) binding, Cu(A) and Cu(B). RT-PCR expression results revealed *FmHPPO* transcripts exclusively in the hepatopancreas, with no detection in other tissues. Furthermore, *FmHPPO* expression significantly increased, peaking at 24 h post-challenge with *Vibrio parahaemolyticus* and at 12 h post-challenge with white spot syndrome virus (WSSV). Additionally, shrimp with suppressed *FmHPPO* exhibited markedly elevated mortality rates when confronted with highly pathogenic microorganisms, *V. parahaemolyticus* and WSSV. These findings underscore the critical role of *FmHPPO* in the shrimp immune system, positioning it as a vital defender against these pathogens. The study confirms that *FmHPPO*, as an isoform of prophenoloxidase, plays an indispensable role in the innate immune response of shrimp, exhibiting inducibility in the face of pathogenic challenges, particularly from *V. parahaemolyticus* and WSSV.

Keywords: Banana shrimp; Prophenoloxidase; *Vibrio parahaemolyticus*; White spot syndrome virus

P - 091 Screening and Selection of β-Mannanase Producing *Bacillus* spp. for Biofilm Removal Application

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Abstract

β-Mannanases, the major mannan-degrading enzymes have been applied in various industries and the enzyme from Bacillus spp. have been used as commercial enzyme producers particularly Bacillus subtilis which is claimed as generally recognized as safe (GRAS) microbes and the Bacillus spp. were commonly found in Miang samples and produced some hydrolytic enzymes involved in Miang fermentation. The biofilm is a polymer called extracellular polymeric substance (EPS) is recognized as the main cause of some critical problems such as contamination of food and medical devices. Regarding, β-mannanase has been reported as one important enzymes in hydrolysis of biofilm polysaccharides, this study aims to find the Bacillus spp. capable of hydrolytic enzyme production especially β-mannanase for application in biofilms removal. A total of 108 isolates of Bacillus spp. were isolated from Miang samples and tested for their ability to produce β-mannanase by plate assay on nutrient agar (NA) supplemented with locust bean gum (LBG) as the sole carbon sources. The number of bacterial isolates those are positive for β-mannanase activities were 73 isolates. The Bacillus isolate K9.1 showed the highest in β-mannanase production in NB medium supplemented with 0.5% LBG as 5.36 U/mL. Isolate K9.1 was selected for the enzyme production in basal medium containing gram per liter of 5.0 LBG, 10.0 NaCl, 20.0 K_2HPO_4, 5.0 $NaNO_3$, 1.0 KCl, 2.0 $MgSO_4$•$7H_2O$ and 5.0 Yeast extract. The β−mannanase activity reached the maximum activity of 14.5 U/mL at 24 h cultivation. Crude β-mannanase clearly showed the capability in removal of the biofilm formed by Pseudomonas aeruginosa and Streptococcus mutans at 33% and 30% inhibition, respectively.

Keywords: *Bacillus* spp.; β-Mannanase; Biofilm degradation

P - 093 Unlocking Nutritional Potential: Extended Germination Boosts Nutrition and Phytochemicals of Yellow Soybean Sprouts

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Abstract

Soybeans are known as one of the most economical crops in the world. Despite their popularity, their use as a functional ingredient seldom extends to soybean sprouts. Soybean sprouts typically are a product of short-time germination and are mainly used for fresh consumption. This research investigated the effect of an extended germination period of 9 days on the physical and chemical qualities of yellow soybean seeds and sprouts. Soybean seeds were grown under a controlled environment and collected on days 0, 1, 3, 5, 7, and 9. Freeze-dried samples were analyzed on major nutrients, allergen (ELIZA test), total phenolic content, total flavonoid content, and antioxidant activities (DPPH and FRAP assays). The results showed that protein content, phytochemicals, and antioxidant activities significantly increased with germination time while the allergen levels decreased ($P<0.05$). All sprouts showed higher nutrients, phytochemicals, and antioxidant activities than soybean seeds. Sprouts on day 7th had the highest protein content (39.50 ± 0.14 g/100g) while total phenolic content (308.4 ± 2.5 mg GAE/100g), DPPH value (133.5 ± 0.6 mg TE/100g) and FRAP value (123.0 ± 0.9 mg TE/100g) were highest on day 9th. The allergen level of sprouts at the end of the germination period decreased by 92% compared to the starting soybean seeds (from 128.17 to 10.08 g/100g). Therefore, yellow soybean sprouts could be developed as a functional ingredient for the food and supplement industry.

Keywords: *Glycine max*, Allergen, Legume, Nutrition, Food safety

P - 094 Green Alga *Chlorella* sp. KLSc61 Tended to Partially Remove 3-Amino-5-Nitrosalicylic Acid (ANS) from 3,5-Dinitrosalicylic Acid (DNS) Wastewater

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Abstract

Currently, numerous reports focus on green algae and green ecosystems, with one noteworthy discovery being their application in wastewater treatment. Additionally, various studies show that biomass from algae can be used to produce biofuels, nutritional supplements, animal feed, etc. One of particular interest in this study is the utilization of green algae for the treatment of 3,5-dinitrosalicylic acid (DNS), a representative phenolic compound, commonly used in various experiments, including reducing sugar determination. This reaction often results in the generation of wastewater, containing the remaining substrate DNS and the final product, 3-amino-5-nitrosalicylic acid (ANS). Both substances are known to be toxic with an LD_{50} of 860 mg/L in rat (for DNS) and 3,400 mg/L (for ANS). Our research is focused on the use of *Chlorella* sp. KLSC61 to remediate these compounds, contributing to the advancement of green algae applications. *Chlorella* sp. KLSc61 has initially demonstrated a 30% reduction in ANS, with no observable treatment effect for DNS. For further our next aim is to further enhance this percentage ANS treatment, utilizing carbon sources from ANS to promote the growth of *Chlorella* sp. KLSc61 for utilization in food supplements, animal feed, ecosystem development, and pharmaceuticals, as well as other various phenolic compounds.

Keywords: Green algae; 3,5-dinitrosalicylic acid; 3-amino-5-nitrosalicylic acid; green ecosystems, *Chlorella* sp. KLSc61

P - 097 Total Phenolic Content and Antioxidative Properties of Some Edible Wild Edible Mushrooms in Northern Thailand

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Abstract

Several edible wild mushrooms are known to be a good source of essential dietary minerals, nutrients, and vitamins, which makes them an important source of food for human. These mushrooms have also been recognized as a source of many bioactive compounds (e.g., immunomodulatory compounds, phenolic compounds, polysaccharides, terpenoids and tocopherols) which exhibit various beneficial biological activities effective biological activities (including anticancer, anti-inflammatory, antimicrobial, antioxidant, cholesterol-reducing, immunomodulatory and neuroprotective properties). This study aimed to determine the total phenolic content and antioxidant activity of 20 samples of edible wild mushrooms collected in northern Thailand. The obtained total phenolic content was investigated from ethanolic extracts of each mushroom sample. The obtained total phenolic contents ranged from 0.373 to 3.869 mg GAE/g extract. It was found that *Tylopilus* sp. 2. showed the highest total phenolic content. Moreover, the antioxidant activities of mushroom extracts were investigated by three different methods, namely 2,2-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid), 2,2-diphenyl-1-picrylhydrazyl, and ferric reducing antioxidant power assays. The result indicated that all mushroom extracts showed positive antioxidant activity. The outcomes of this study provide significant information on the phenolic content and antioxidant activity potential of edible wild mushrooms in northern Thailand.

Keywords: Antioxidant activity; Edible mushrooms; Phenolic compound; Thailand; Tropical area

P - 098 Determination of *Cordyceps militaris* Extraction with Ultrapure Water, Time and Temperature on the Amount of Important Substances, Polysaccharide and Antioxidant Activity of Extracts

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Abstract

Cordyceps militaris has been extensively used as a traditional medicine and healthcare field in East Asia due to its various pharmacological activities. Our research is focused on determining the effect of sonicate and incubate extraction with ultrapure water, time and temperature extraction conditions of *C. militaris* to assess the amount of important substances cordycepin and adenosine, polysaccharide, and antioxidant activity. To support the purification of substances. addition, expect to provide support for the application of *C. militaris* in the healthcare field and the development of *C. militaris* in health food. The *C. militaris* fruiting body, cultured from the Biology Laboratory, Faculty of Science King Mongkut's Institute of Technology Ladkrabang, Thailand, was investigated in this study. In this study, it was found that incubated extraction used time and temperature than sonicated extraction. The extracts from the fruiting body of *C. militaris* observed by HPLC showed the highest cordycepin content of 6.39 ± 0.02 (mg/g DW), and the highest adenosine content, 1.62 ± 0.02 (mg/g DW) by using sonicated extraction at 45 °C for 60 min. The content of polysaccharides was 14.31 mg/g of sonicated extract and 14.07 mg/g of incubated extraction at 80 °C for 2h. Both condition extraction shows the antioxidant activity exhibited at concentrations range of 0.01-0.3 mg/mL. with an IC50 value of 0.16 mg/ml on the DPPS assay and 0.18 on the ABTS assay of sonicated extract. and 0.16 mg/ml on the DPPS and ABTS assay of incubated extract.

Keywords: *Cordyceps militaris*; Antioxidants; Extraction; Cordycepin; Adenosine

P - 103 Effect of Fatty Acids and Phenolic Compounds Addition on Chemical, Physical, Physicochemical, and Morphology Properties of Rice Starch

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Abstract

The amylose component of starch can form a complex with several ligands known as V-amylose. Particularly, the starch-lipid V-type complex has been classified as a resistant starch type5 (RS5) whereas starch-polyphenol V-type complexes still need more investigation on their properties as an RS5. V-amylose is associated with modification pasting properties, reduction of retrogradation, and increase in the resistant starch content of starch. In this study, the effect of the addition of fatty acids and phenolic compounds on V-amylose complex formation and physicochemical properties of rice starch was investigated. Stearic acid, lauric acid, and phenolic compounds (gallic acid and quercetin) were added at 10% to rice starch with heat treatment. The starch sample heated without fatty acid and phenolic compound addition served as a control. Adding fatty acids alone or in combination with phenolic acid changed the pasting viscosity behavior of rice starch. Fatty acid and phenolic compound addition altered the A-type crystalline polymorph of natural rice starch to a mixture of A- and V-type crystals. The rice starch with quercetin and stearic showed enthalpy related to the formation of the V-amylose complex. The complex index (CI) of rice starch with fatty acids and phenolic compounds was observed that adding only stearic acid, stearic acid with quercetin, and lauric acid with quercetin gave the highest CI in the range between 75.11 and 81.90%. These findings suggested that the addition of fatty acids and phenolic compounds had the potential to increase the RS formation of rice starch through the V-amylose complex and simplify the development process for RS starch preparation.

Keywords: Rice starch; Fatty acids; Phenolics; Complex index; Resistant starch

P - 106 Nutritional and Bioactive Implications from A Vegetable Fermented Drink

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Abstract

Current crop and food production systems are encountering many challenges such as climate change and rampant demographic development. Therefore, there is an urgent necessity for more sustainable approaches to transform food production systems, by advancing in new research lines that contribute to climate resilience, biodiversity preservation, soil restoration and healthier diets, in line with the European Green Deal priorities and Farm2Fork strategy. Advancements on the discovery and characterization of novel microorganisms are therefore necessary for the identification of novel microbiome-based products and processes (biocatalysts in feed and food industries) and to boost sustainable food system. This study aims to explore the creation of a vegetable-based beverage, enriching it with probiotics to examine its nutritional composition and bioactive attributes. Post-fermentation, intriguing shifts were noted: a marked increase in both phenolic compounds and protein content emerged, underscoring the transformational impact of the fermentation process on these nutritional elements. Moreover, a meticulous investigation into the mineral content revealed noteworthy variations, shedding light on the beverage's potential as a source of essential minerals. To ensure the safety and quality of the samples, a comprehensive analysis of heavy metal content was conducted, providing crucial insights into the overall safety profile of the fermented wheat drink. This multifaceted evaluation not only delves into the beverage's nutritional enhancement through fermentation but also prioritizes its safety and potential health benefits, marking a comprehensive exploration of its properties.

Keywords: Fermentation; Plant-based beverages; Sustainability

P - 107 Production of Reduced-Fat Beef Patty Using Fat Replacer Derived from Pectin Gel Induced by Fish Bone Powder

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Abstract

Beef patty is recognized as meat product containing high saturated fatty acids and has been avoided by health concerning consumers and chronic patients. A reduction of fat without affecting overall qualities has been challenged and would be possible by substitution with suitable fat replacer (FR). Gelation of mixed pectin (extracted from pineapple waste and low methoxyl pectin) was induced by available calcium from fish bone powder in the present of soy protein isolate in order to prepare FR. The fat content in beef patty recipe was therefore substituted by FR for 0, 25, 50, 75, and 100%. Substitution of fat by FR > 75% resulted in changes in color values. A reduction of fat and an increase in total mineral content were found upon increasing FR. The maximum reduction of fat content was found at 0.56 folds when 100% FR was substituted. At this level, total mineral and calcium contents were increased to be 1.72 and 3.08 folds, respectively. Rancidity, assessed by TBARS, and total microbial count were significantly reduced after substitution fat with FR for 25%. However, a significant reduction of an overall acceptance due to changes in taste was in sample substituted fat with FR ≥ 50%. Based on this study, production of reduced-fat beef patty could be possible by substitution fat with FR for 25%. This strategy could reduce fat content and increase natural mineral and calcium contents.

Keywords: Beef patty; Fat replacer; Pineapple pectin; Natural calcium; Fish bone powder

P - 114 Amino Acid Composition, Consumer Acceptance, and Color Stability of Rice Protein Drink Extracted by Protease G6

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Abstract

The purpose of this research is to develop rice-protein (RP) drinks from carbohydrate-digested rice (CDR), a by-product of producing sports drinks. The RP extraction was conducted using 4% w/v solid-liquid ratio and 5% v/v Protease G6 per total solution at pH 7.0, 52°C for 180 min. The protein content and amino acids profile of the RP solution were determined by the Kjeldahl method and gas chromatography-mass spectrometry (GC-MS), respectively. Afterward, the RP drink was formulated by adding 1% w/v stevia glycoside, 0.3% w/v citric acid, 0.03% w/v food colorant (orange), and 0.01% w/v food flavor (orange). The RP drink was contained in 50 mL PET bottles before being pasteurized at 63°C for 30 min. The color change and microbial numbers of the RP drink were measured during the 21-day shelf life at different temperatures (4, 10, and 25°C). In addition, the sensory attributes, consisting of appearance, color, viscosity, smell, flavor, aftertaste, and overall acceptance, were also evaluated in 50 volunteers (18-35 years old). The results displayed the RP drink provided a relatively high lysine content (56.19 ± 0.81 mg/g protein). Moreover, almost all essential amino acid content meets the body requirement, represented by amino acid scores > 1, except for methionine (0.79). The sensory evaluation demonstrated the RP protein can be comparable to commercial whey protein drinks (most scores > 6). However, the scores of tastes and aftertaste were lower because of the bitterness derived from enzymatic hydrolysis. Furthermore, the color change was stable over 14 days of shelf life at different temperatures (4, 10, and 25°C). In the meantime, the microbial numbers were in a range of the standard (<10 cfu/g of the total plate count and yeast and mold counts, including <3 MPN/mL of coliforms and E.*coli*) over the period. According to the results, the RP extracted by Protease G6 manifested the potential approach for producing commercial RP drinks.

Keywords: Protease G6; Rice protein drink; Amino acid score; Sensory evaluation; Color change

P - 116 As, Cd and Health Risk Assessment in Unpolished Rice Samples from the South of Thailand

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Abstract

As arsenic (As) and cadmium (Cd) are considered as potential toxic elements of carcinogenicity. To obtain accurate method in determining the elements and health risk assessment, the method for the analysis of the elements were developed and validated. In this study, As and Cd in 20 unpolished rice samples obtained from the south of Thailand were determined by inductively coupled plasma mass spectrometer (ICP-MS). Closed-vessel microwave digestion was used and followed by analysis using ICP-MS. The recoveries of As and Cd in rice evaluated by analyzing NIST SRM 1568b (rice flour) in the same manner as the samples. The recoveries for the determination of As and Cd in rice were 97.3% and 85.5%, respectively. The average concentrations of As and Cd obtained in unpolished rice samples were 0.29 and 0.035 mg kg^{-1}, respectively. As and Cd found in the rice samples were lower than the codex maximum levels, 0.35 mg kg^{-1} (As in husked rice) and 0.4 mg kg^{-1} (Cd in rice), respectively. It was fond that there was no correlation between As and Cd contents in unpolished rice. The estimated weekly intake (EWI) values of As for consumption of the unpolished rice samples for male (6.69 µg kg^{-1} BW) and female (8.01 µg kg^{-1} BW) were lower than the provisional tolerable weekly intake (PTWI) of 15 µg kg^{-1} BW. The estimate monthly intake (EMI) values of As for Thai population in consumption of the unpolished rice were 28.69 µg kg^{-1} BW (for male) and 34.34 µg kg^{-1} BW (for female), respectively. The EMI values of Cd for consumption of the unpolished rice were 4.96 µg kg^{-1} BW (for male) and 5.93 µg kg^{-1} BW (for female), which is lower than the provisional tolerable monthly intake (25 µg kg^{-1} BW). This revealed that Thai population was safe from As and Cd exposure by consumption of the unpolished rice.

Keywords: Unpolished rice; ICP-MS; Toxic elements; Health risk assessment

P - 117 Discrimination of Geographical Origin of Southern Local Rice Using Multi-Elements Combined with Multivariate Analysis

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Abstract

In this study, geographical origin of southern local rice was discriminated using multi-elements combined with multivariate analysis. Twenty elements including Mn, Co, Cu, As, Se, Rb, Sr, Mo, Ag, Cd, Cs, Mg, P, K, Ca, Fe, Zn, Ga, Tl, and U were analyzed using inductively coupled plasma mass spectrometry (ICP-MS). The rice samples were digested by closed-vessel microwave digestion prior to ICP-MS analysis. The elemental concentrations found in 36 southern local rice samples cultivated from different six districts in Nakhon Si Thammarat province were combined with multivariate analysis (linear discrimination analysis, LDA) in order to discriminate the geographical origin of the rice samples. There were significant differences in Mn, Co, As, Rb, Sr, Mo, Ag, Mg, P, K, Ca, Tl, and U concentrations found in the southern local rice samples cultivated from six districts. Discrimination of geographical origin of southern local rice cultivated from different six districts in Nakhon Si Thammarat province was achieved with 100% correct classification of their original groups and 77.8% cross-validation. The database could be used for traceability of the geographical origin of Thai rice in order to prevent mislabeling and adulteration.

Keywords: Local rice; ICP-MS; Geographical origin; Multi-elements; Multivariate analysis

P - 118 Investigation on Microbial Communities of Grass Silage Produced by Lactic Acid Bacterial Starter KUB-G2 in Plastic Bag Silos

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Abstract

Silage production in Thailand commonly carried out by using the commercial lactic acid bacteria (LAB) starters imported overseas. This made some difficulties in terms of the regulation of importing biological materials into the county and high price. Moreover, most imported starters are designed for the silage production in the continental and dry regions, which may not be suitable for tropical region like Thailand. To replace an import of starters, a local LAB starter, KUB-G2, containing *Lactiplantibacillus plantarum* KUB-SP1-3 and *Pediococcus acidilactici* KUB-M6, was investigated for its ability to ensile signal grass silage (*Brachiaria brizantha*) in 20-ton plastic bag silos for 21 days, compared to the commercial starter as a control (*Lb. plantarum* CNCM MA18/5U and *Lb. buchneri* NCIMB 40788, Lallemand® Combo, Canada). After post ensiling, alpha diversity analysis observed by the observed features, Shannon index, and Faith PD indicated that the KUB-G2 had lower bacterial diversity than the control, but no significant differences ($P>0.05$). However, beta diversity based on Bray–Curtis dissimilarity showed that both treatments had distinctive difference in microbial communities. Investigation on microbiome profiles by Linear Discriminant Analysis Effect Size (LEfSe) at the LDA score higher than 3.0 ($P<0.05$) suggested that the KUB-G2 drives a narrow microbial community, but higher diversity of LAB, especially the colonization of pediococci at their abundances of 32.70% and 31.80%, while the control showed a broad range of microbial community, but less diversity of LAB with the colonization of *Lactiplantibacillus* and *Lentilactobacillus* at their abundances of 18.69% and 11.14%, respectively.

Keywords: Silage; Signal grass; Lactic acid bacteria; Organic acids; Microbial community

P – 124 Enhancing Digestion Resistance of Enzymatically Debranched Waxy Starch Dextrins through Sodium Sulfate Crystallization

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Abstract

This study investigates the effect of sodium sulfate (100-500 mM) on *in vitro* digestibility via promoting crystallization of enzymatically debranched waxy starch dextrin. Enzymatic debranching of waxy maize starch (50°C for 24 h) followed by crystallization (50°C for 2 d) in aqueous solutions of different sodium sulfate concentrations (0-500 mM). The research explores how sodium sulfate affects crystallization and its subsequent impacts on the digestion resistance of dextrin crystals. The addition of sodium sulfate significantly increased the yield of dextrin crystals, reaching 84% at 500 mM sodium sulfate. The dextrin crystals exhibited an A-type arrangement of double helices, indicating higher thermal properties than native starch. The enhanced thermal properties lead to increased resistance to digestive enzymes. The addition of sodium sulfate during crystallization improved crystallinity and digestion resistance. *In vitro* digestibility showed that dextrin crystals prepared with 500 mM sodium sulfate maintained an 80% resistant fraction in the uncooked state. Even after cooking (boiling), more than 50% of the dextrin maintained resistance to digestive enzymes. This study demonstrated that kosmotrope salts, specifically sodium sulfate, could effectively promote the association of dextrin chains, resulting in digestion resistance. The findings highlight the potential of sodium sulfate as a strategic modulator for designing starch-based structures with enhanced resistance to enzymatic digestion. Using kosmotropic formulations offers a promising way to modify starch properties to specific dietary and nutritional requirements, opening new possibilities for functional food ingredient development.

Keywords: Resistant dextrin; Kosmotrope salts; Debranching; Crystallization; Digestibility

P - 126 Functional Analysis of Cullin 3 on Cell Growth and Drug Resistance in Cholangiocarcinoma Cell Lines

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Abstract

Cholangiocarcinoma (CCA) is an aggressive cancer that occurs in the biliary tree, representing a global health problem with high incidence and mortality rates, particularly in the northeastern region of Thailand. The treatment option for CCA patients are limited due to late diagnosis; consequently, chemotherapy is the main treatment for advanced CCA. Unfortunately, the treatment outcomes is frequently poor due to the development of drug-resistant phenotypes. Our previous study, using proteomic analysis in CCA cell lines that exhibit resistance to chemotherapeutic drugs 5-fluorouracil and gemcitabine, namely KKU213A-FR and KKU213A-GR, respectively, identified numerous upregulated proteins in the drug-resistant cell lines when compared to the parental cell line (KKU-213A). Cullin 3 (Cul3) is one of the most upregulated proteins in these drug-resistant cells. Analysis of CCA patient data from The Cancer Genome Atlas Program (TCGA) database through GEPIA2 (Gene Expression Profiling Interactive Analysis) web portal and the Human Protein Atlas revealed the upregulation of Cul3 in CCA patients' tissues when compared to normal adjacent tissues. Despite the role of Cul3 having been explored in various type of cancers, its role in CCA is remains unexplored. This study aims to investigate the function of Cul3 in drug-resistant CCA cell lines. To confirm the expression of Cul3 in KKU213A-FR and KKU213A-GR, real-time quantitative PCR and western blot analyses were performed. The results showed a significantly upregulation of Cul3 at both the mRNA and protein levels in drug-resistant cell lines compared to the parental control. siRNA-mediated knockdown of Cul3 suppressed cell proliferation and induced cell cycle arrest in both drug-resistant CCA cell lines. Additionally, suppressing Cul3 expression rendered CCA cells more sensitive to chemotherapeutic drugs. Collectively, these findings underscore the crucial role of Cul3 in CCA progression, suggesting its potential as a therapeutic target for drug-resistant CCA.

Keywords: Cholangiocarcinoma; Cullin 3; Drug resistance; 5-Fluorouracil; Gemcitabine

P - 127 Optimization of Cannabinoids Extraction form *Cannabis indica* L. (Blueberry Variety) Using the Combination of Ultrasound and Microwave

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Abstract

Microwave-ultrasound assisted extraction (MUAE) was applied to extract *Cannabis indica* L. (Blueberry cultivar) cannabinoids including cannabidiol (CBD) and delta-9-tetrahydrocannabinol (Δ9-THC). The conditions of MUAE were optimized by response surface methodology based on central composite design (CCD). The influence of solid to liquid ratio (X1, A: 1:10-1:30), microwave time (X2, B: 5-20 min), and ultrasound time (X3, C: 10-30 min) was analyzed. A significant quadratic regression models were obtained and validated using the analysis of variance (ANOVA). According to the results, the optimal conditions of the UMAE extraction procedure were following solid to liquid ratio (X1, A): 1:22, microwave extraction time (X2, B): 5 minutes, and ultrasound extraction time (X3, C): 14 min. The maximum CBD and Δ9-THC contents were 0.298 ± 0.001 mg/g and 91.35 ± 0.35 mg/g (concentration per gram of the raw material), respectively. Experimentally achieved values were in accordance with those estimated by CCD model, suggesting applicability of the utilized model and the favorable result of CCD application in optimization of UMAE extraction parameters.

Keywords: Green technology; Cannabinoids; Ultrasound; Microwave

P - 133 Effect of Enzymatic Hydrolysis and Hydrolysis Time on Functional Properties of Rice Bran Protein Hydrolysate

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Abstract

Rice bran is a by-product from the rice milling industry. It is an interesting protein source because of its nutritional values, especially protein. The aim of this study is to investigate the types of enzymes (alcalase or flavourzyme) and hydrolysis time (0, 30, 60, 90 or 120 min) on emulsion and foaming properties of resulting rice bran protein hydrolysate. Rice bran was defatted before protein extraction. For the enzymatic hydrolysis, the rice bran protein mixture (1000 mg/mL) was adjusted temperature and pH to 55°C, pH 8 for alcalase or 50°C, pH 6 for flavourzyme. The hydrolysis was performed for 0, 30, 60, 90 or 120 min, then the appearance, degree of hydrolysis, emulsion and foaming properties of the hydrolysate were determined. The results showed that the darker color and degree of hydrolysis (DH) of the hydrolysate prepared by alcalase was higher than those of flavourzyme comparing in the same hydrolysis time ($P<0.05$). The highest DH value was noticeable for alcalase hydrolysis at 120 min (56.40%). Enzymatic hydrolysis improved the emulsifying properties when compared to control (without enzyme). Emulsion activity index of the hydrolysate prepared from both enzymes was significantly highest at 30 min ($P<0.05$) (alcalase = 77.71 m^2/g and flavourzyme = 63.39 m^2/g). The highest emulsion stability index was significantly found at 90 min that hydrolyzed by alcalase (65.84 min). The hydrolysate from both alcalase and flavourzyme at 120 min showed the highest foam expansion (12.67%, 23.33%) and foam stability (120%, 119.17%), respectively. This finding showed that functional properties of protein extraction from rice bran could be improved by enzymatic hydrolysis and the optimal hydrolysis time should be considered further depending on the properties of food products.

Keywords: Rice bran protein; Enzymatic hydrolysis; Alcalase; Flavourzyme; Hydrolysis time; Functional properties

P - 134 Enhancing Bioactive Compounds in Coffee Cherry Beverage Fermentation: The Role of Yeast and Lactic Acid Bacteria Co-culture

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Abstract

Global production of green coffee beans primarily results in the generation of coffee cherry pulp (CCP) as a by-product from the wet processing of coffee cherries. CCP trend to spoilage when improper treatment leads to the acidification of soil and rivers. Developing value-added products from CCP supposes an effective green and sustainable strategy because there are contains different classes of phenolic compounds and antioxidant activity. The fermentation of CCP with co-culture of yeasts and lactic acid bacteria can produce higher bioactive compounds that could yield higher antioxidant activities to be used as functional food and health-promoting properties. The objective of this study was to investigate the changes in bioactive compounds including antioxidative properties of CCP fermentation. *Lactobacillus plantarum* TISTR 2070 (LP), *Saccharomyces cerevisiae* (SC), and co-culture (LP-SC) were used as a starter for the fermentation with CCP extract. Changes in bacterial count, pH, total phenolic contents, antioxidant properties, organic acid compounds, and total sugar were investigated during fermentation of extracted CCP. The highest phenolic content was obtained in the sample containing the extracted CCP water, 10% sugar (w/w) fermented with LP-SC by fermentation at 37°C for 72 h. After the fermentation period the total bacteria count, total phenolic content, antioxidant activity and organic acid compounds were significantly increased compared to their initial values. The total phenolic content, and antioxidant activity of the fermented by LP-SC were increased to 15.59% and 32.38%, respectively. Therefore, this experiment confirmed the efficacy of fermentation of CCP with LP-SC that could produce higher bioactive compounds and possibly utilize them as health-promoting beverage in the future.

Keywords: Antioxidant; Zero waste; Coffee cherry pulp; Fermented Beverages

P - 135 The Influence of Roasting Levels on The Physiochemical Changes and Cupping Quality of Thai Arabica Coffee Beans

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Abstract

The roasting process significantly impacts the aroma, flavor, and physical properties of coffee. This study investigated the influence of different roasting levels (light, light-medium, and medium) on the physiochemical changes and cupping quality of Arabica coffee beans from Doi Chang, Thailand, processed using natural (DP), washed (WP), and honey (HP) methods. Green coffee beans were roasted at 205°C (light), 210°C (light-medium), and 218°C (medium) and analyzed for moisture content (MC), water activity (a_w), color, acid value (AV), free fatty acids (FFA), *p*-anisidine value (P-AV), peroxide value (PV), thiobarbituric acid reactive substances (TBARs), and TOTOX. Cupping evaluations were conducted following the Specialty Coffee Association of America (SCAA) protocol. Roasting level significantly affected both physical properties and lipid oxidation. MC and a_w decreased with increasing roasting level, ranging from 2.13 to 0.89% (dwb) and 4.73 to 1.60, respectively. Primary oxidation increased with roasting, as evidenced by AV, FFA, and P-AV, which ranged from 1.87 to 3.14 mg KOH/g oil, 4.78 to 8.03% palmitic acid, and 1.84 to 2.50, respectively. Secondary oxidation (PV and TBARs) was lower at lighter roasting levels (0.73 to 1.53 meq/kg oil and 7.35 to 17.88 MDA/kg oil, respectively). Light-medium roasted beans from all three processing methods achieved the highest cupping scores (84.00 for HP, 83.75 for WP, and 82.92 for DP). Compared to lower roasting levels, light-medium roasts exhibited superior qualities in terms of fragrance, aroma, flavor, aftertaste, acidity, balance, and overall cupping score. This study demonstrates that roasting level significantly influences the physiochemical properties and cupping quality of Thai Arabica coffee. Light-medium roasting yielded the highest cupping scores across all processing methods, suggesting an optimal balance between desirable Maillard reactions and undesirable oxidation processes. These findings provide valuable insights for optimizing roasting profiles for Thai Arabica coffee to achieve superior sensorial qualities.

Keywords: Coffee cupping; Lipid oxidation; Roasting; Sensory; Specialty coffee

P - 138 Comparative Study on Nutritional Values and Amino Acid Profile, Physical and Functional Properties of Different Sources of Protein Powder

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Abstract

Whey protein isolate (WPI) is known for being a highly digestible animal protein. However, the global shift toward plant-based diets is driven by increased awareness of the impact of food choices on health, environment, and animal welfare. Soy protein isolate (SPI), a dominant plant protein source, is rich in phytochemicals and widely used. However, interest is growing in alternative sources such as pea protein isolates (PPI) and sunflower protein concentrates (SfPC), known for their hypoallergenic properties. This research aimed to examine and compare the nutritional values and amino acid profile, physical and functional properties of SPI, PPI, WPI and SfPC. The results showed that WPI contained the highest protein content (84.20 g/100 g) followed by SPI (81.88 g/100g), PPI (74.04 g/100g), and SfPC (56.66 g/100g), respectively. However, the highest content of total fat, carbohydrate, ash was observed in SfPC. The similar trend was found in the amino acid composition. Leucine (6.12-10.62 g/100 g) and glutamic acid (11.02-13.62 g/100 g) were the major amino acids in all protein powder samples. SPI, PPI, WPI and SfPC showed a higher level of valine and isoleucine than FAO reference pattern on essential amino acid for adults. WPI also had higher leucine, lysine, and threonine than FAO reference pattern. For the physical properties, water activity and pH ranged of 0.13-0.49 and 6.07-7.27, respectively. WPI was lighter than other samples, while the lowest L^* (lightness) was found in SfPC. Functional properties exhibited that WPI had better water and oil holding capacity and solubility, while PPI had better foaming capacity and foaming stability than other samples. Overall, this study might help processors select the appropriate protein source for their target application in food products.

Keywords: Soy protein isolate; Pea protein isolate; Whey protein isolate; Sunflower protein concentrate

P - 140 Total Phenolic Content and Antioxidant Activities of Ethanolic Extracts from Stems and Leaves of Chinese Chives

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Abstract

Chinese chive (*Allium tuberosum* Rottl. ex Spreng) is one of the popular vegetables in the allium family. Allium species are rich in organosulfur compounds, flavonoids, saponins, and thioethers, exhibiting high antioxidant activity and total phenolic content. This study aimed to compare the total phenolic content and antioxidant activities of ethanolic extracts from the stems (SCC) and leaves (LCC) of Chinese chives. SCC and LCC were extracted with 70% ethanol and removed chlorophyll before determining total phenolic content using the Folin-Ciocalteu method and antioxidant activities by 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS), and ferric reducing antioxidant (FRAP) method. The results indicated that LCC had a higher total phenolic content (24.79 ± 0.04 mg GAE/g extract) than SCC (13.73 ± 0.04 mg GAE/g extract). Antioxidant activity of LCC was two times higher than SCC, with values of 1131.80 ± 0.05, 8043.90 ± 0.11, and 1871.60 ± 0.00 mM TE/g extract for DPPH, ABTS, and FRAP assays, respectively, compared to SCC with values of 582.10 ± 0.03, 2591.40 ± 0.20, and 1146.30 ± 0.01 mM TE/g extract. Although LCC had higher total phenolic content and greater antioxidant activity, both extracts could be used compatibly in some food applications since the de-chlorophyllization process reduced the green color value.

Keywords: *Allium tuberosum* Rottl. ex Spreng; Chinese chive; Chlorophyll removal; Total phenolic content; Antioxidant activities

P - 141

Effect of Physical Modification Techniques on Nutritional Values, Physical Properties and *In Vitro* Estimated Glycemic Index of Jackfruit Seed Flour

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Abstract

This research aims to investigate the nutritional values, physical properties, and *in vitro* estimated glycemic index (eGI) of native jackfruit seed flour (N-JSF) and four modified jackfruit seed flours (JSF), namely partial gelatinization treatment (PG), heat-moisture treatment (HMT), microwave heat-moisture treatment (MHMT), autoclave heat-moisture treatment (AHMT). The results found that there was no significant difference on protein content of HMT-JSF and AHMT-JSF with N-JSF, while PG-JSF and MHMT-JSF increased protein content to 11.58-11.83%. PG-JSF contained similar carbohydrate contents to N-JSF, while those of AHMT-JSF, HMT-JSF and MHMT-JSF differed from their native form. Moreover, fiber content of PG-JSF, HMT-JSF and MHMT-JSF was not significant difference with N-JSF, while AHMT-JSF decreased fiber content to 12.73%. The determination of eGI exhibited that these modified methods resulted in increasing eGI of N-JSF from low range (32.30) to medium range (58.53-68.27) in modified JSF. For the physical properties, the result indicated that samples contained various sizes of particles ($P<0.05$). N-JSF had more lightness values but less redness and yellowness values than modified JSF samples. The water activity of the JSF samples ranged from 0.160-0.354. Water holding capacity was found to be higher in modified JSF samples, while oil holding capacity showed a similar value across all JSF samples. In terms of pasting properties, N-JSF exhibited the highest peak viscosity, trough, breakdown, final viscosity, and setback. In comparison between modified JSF samples, the lowest peak viscosity was reported in HMT-JSF. No significant differences were found on breakdown values between modified JSF samples. Moreover, HMT-JSF, MHMT-JSF and AHMT-JSF showed the lowest trough viscosity, final viscosity and setback. A comparison of various characteristic of N-JSF and Modified JSF samples is expected to be a reference for developing and applying these JSF in various fields and product.

Keywords: Jackfruit; Flour; Modification; Nutritional values; Physical properties

P – 145 Quality Evaluation of Mango (*Mangifera indica*) Juice Formulated with Ultrasound-Extracted Pectin from 'Saba' Banana (*Musa acuminata* Colla *x Musa balbisiana* Colla *BBB Group*) Peel Waste

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Abstract

Pectin, a common stabilizer for fruit juices, was extracted from unripened saba banana peel waste using ultrasound-assisted extraction. To further understand the characteristics of the ultrasound-extracted saba banana peel pectin (UESBP), its effect on the quality of mango juice, a common fruit juice in the Philippines, was investigated. Mango juice was processed with 1% UESBP, and this was compared with mango juice processed without pectin (negative control), with 1% high methoxyl citrus pectin (HMCP), and with 1% low methoxyl citrus pectin (LMCP). Results showed that the pH of all samples were acidic ($pH \leq 4.6$), and their TSS were within the 19-21°Brix range. Moreover, L^* a^* b^* readings showed that UESBP samples had the lowest lightness score (39.61 ± 3.00) and greatest redness (0.18 ± 0.22) among the samples. Flow rates were also measured by allowing juice to flow throgh a 10-mL glass pipette. Results showed that the flow rate of the negative control (1.16 ± 0.02 mL/s) and UESBP (1.16 ± 0.02 mL/s) were not significantly different. Sensory evaluation of the samples using a 15-point scale showed that there was no significant difference among the color and fruity taste of the samples. However, significant differences were found on the homogeneity appearance, aroma, viscosity, smoothness, acidity, and general acceptability of the samples. Notably, LMCP had the highest viscosity score (10.79 ± 2.39), while the negative control had the lowest viscosity score (3.54 ± 1.44). Viscosity scores of HMCP (7.00 ± 2.13) and UESBP (5.58 ± 2.11) were not significantly different. In addition, the general acceptability of the UESBP (9.33 ± 2.57) was not significantly different to all the samples (negative control: 11.08 ± 1.73; HMCP: 10.17 ± 2.73; LMCP: 6.25 ± 3.22). All in all, UESBP can be used in mango juice processing, without determintal effects to the sensory quality of the product.

Keywords: Saba Banana Peel Waste; Juice; Ultrasound-Assisted Extraction

P – 149 Effect of Preparation Conditions on Physicochemical Properties of Cocoa Pod Husk Powder

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Abstract

Cocoa pod husk (CPH) is a by-product from cocoa industry, which is 52-76% by total weight of cocoa fruit. It contains beneficial substances, but there is limited study about its preparation for applying in food products. In this study, preparation conditions such as enzyme, drying time and temperature on physicochemical properties of CPH powder were investigated. CPH was prepared with and without pectinase enzyme, then it was dried in a tray dryer at 60 or 70°C for 4, 5 or 6 h. The CPH powder treated with pectinase enzyme, higher drying temperature and longer drying time decreased the *L** and increased *a** and *b** that represented the darker, more red and yellow color in CPH powder. However, the effect of drying temperature and time of CPH powder with non-pectinase treated significantly increased the *L** only the powder dried at 60°C, but *a** and *b** values did not significant difference. The CPH powder treated with pectinase enzyme showed significantly lower moisture content and higher water activity than those of without enzyme ($P<0.05$). However, treated with pectinase enzyme decreased the water and oil holding capacity, but did not affect the total phenolic content of CPH powder. The CPH powder prepared with pectinase enzyme and dried at 60°C for 4 h was the best preparation conditions in this study.

Keywords: Cocoa pod husk; Drying condition; Pectinase; Phenolic content

P – 150 Extraction of Polysaccharides from Defatted and Deproteinated Tiger Peanut (*Arachis hypogaea*) Cake

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Abstract

Polysaccharides are widely used in the food industry because of their physical and chemical properties. They are the major nutrients remaining in defatted and deproteinated Tiger peanut cakes, which can be transformed into a value-added product such as a food encapsulant. Ultrasonication was used to extract polysaccharides from the Tiger peanut cake. Optimization of extraction was done using a Factorial design with independent variables being amplitude and time. The most effective extraction parameters based on yield were 20 min using an amplitude of 20%, keeping temperature below 40°C. Water activity and moisture content of the dried Tiger peanut cake powder by hot air oven and vacuum oven before extraction were 0.30 and 0.48; 6.92% db and 11.97% db, respectively. Protein content was 7.94% (vacuum) and 8.94% (hot air) while fat content was 7.33% and 7.71%, respectively. Optimum conditions for extraction will be determined based on the results from extraction yield and properties of the extract. The findings from this research will determine the suitability of Tiger peanut polysaccharides as a commercial food encapsulant and provide an avenue for further studies into various other applications in the food and pharmaceutical industries.

Keywords: Extraction; Polysaccharide; Optimization; Tiger peanut cake; Ultrasonic

P – 152 Development of Refreshing and Healthy Drink Made from Chitosan, Indian Rose Chestnut Flower, and Peppermint

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Abstract

Individuals had to wear antibacterial masks every day because of the COVID-19 pandemic, which caused the mask to smell like food. A beverage manufacturer and entrepreneur seeks to create an innovative and potent drink with antibacterial and health-promoting qualities. The objective of this study was to develop a refreshing and healthy drink from chitosan, Indian rose chestnut flower, and peppermint. The experimental design using Central Composite Design (CCD), physico-chemical (pH and color), microbiological, antioxidant activities (DPPH, ABTS, FRAP method), sensory evaluation, and product's shelf-life were analyzed. The research from the data analysis of 17 formulations (C1-C17) from CCD has found that the appropriate conditions for preparing healthy and refreshing beverages from the mixture of chitosan and Indian Rose Chestnut flower extract are 5.10% and 10.10%, respectively, by fixing the concentration of peppermint at 3%. The study has selected the formulas C6 and 15, which is due to the fact that C1, C2, and C8 are further developed as drinks. The drinks have been found to be very effective with *Lactobacillus Plantarum* using the disk diffusion method. It found that C8 had the highest inhibition zone (8.63 ± 0.59 mm.). Analysis values of the antioxidant dosage are antioxidants with the highest dosage in C6 when measured by the ABTS method, C2 in antioxidants measured with the DPPH method, and C2 samples in maximum concentration as measured by the FRAP method. The studies of the product's shelf life are at 4°C and 25°C for 21 days. It is found that the analysis of sensorial, physical-chemical, and microbiological factors falls within the standard criteria.

Keywords: Healthy Drink; Indian Rose Chestnut Extract; Chitosan; Peppermint

P – 153 Impact of Sodium Chloride, Sodium Bicarbonate, Sodium Triphosphate and Sodium Acid Pyrophosphate on the Quality of Cooked Peeled Mantis Shrimp *(Harpiosquilla raphidea)*

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Abstract

Cooked peeled Mantis Shrimp (*Harpiosquilla raphidea*) (CPM) was treated with different concentrations of sodium bicarbonate ($NaHCO_3$) at 1, 2, and 3 g/100 mL with 2.5 g/100 mL sodium cholride (NaCl). Weight gain, pH, shear force, color, salt content, and total soluble peptide of the samples were determined and compared with tetrasodium pyrophosphate (TSPP) and sodium acid pyrophosphate (SAPP)-treated and non-treated samples (control). CPM treated with 3 g/100 mL $NaHCO_3$ and 2.5 g/100 mL NaCl could increase the weight gain of CPM from 8.75 to 11.70 g/100 g of fresh sample, comparable to 5.8 g/100 g of fresh sample with STPP and SAPP treatment. Weigh gain and salt content increased with a coincidential decrease in shear force ($P<0.05$). There was no significant difference in the average color and pH of the CPM among the treatments. The results indicated a high potential for the use of 3 g/100 mL $NaHCO_3$ and 2.5 g/100 mL NaCl as phosphate alternatives to improve the quality of CPM in the seafood industry.

Keywords: Mantis shrimp; Non-phosphate; Seafood

P – 159 Structural Basis of Thermophilic Alginate Lyase AlgAT5 Uncovering Substrate Preferred and Metal Ion Activation Mechanisms on PL Family 7

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Abstract

Annually, algae fix 50 gigatons of inorganic carbon into glucose, which is the main building block for glycans. Alginate, a predominant polysaccharide found in brown algae, constitutes approximately 30 to 40% of the overall biomass. It is made of two distinct units, mannuronic acid (M) and guluronic acid (G), which occur in varying proportions. The degradation product of alginate has wide-ranging applications in several industries including medical treatment, cosmetics, feed additives, and agriculture. Currently, the alginate lyase in PL7 family are primarily characterized, although the mechanisms of thermal stability, substrate specificity, and metal ion activation in this family remain unclear and are merely described as phenomena. The alginate lyase investigated in this research demonstrates an optimal temperature of 70℃ and a half-life time of 6 hours, making it the most thermally stable alginate lyase in this family. This study found that AlgAT5 had a notably higher concentration of aspartic acid (Asp), glutamic acid (Glu), and histidine (His) in its amino acid composition compared to the mesophilic enzyme; likewise, AlgAT5 had a much larger number of salt bonds. The substrate specificity of the enzyme was controlled by two amino acids located at positions 146 and 149. The enzyme's substrate specificity could be altered using site-directed mutagenesis. AlgAT5's enzymatic activity has been significantly increased by many divalent metal ions. The improvement can be ascribed to the participation of divalent metal ions in promoting the attachment of the substrate to Asp146. In contrary, the addition of NaCl causes a notable change in the structure of the loop area, which controls the entry and exit of the substrate, thereby enhancing the reaction ability. The primary objective of this study is to clarify substrate preferred and metal ions activation mechanisms on PL family 7. This will ultimately facilitate in the actual application of alginate lyase for the conversion of valuable chemicals.

Keywords: Alginate lyase; Thermophilic; Epimerism; Substrate-preferred mechanisms; Metal ions activation

P – 164 The Role of Food Souvenirs in Achieving Tourism for Sustainable Development Goals: A Systematic Review

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Abstract

'Tourism 4 SDGs' is the United Nations World Tourism Organization's Global Code of Ethics, providing recommendations for academia, civil society organizations, tourism and hospitality companies, international organizations, public bodies, travelers, and donors to achieve the 2030 goals. Among various tourism activities, shopping stands as the second-highest contributor in terms of tourism receipts. Within shopping activities, food souvenirs constitute a significant share. Therefore, this research employs a systematic review to identify the contributions of academic food souvenir-related research towards achieving the 2030 goals in accordance with the 'Tourism 4 SDGs' guidelines. A generic keyword search of "Tourism AND Souvenir" yielded 193 articles from the Scopus database and 233 articles from the Dimensions database. After eliminating 29 duplicates, a total of 397 articles were reviewed. The findings indicate an absence of direct mentions of 'Tourism 4 SDGs' guidelines in food souvenir-related research. However, the review revealed that food souvenirs contribute towards (1) creating the destination image, (2) enhancing destination competitiveness, (3) destination's revenue, (4) addressing carbon emissions, (5) promoting gender equality, (6) fostering community and local-level income, and (7) facilitating job creation. These contributions serve as indirect indicators of UN SDG goals 1, 2, 5, 8, 10, 11, 13, and 16. Furthermore, the findings reveal that researchers in rural tourism and remote locations, such as islands, exhibit comparatively greater engagement than those from urban and mass tourism destinations. Nevertheless, further research is needed to comprehend the role of food souvenirs and their stakeholders in achieving the United Nations Sustainable Development Goals.

Keywords: Food souvenir; Tourism industry; Tourism 4 SDGs; Sustainability

P – 165 Challenges in Industry 5.0 Adoption – A Case of Seafood Processing SMEs in Thailand

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Abstract

The term 'Industry 5.0' is a recent industrial revolution based on human-centricity, sustainability, and resilience. The previous industrial revolutions mainly focused on innovation and technology, which replaced human beings with automation. However, in the seafood processing industry, humans play a crucial role. The present status of the seafood processing SMEs in Thailand is that they are still in Industry 1.0 to Industry 3.0. However, the elements of Industry 5.0, such as human-centricity and sustainability, are widely considered and incorporated by seafood processing SMEs. Still, there are several challenges faced by seafood processing SMEs in adopting Industry 5.0. The prominent challenging factors were identified through a survey with 75 seafood processing SMEs, and the study found that SMEs are lacking in "getting skilled labor", "investment", "government support", "infrastructure", "knowledge", and "fear of getting a return on investment".

Keywords: Industry 5.0 challenges; Seafood processing SMEs.

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