8th International Conference on Food and Nutrition

8th International Conference on Food and Nutrition

22nd & 23rd May 2025 | Kuala Lumpur, Malaysia

ICFN 2025

Organized by

Appediet, India
Mahakaushal University, India
Center of Marine Ecology and Biomonitoring for Sustainable Aquaculture (Ce-MEBSA) Diponegoro University, Indonesia
SEGi University & Colleges, Malaysia
IFERP Life Sciences-Formerly BioLEAGUES

8th International Conference on Food and Nutrition

8th International Conference on Food and Nutrition (2025), Kuala Lumpur, Malaysia

ISBN 978-93-92106-78-1

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IFERP Life Sciences, India.

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CONFERENCE THEME

"INNOVATIVE APPROACHES TO GLOBAL NUTRITION AND SUSTAINABLE FOOD SYSTEMS"

Preface

We are delighted to extend a warm welcome to all participants attending 8th International Conference on Food and Nutrition (ICFN-2025) organized by Appediet-India, Mahakaushal University, India, Center of Marine Ecology and Biomonitoring for Sustainable Aquaculture (Ce-MEBSA) Diponegoro University-Indonesia, SEGi University & Colleges-Malaysia and IFERP Life Sciences-Formerly BioLEAGUES on May 22nd-23rd, 2025. This conference provides a vital platform for researchers, students, academicians, and industry professionals from all over the world to share their latest research results and development activities in the field of Food and Nutrition. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for ICFN-2025 contain the most up-to-date, comprehensive, and globally relevant knowledge in the field of Food and Nutrition. All submitted papers were subject to rigorous peer-reviewing by 2–4 expert referees, and the papers included in these proceedings have been selected for their quality and relevance to the conference. We are confident that these proceedings will not only provide readers with a broad overview of the latest research results in Food and Nutrition but also serve as a valuable summary and reference for further research in this field.

We are grateful for the support of many universities and research institutes, whose contributions were vital to the success of this conference. We extend our sincerest gratitude and highest respect to the many professors who played an important role in the review process, providing valuable feedback and suggestions to authors to improve their work. We also extend our appreciation to the external reviewers for providing additional support in the review process and to the authors for contributing their research results to the ICFN-2025.

Since January 2025, the Organizing Committees have received more than 150+ manuscript papers, covering all aspects of ICFN-2025. After review, approximately 40+ papers were selected for inclusion in the proceedings of ICFN-2025. We would like to thank all participants at the conference for their significant contribution to its success.

We express our gratitude to the keynote and individual speakers and all participating authors for their dedication and hard work. We also sincerely appreciate the efforts of the technical program committee and all reviewers, whose contributions made this conference possible. Finally, we extend our thanks to all the referees for their constructive comments on all papers, and we express our deepest gratitude to the organizing committee for their tireless work in making this conference a reality.

ISBN : 978-93-92106-78-1

About ICFN 2025

The 8th International Conference on Food and Nutrition coordinately invites all the Nutritionists, Dieticians, Professors, Deans, Scientists, Researchers, Research Scholars, Health experts, Delegates, Industrialists and Students which will be held on 22nd and 23rd May 2025 Kuala Lumpur,Malaysia Hybrid Conference. With the theme entitled "Innovative Approaches to Global Nutrition and Sustainable Food Systems". Current advancement and research within the field of food science and nutrition will be shared which delivers extensive knowledge, novel ideas, and experience to the participants from the experts in the field. This global conference also discusses the trends, concerns, practical challenges came across and the solutions. The International Conference on Food and Nutrition not only shares the knowledge but also provides a platform that helps in building prolific networking and professional opportunities which will boost one's career.

About IFERP Life Sciences

IFERP Life Science is a globally recognized professional association meant for research, innovation and development in the field of life sciences and medical sciences . It serves to propel and fuel all innovative works of research with immense potential in the fields of Healthcare, Life Sciences, Pharmaceutical Sciences, Medical Sciences, Food & Nutrition, Environmental Science, Oncology, Cardiology, Nursing, Microbiology, Physiotherapy, Dentistry and many more. IFERP Life Science has been directly responsible for a significant amount of the revolutionary developments that have taken place in these fields over the past few decades.

IFERP Life Science is a specialized platform that supports life science and medical professionals in advancing their careers and research impact. Our tailored solutions include international conferences, Faculty Development Programs, Webinars, author services, membership and scientific communications, designed to foster collaboration and knowledge-sharing within the global medical community

ISBN : 978-93-92106-78-1

Message from Chancellor, Mahakaushal University

Dr. Anil Kumar Tiwari

Chancellor, Mahakaushal University
Jabalpur (M.P.), India

Ladies and Gentlemen !

It is a true privilege and a sincere pleasure to extend a warm welcome to all esteemed delegates attending the 8th International Conference on Food and Nutrition (ICFN 2025), scheduled for 22th–23th May 2025 at the Corus Hotel in Kuala Lumpur, Malaysia. Organized by IFERP Life Sciences, this international forum is the result of a meaningful partnership with Mahakaushal University (India), SEGi University and Colleges (Malaysia), Ce-MEBSA-Diponegoro University (Indonesia), and Appediet. This diverse collaboration reflects our shared commitment to advancing knowledge in food science and nutrition. We are delighted to gather in Kuala Lumpur, a vibrant and forward-looking city, to connect experts, researchers, and innovators from across the globe. ICFN 2025 serves as a platform to explore cutting-edge developments, share groundbreaking research, and foster global partnerships that will shape the future of nutrition and food sciences.

On behalf of Mahakaushal University, it is an honor to participate in this esteemed gathering, which plays a pivotal role in driving innovation, advancing research, and fostering international collaboration in the field of nutrition and food systems. Under the theme “Innovative Approaches to Global Nutrition and Sustainable Food Systems,” this hybrid conference offers a rich platform for presenting breakthrough studies, exploring current trends, and tackling urgent global issues such as food security, sustainable agriculture, and public health nutrition.

Bringing together a distinguished community of professionals-including nutrition experts, dietitians, academic scholars, researchers, students, and leaders from industry-ICFN 2025 promises to spark meaningful dialogue through panel discussions, interactive sessions, and technical presentations. Our shared mission is to encourage cross-disciplinary partnerships and push the boundaries of nutrition science to support global health and sustainability. I am eager to contribute to these critical conversations and to engage with fellow participants in the energetic and diverse setting of Kuala Lumpur during the 8th ICFN 2025.

Thank you for being a part of this remarkable event. I wish you a productive and enriching Conference experience.

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Message from Vice Chancellor, Mahakaushal University

Dr. R C Mishra

Vice Chancellor, Mahakaushal University
Jabalpur (M.P.), India

It is with great humility, profound respect, and immense pleasure that I, Dr R C Mishra on behalf of the Mahakaushal University, Jabalpur (MKU), extend our warmest welcome to you. We are truly honored to have you join us today at the 8th International Conference on Food and Nutrition (08th ICFN) , a prestigious event that has become a beacon of hope, innovation, and collective action in the realm of Food Science and Nutrition This summit is hosted by IFERP Life Sciences and takes place on the 22nd and 23rd of May, 2025, a momentous occasion that marks yet another milestone in our ongoing journey to foster cross-disciplinary partnerships and push the boundaries of nutrition science to support global health and sustainability.

On behalf of Mahakaushal University, it is an honor to participate in this esteemed gathering, which plays a pivotal role in driving innovation, advancing research, and fostering international collaboration in the field of nutrition and food systems. Under the theme “Innovative Approaches to Global Nutrition and Sustainable Food Systems,” this hybrid conference offers a rich platform for presenting breakthrough studies, exploring current trends, and tackling urgent global issues such as food security, sustainable agriculture, and public health nutrition.

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Thank you for being a part of this remarkable event. I wish you a productive and enriching Conference experience.

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Message from CEO, Ce-MEBSA Diponegoro University

Mr. Sapto P. Putro

CEO, Ce-MEBSA Diponegoro University, Indonesia

Ladies and Gentlemen,

It is with great honor and heartfelt gratitude that I extend my warmest welcome to all distinguished participants of the 8th International Conference on Food and Nutrition (ICFN 2025), held at the Corus Hotel, Kuala Lumpur, Malaysia, on 22th–23th May 2025. Hosted by IFERP Life Sciences in collaboration with Mahakaushal University (India), SEGi University and Colleges (Malaysia), Ce-MEBSA – Diponegoro University (Indonesia), and Appediet, this international gathering brings together a vibrant community of scholars, professionals, and thought leaders in one of Southeast Asia's most dynamic cities.

On behalf of Ce-MEBSA, Diponegoro University, it is a privilege to be part of this prestigious event, which serves as a vital platform to promote innovation, research excellence, and global collaboration in the realms of nutrition science and food systems. Themed "*Innovative Approaches to Global Nutrition and Sustainable Food Systems*," this hybrid conference will serve as a fertile ground for sharing cutting-edge research, discussing emerging trends, and addressing critical global challenges such as food security, sustainable food production, and public health nutrition.

This conference convenes an inspiring array of experts—nutritionists, dietitians, scientists, professors, researchers, students, and industry leaders—who will engage in dynamic dialogues, panel discussions, and technical sessions. Our collective goal is to foster interdisciplinary collaboration and advance the frontiers of nutritional science in service of global well-being and sustainability. It is my hope that the exchange of ideas here will not only spark transformative insights but also cultivate long-lasting professional networks that contribute to impactful solutions aligned with the Sustainable Development Goals (SDGs), particularly Goals 2, 3, 6, and 12.

I look forward to contributing to this important conversation and to engaging with all of you during the 8th ICFN 2025 in the vibrant city of Kuala Lumpur.

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Message from Appediet

Welcome to the 8th International Conference on Food and Nutrition !

On behalf of the Appediet team, we are honored to welcome you to the 8th International Conference on Food and Nutrition, held on May 22th–23th, 2025, in Kuala Lumpur, Malaysia. This hybrid event, organized by IFERP Life Sciences and the Universal Society of Food and Nutrition (USFN), brings together global experts to explore innovative approaches to global nutrition and sustainable food systems.

As an associate partner, Appediet is proud to support this platform that fosters interdisciplinary collaboration and knowledge exchange. Our commitment to advancing nutritional science and promoting sustainable food practices aligns seamlessly with the conference's objectives.

Over the next two days, participants will engage in insightful sessions covering a range of topics, including food security, dietary trends, innovative food production methods, and nutritional policies. Through interactive workshops, panel discussions, and expert presentations, we aim to inspire novel research and encourage the development of sustainable solutions that contribute to healthier communities and improved food systems worldwide.

We extend our heartfelt gratitude to all attendees, speakers, and partners for their contributions to this event. Together, we embark on a journey to advance knowledge, share experiences, and drive impactful solutions in the fields of food and nutrition.

Regards,
Appediet
Shraddha Vyas, *Functional Nutritionist, Certified Health and Wellness Coach*

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Message from Managing Director, IFERP

Mr. A. Siddth Kumar Chhajer

Managing Director & Founder,
IFERP, Technoarete Group.

On behalf of Institute For Educational Research and Publications (IFERP) & the organizing Committee, I express my hearty gratitude to the Participants, Keynote Speakers, Delegates, Reviewers and Researchers.

The goal of the 8th International Conference on Food and Nutrition (ICFN-2025) is to provide knowledge enrichment and innovative technical exchange between international researchers or scholars and practitioners from the academia and industries of Food and Nutrition.

This conference creates solutions in different ways and to share innovative ideas in the Food and Nutrition fields. ICFN-2025 provides a world class stage to the Researchers, Professionals, Scientists, Academicians and Students to engage in very challenging conversations, assess the current body of research and determine knowledge and capability gaps.

8th International Conference on Food and Nutrition (ICFN-2025) will explore the new horizons of innovations from distinguished Researchers, Scientists and Eminent Authors in academia and industry working for the advancements in Food and Nutrition fields from all over the world. ICFN-2025 hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in the Food and Nutrition fields.

ISBN : 978-93-92106-78-1

Message from Managing Director, IFERP

Mr. Rudra Bhanu Satpathy

CEO & Founder,
IFERP, Technoarete Group.

IFERP is hosting the 8th International Conference on Food and Nutrition (ICFN-2025) this year in month of May, 2025.

The main objective of ICFN-2025 is to grant the amazing opportunity to learn about groundbreaking developments in modern industry, talk through difficult workplace scenarios with peers who experience the same pain points and experience enormous growth and development as a professional. There will be no shortage of continuous networking opportunities and informational sessions.

The sessions serve as an excellent opportunity to soak up information from widely respected experts. Connecting with fellow professionals and sharing the success stories of your firm is an excellent way to build relations and become known as a thought leader. I express my hearty gratitude to all my Colleagues, Staffs, Professors, Reviewers and Members of Organizing Committee for their hearty and dedicated support to make this conference successful. I am also thankful to all our delegates for their pain staking effort to make this conference successful.

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About Keynote Speaker

Dr. Farooq Anwar

Professor, Department of Food Science
Faculty of Food Science and Technology
Universiti Putra Malaysia, Malaysia

Dr. Farooq Anwar with PhD in Analytical Chemistry from NCEAC, Jamshoro has more than 24 years of research experience at national and international level. He has earned two Post-Doctoral fellowships including from University of Lethbridge, Canada (2007–08) and Universiti Putra Malaysia, Malaysia (2010–11). He also served as Associate Professor at Prince Sattam bin Abdulaziz University (PSAU), Al-Kharj, Saudi Arabia for almost three years (2014 to 2017). Professor Anwar has served as Director Office of the Research Innovation and Commercialization (ORIC) during 2018–2023 and Director Institute of Chemistry during 2017– 2023 at University of Sargodha (UOS), Pakistan. He is a Professor of Analytical Chemistry at University of Sargodha (UOS), Sargodha, Pakistan since 2017. Currently, Dr Anwar is engaged as a Professor at Faculty of Food Science and Technology, Universiti Putra Malaysia, Serdang, Malaysia. In addition to involvement in different funded research projects as Principal Investigator (PI), he has supervised 15 PhDs, 72 MPhil and 111 MSc research students. He has published mora than 310 publications with 36,200 Google Scholar based Citations (h-index 93, i-10 index 224); 19,700 Scopus indexed citations (h-index 75); 28,000 Research gate based citations (h-index 87) to his credit. He has also authored 21 Book chapters and one Book with foreign publishers.

Dr Anwar has been enlisted as Productive Scientist of Pakistan (PCST) and Fellow of the Chemical Society of Pakistan (CSP). He has also been awarded Dr. Atta-ur-Rehman Gold Medal/Prize-2010 (Chemistry) by Pakistan Academy of Sciences (PAS). He has also been awarded TWAS Young Affiliate Fellow (2009–14) by World Academy of Sciences (TWAS), Trieste, Italy. He has also been awarded Research Excellence Award -2018 by PSAU, Saudi Arabia. He has also been enlisted among Worlds 2% top scientists by Elsevier BV Stanford University, USA for the year 2020, 2021, 2022, 2023 and 2024 based on "Updated science-wide author databases of standardized citation indicators. Prof Anwar has also been awarded Research Fellowship by Shinawatra University, Pathum Thani, Thailand for the period 2024– 2027.

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About Keynote Speaker

Dr. Pothiyappan Karthik

Head of the Department, Department of Food Technology
Karpagam Academy of Higher Education (Deemed to be University)
India

Dr. Pothiyappan Karthik is presently an Associate Professor and Head at the Department of Food Technology, Karpagam Academy of Higher Education (Deemed to be University), Tamil Nadu, India. He has done Ph.D. in "Food Technology" at CSIR-Central Food Technological Research Institute (CFTRI), Mysore, India. He has grown academically as B.Tech. (Biotechnology) from Bharathidasan University and M.Tech. (Food Technology) from AC. Tech., Anna University. He has work experience in Post-Doctoral Fellow at School of Food Science and Biotechnology, Zhejiang Gongshang University, China in collaboration with University of Leads, UK. He has received the prestigious CSIR-Senior Research Fellowship (SRF) from CSIR, Govt. of India for his doctoral work, Young Scientist Award from IMRF Reg. from Regd with Govt. of India NITI Aayog NGO Darpan and NESA Scientist of the Year Award-2023 from National Environmental Science Academy, New Delhi. In addition, he got international research travel grant to attend the conference at Australia, 2015 by SERB-DST, CICS and DBT, Govt. of India. He has also a recipient of a funded major research project Rs. 75 Lakhs from DST, Ministry of Science and Technology, Govt. of India. His research interests include Food Nanotechnology, Food Engineering, Food colloids, Encapsulation of bioactives, Biopolymers, Functional Foods and Nutraceuticals.

The research accomplishments include 2649 citations with 16 h-index and a cumulative impact factor of 130. He has published more than 30 articles in peer-reviewed international journals and publishers, 15 book chapters, granted international patents (Germany and China) and 1 national patent. Further, he supervised Post-doctorate, JRF, undergraduate and a Master student's (MS) on the development of millets, functional foods and food emulsions. He has recognised as one of the Royal Society of Chemistry's 2023 (UK) outstanding reviewers among 7 members in the world. He serves as an academic editor in Journal of Food Processing and Preservation, Int. Journal of Food Science, Journal of Food Quality, Journal of Nanotechnology and Editorial Board Member for BMC Biotechnology, apart from being a Guest Editor in Environmental Science and Pollution Research, Discover Foods, BMC Chemistry and BMC Nutrition, Springer Nature. He is currently editing a book entitled "Native and Modified Starches for Food Applications" and "Omega-3 and Omega-6 Polyunsaturated Fatty Acids in Food Systems: Advances and Opportunities in Product Formulation, Technology and Delivery" in Elsevier.

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About Keynote Speaker

Dr. Rachel Tan Choon Hui

Head of the Department
Department of Food Science and Nutrition
Faculty of Applied Sciences, UCSI University, Malaysia

Assistant Professor Dr. Tan Choon Hui currently serves as the Head of the Food Science and Nutrition Department at the Faculty of Applied Sciences. She has been with UCSI University since 2009, specializing in food processing and technology. Dr. Tan holds a Bachelor's degree in Science and Food Technology, a PhD in Food Technology, and a Postgraduate Diploma in Tertiary Teaching. She is a Professional Member of the Malaysia Institute of Food Technologists (MIFT) and a full member of the Organization for Women in Science for the Developing World.

Her research focuses on the characterization and utilization of palm oil, food processing, and the development of functional food products, particularly aimed at enhancing the nutritional quality and shelf life of food products. Over the years, Dr. Tan has secured twelve government and institutional research grants and has contributed as a consultant to ten industrial collaboration projects.

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About Keynote Speaker

Dr. Sapto P. Putro

Head of Biology Department, Faculty of Science and Mathematics
Director - Center of Marine Ecology and Biomonitoring for Sustainable Aquaculture (Ce-MEBSA), Diponegoro University, Indonesia

Sapto P. Putro obtained his undergraduate degree from the Faculty of Biology at Jenderal Soedirman University, Purwokerto, Central Java, Indonesia, in 1992. He subsequently pursued a Master's degree in Ecology at the Postgraduate Program of the Bandung Institute of Technology, West Java, Indonesia, and graduated in 1999. In 2007, he earned his Doctorate (Ph.D.) in Marine Ecology and Aquaculture from the School of Biological Sciences, Faculty of Science and Engineering, Flinders University of South Australia. His professorship in Marine Biology was conferred in 2021. Dr. Putro has dedicated numerous years to the study of aquatic ecology, focusing primarily on biomonitoring aquaculture activities in diverse aquatic environments, including lakes, rivers, coastal areas, offshore regions, and coastal aquaculture systems, both in tropical and temperate ecosystems. He is currently a Senior Lecturer specializing in ecology and aquaculture at the Department of Biology, Faculty of Science and Mathematics, Diponegoro University, Indonesia. Actively engaged in both national and international scientific forums, he is a member of professional organizations such as the Indonesian Biological Association (PBI), the Indonesia Aquaculture Society (IAS), and the World Aquaculture Society (WAS). Additionally, he serves on the editorial boards of several international scientific journals and as an international keynote speaker in the scientific conferences in Marine Ecology and Aquaculture. Dr. Putro has published numerous articles in reputable international journals and has authored several books. His ongoing research emphasizes the development of smart, productive, and sustainable aquaculture practices by employing Integrated Multi-Trophic Aquaculture (IMTA) systems, including his patented innovation, the Stratified Double Net Cage (Patent No. IDS000001488, August 8, 2016; Trademark "KJABB-IMTA SP01" No. IDM000661772, August 24, 2017; DJKI RI). The KJABB-IMTA product was recognized among the "110 Most Prospective Indonesian Innovation Works" in 2018 and has since received several accolades, including the 2023 Award for the Smart Dashboard System to support Smart Modern Aquaculture and Ecoedutourism, as well as the 2024 Award for the Smart Robotic IMTA Cage to support Productive Sustainable Mariculture, granted by the Business Innovation Center (BIC). Moreover, Dr. Putro has developed innovative software for biomonitoring applications that integrates abiotic and biotic data (macrobenthic structure), which has been registered with copyright (No. 000143025, EWS-3SWJ software, January 16, 2019, DJKI RI). He has also established and currently leads the Center of Marine Ecology and Biomonitoring for Sustainable Aquaculture (Ce-MEBSA), which serves as a hub for advancing research and innovation in sustainable aquaculture practices.

ISBN : 978-93-92106-78-1

About Keynote Speaker

Dr . Shahrim Ab Karim

Professor, Department of Foodservice Management
Faculty of Food Science and Technology,
University Putra Malaysia, Malaysia

Professor Dr. Shahrim Karim is a distinguished figure in Malaysian Heritage, holding the prestigious position of Professor of Malaysian Heritage Food and Culture at the Department of Food Service Management within the Faculty of Food Science and Technology at Universiti Putra Malaysia. With a profound passion for Malaysian culinary traditions, he has played a pivotal role in advancing the recognition and global dissemination of Malaysia's rich heritage cuisine. His significant contributions extend beyond academia, as he has actively participated in national committees dedicated to preserving and promoting Malaysia's food heritage. Through his efforts, he has been instrumental in documenting and refining the nation's culinary heritage, ensuring its perpetuation for future generations. Professor Dr. Shahrim Karim's influence transcends academic circles, as he has been a prominent figure in various television programs that showcase Malaysia's vibrant food scene. Moreover, he is a prolific author, having authored more than 100 articles and five books on Malaysian cuisine, emphasising traditional culinary delights. He also has published several publications on Malaysia and Brunei rich biodiversity, related to herbs and spices. In addition to his academic pursuits and advocacy work, Professor Dr. Shahrim maintains a diverse range of research interests, encompassing Destination Management, Culinary, Foodservice Management, Food Tourism, Food Culture, and Heritage Food. His research methodologies span both quantitative and qualitative approaches, reflecting his comprehensive understanding of the subject matter. Beyond his professional endeavours, Professor Dr. Shahrim indulges in his passions during his leisure time, which include cooking, traveling for culinary exploration, food photography, and expressing his creativity through canvas painting. His multifaceted interests and unwavering dedication to Malaysia's culinary heritage continue to inspire and enrich the culinary landscape of the nation.

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About Session Speaker

Dr . Muhamad Firdaus Syahmi Bin Sam-on

Senior Lecturer, Department of Food Sciences
Faculty of Science and Technology, Universiti Kebangsaan Malaysia
Malaysia

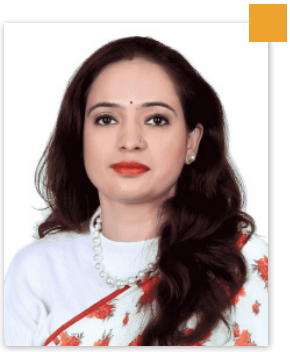
Dr Muhamad Firdaus Syahmi bin Sam-On is a dedicated and accomplished Senior Lecturer specializing in Microbiology, with a profound passion for research and academic excellence. He obtained his Bachelor of Science in Microbiology in 2020 and subsequently finished a PhD in the same field from Universiti Putra Malaysia in 2023. Additionally, his expertise in farming and biotechnology has equipped him with valuable skills in pests and pathogens management, laboratory protocols, and problem-solving.

Throughout his academic journey, Dr Muhamad Firdaus Syahmi has exhibited a keen interest in exploring microbial pathogens and their potential applications in various fields, particularly in aquaculture and food safety. His doctoral research focused on evaluating the efficacy of Bacillus spp. as probiotics against pathogens causing Vibriosis and Aeromonosis, which culminated in several high-impact publications in esteemed journals.

Serving as a Senior Lecturer at Universiti Kebangsaan Malaysia, Dr Muhamad Firdaus Syahmi continues to improve his passion for teaching and research. His interdisciplinary approach and innovative methodologies have earned him recognition in the field of food microbiology, and his target is to make a lasting impact on scientific knowledge and understanding.

ISBN : 978-93-92106-78-1

About Session Chair



Dr. Bhaskar Jyoti

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Dr. Sapto P. Putro

Head of Biology Department, Faculty of Science and Mathematics, Director - Center of Marine Ecology and Biomonitoring for Sustainable Aquaculture (Ce-MEBSA), Diponegoro University, Indonesia

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ISBN : 978-93-92106-78-1

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ISBN : 978-93-92106-78-1

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Innovative Ice Cream Waffle Cones: Harnessing the Power of Blue Pea Flower, Millets and Whey Protein

Dr. Kanchi Baria
Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara, India

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Keshvi Pandya
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Introduction: The incorporation of indigenous ingredients such as blue pea flower (*Clitoria ternatea*), finger millet (*Eleusine coracana*), Kodo millet (*Paspalum scrobiculatum*), whey protein concentrate into food products aligns with India's goals for nutritional enhancement and sustainability. Blue pea flower is rich in anthocyanins, antioxidants known for reducing oxidative stress. Millets offer dietary fiber, protein, micronutrients and environmental resilience due to their drought-resistant characteristics, while whey protein supports muscle repair, satiety and sustained energy levels. Thus, this study aimed to develop and evaluate the sensory acceptability of extruded millet-based ice cream waffle cones incorporating varying levels of blue pea flower.

Methodology: Extruded products containing finger millet, Kodo millet, whey protein concentrate and varying levels of blue pea flower powder (0%, 5% and 10%) were milled and formulated into ice cream waffle cones. Samples A (0%), B (5%) and C (10%) underwent sensory evaluation using a 9–point hedonic scale and a composite scorecard assessing attributes including colour and appearance, flavour, taste, texture, mouthfeel, aftertaste and overall acceptability. Evaluations were performed by 35 semi-trained panellists.

Results and Discussion: Sample B (8.74±0.60) demonstrated the highest acceptability on the 9–point hedonic scale, followed by Sample C (8.40±0.90) and Sample A (8.34±0.47). Composite scorecard results indicated Sample B scored highest in colour and appearance (19.89±0.40), flavour (14.54±0.85), texture (19.94±0.24), taste (14.91±0.28) and overall acceptability (9.89±0.32). Sample C followed the acceptability with the score closely behind the Sample B, while Sample A showed highest acceptability in mouthfeel (9.97±1.64). These findings indicate that incorporating blue pea flower, millet and milk protein into waffle cones enhances nutritional value, antioxidant capacity and acceptability. This functional food aligns with sustainable practices, supports indigenous crop production and offers a healthier alternative to conventional products. Moreover, it also suggests that incorporating 5% blue pea flower provided optimal sensory qualities, balancing aesthetic appeal, textural excellence and overall consumer acceptance.

Conclusion: The inclusion of blue pea flower, millet and whey protein concentrate successfully enhanced the nutritional and sensory profile of ice cream waffle cones. Sample B, with 5% blue pea flower, emerged as the optimal formulation. This innovative product offers potential marketability, combining health benefits with consumer acceptability and sustainability.

Key Words: Blue Pea Flower, *Clitoria Ternatea*, Finger Millet, *Eleusine Coracana*, Kodo Millet, *Paspalum Scrobiculatum*, Whey Protein Concentrate, Functional Foods, Waffle Cone, Extruded Product, Sustainability, Make In India

ISBN : 978-93-92106-78-1

Development and Sensory Evaluation of Millet-Based Extruded Ice Cream Waffle Cones for Enhanced Sustainability and Dietary Diversity

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Introduction: The increasing global demand for sustainable and nutritionally diverse foods has prompted exploration into innovative applications of traditional cereals and natural ingredients. Conventional ice cream waffle cones, although popular, are often considered unhealthy due to their high sugar and refined flour content. This study aimed to address these nutritional concerns by developing extruded ice cream waffle cones incorporating nutrient-rich ingredients.

Methods: Two distinctive waffle cone variants were developed: Variant A, which included finger millet (Eleusine coracana), kodo millet (Paspalum scrobiculatum), whey protein concentrates and beetroot (Beta vulgaris) powder; and Variant B, which replaced beetroot powder with chocolate powder. Ingredients were extruded and milled into flour to prepare the waffle cones. Sensory evaluation was conducted using a 9–point hedonic scale by 30 semi-trained judges from the Department of Foods and Nutrition.

Results and Discussion: Sensory scores indicated high acceptability for both variants. Mean sensory scores for Beetroot waffle cones were 8.10 ± 0.96 (appearance), 8.00 ± 0.74 (taste), 8.20 ± 0.66 (flavour), 8.63 ± 0.61 (texture), and 8.60 ± 0.72 (overall acceptability). Chocolate waffle cones scored slightly higher, with 8.70 ± 0.60 (appearance), 8.63 ± 0.49 (taste), 8.80 ± 0.41 (flavour), 8.97 ± 0.18 (texture), and 8.90 ± 0.40 (overall acceptability). Both waffle cone variants demonstrated substantial sensory acceptance, with the chocolate variant slightly preferred. The inclusion of millet and whey protein concentrates contributed positively to the nutritional quality, offering healthier choices and promoting dietary diversity. Utilizing locally available, nutrient-dense millets supports sustainability by encouraging diversified agriculture and reducing reliance on refined ingredients.

Conclusion: This research highlights the viability of millet-based extruded waffle cones as nutritious and sustainable alternatives to conventional products. Incorporation of functional ingredients enhances dietary diversity and promotes sustainable food systems.

Key Words: Sustainability, Functional Ingredients, Millets, Beetroot Powder, Chocolate Powder, Extruded Products, Sensory Acceptability

ISBN : 978-93-92106-78-1

Evaluation of the ACE Inhibitory Potential of Seed Protein Hydrolysates Derived from Muskmelon, Watermelon, and Sunflower

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Antihypertensive treatments, including diuretics and beta/calcium channel blockers, are associated with a range of adverse effects. Naturally-sourced ACE inhibitors may serve as viable alternatives to synthetic medications. Various peptides derived from plants have been assessed for their ACE inhibitory properties through both *in vivo* and *in vitro* studies. This research examines the ACE inhibitory potential of hydrolysates derived from the proteins of muskmelon, watermelon, and sunflower seeds. ACE was isolated from sheep lung tissue, while protein from the mentioned seeds were extracted and hydrolyzed using pepsin, trypsin, and crude enzyme from the stem of *Wrightia tinctoria*. Tricine-SDS PAGE was conducted to observe hydrolysis processes. Method by Cushman and Cheung was used to examine ACE inhibition. The results were compared across different sources and enzymatic treatments. Muskmelon hydrolysate treated with *W. tinctoria* enzyme exhibited the highest ACE inhibition at 85.17%±0.39 after 3 hours of incubation, resembling the inhibitory effects observed in the positive control, Lisinopril, 86.55%±1.15. The findings suggest that muskmelon hydrolysate could be a natural substitute for ACE inhibitors in hypertension management. Further investigations are necessary to explore the hydrolysate's characterization, stability, and effectiveness within biological systems.

Key Words: Sustainability, Functional Ingredients, Millets, Beetroot Powder, Chocolate Powder, Extruded Products, Sensory Acceptability

ISBN : 978-93-92106-78-1

Recent Advancements in Space Food: A Comprehensive Review

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The provision of nutrient-dense food has always been crucial to the success of exploratory missions throughout human history. A wide range of specifically created, prepared, and processed foods and beverages that are produced utilizing food processing technology are consumed by astronauts in space. Both conventional and innovative techniques of food production are being used in space food development. 3D printing for food is one such innovation. Among the many industries that have profited immensely from 3D printing is aerospace. Additionally, studies on nutrient-dense, portable, and tasty formulations—such as functional foods enhanced with vital vitamins and probiotics—support the best possible health while on a mission. The bodies of astronauts may experience a variety of pathophysiological changes during a long-term space mission, including radiation-induced cancer, demineralization of the bones, immune system malfunction, and hormonal imbalance in male and female astronauts during long space missions. Earthly food production may be impacted more broadly by the development of sustainable food production systems for space missions. The present review aims to examine space nutrition from the perspective of astronauts' physiology and attempt to sketch recent advances in this field, which is one of the riskier life support systems for spacecraft. Furthermore, our goal is to demonstrate how closely scientists and technicians must collaborate in a variety of sectors.

Key Words: Astronauts, Cancer, 3D Printing, Hormonal Imbalance, Immune System, Radiation, Space Mission

ISBN : 978-93-92106-78-1

Subjugation to Empowerment and SDGs: A Sociological Lens on the Determinants of Local Food Systems (LFS), Gendered Nutrition, and Institutional Support in Enhancing Resilience among Low Income Household, Tribal and Rural Women Survivors of Violence

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In India's sociocultural context, food and nutrition insecurity disproportionately affects low-income households, especially tribal and rural women, many of whom are survivors of violence and structural marginalization. These communities, long subjugated by caste, class, and gender hierarchies, face compounded challenges in accessing nutritious food, health care, and institutional support. This study explores the intersection of local food systems (LFS), gendered nutrition, and institutional support as key to transforming women's lives from deprivation to resilience, aligning with Sustainable Development Goals (SDGs) 2, 3, 5, and 10. Based on a review of 50 studies (2000–2024), this mixed-methods study balances quantitative data on dietary outcomes with qualitative insights into lived experiences and institutional dynamics. Short value chain (SVC) models, such as farm-to-Anganwadi schemes, nutrition gardens, tribal markets, and SHG-led food carts, improve fruit and vegetable intake by 21–25% among low-income households. However, these gains are shaped by women's mobility, land rights, cultural norms, and program design. Evidence from tribal regions in Jharkhand, Odisha, Chhattisgarh, and Madhya Pradesh reveals barriers, including low awareness, poor infrastructure, linguistic hurdles, and patriarchal food governance. Quantitative findings showed a 26–40% increase in fruit and vegetable intake in SVC-linked households, a strong indicator of better diet quality and chronic disease prevention. In this context, food becomes more than sustenance; it symbolizes recovery and resistance. Women in LFS programs report up to 50% higher decision-making power, stronger peer networks, and reduced dependence on abusive relationships, advancing both nutritional justice and emotional well-being.The key drivers include financial incentives, social marketing, and NGO involvement. Institutions such as One Stop Centres (OSCs), Self-Help Groups (SHGs), and frontline workers (ASHAs, Anganwadi workers) play vital roles in education, psychosocial support, and food delivery enhancing women's autonomy, mobility, and recovery, especially for survivors of violence, trafficking, and caste-based oppression. This study calls for a shift from top-down food security models to bottom-up food sovereignty frameworks, recognizing women as co-creators of agroecological knowledge and community resilience. Tribal women's nutrition is not just a health issue; it reflects deeper socio-political inequalities. The NFHS-5 and POSHAN Abhiyaan data support these findings, showing meaningful dietary and maternal health improvements in areas with active SVCs and institutional collaboration. This review highlights the urgency of intersectional, gender-sensitive policies and multisectoral efforts to ensure that low income households, tribal and rural women become empowered agents not passive recipients within India's food systems. Ultimately, empowerment must move through soil, seed, and solidarity, rooted in local wisdom, community support, and resilience against exclusion and violence.

Key Words: Food and Nutrition Insecurity, Low Income Households, Structural Marginalization, Local Food Systems (LFS), Sustainable Development Goals (SDGs), Empowerment, One Stop Centres (OSCs), Agro-Ecological Knowledge

ISBN : 978-93-92106-78-1

Innovative Approaches to Global Nutrition and Sustainable Food System

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Global population is increasing day by day and it is going to reach approximately 9 billion by 2030. To cope up with this situation farming with the latest technique is fruitful to face this challenge. Lates innovative tools should be applied at all levels of farming. All levels of sustainable food systems are interconnected. First at pre- production level high quality genetic seeds should be used and utilized properly. Good quality fertilizer and in optimum quantity has to be applied so that it will not affect nutrients loss and will not produce harmful affect to the body. Farmer should be ready to be equipped with all resources to face the difficulties during climate change. More productive seeds, mixed farming, and farming alternate food sources. At second level that is production level pest and disease control of optimum quantity should be applied. Farmers have to be ready with all technique to save the crops during bad weather and try to apply good innovative approach to manage the food crops and to save them from loss so that global hunger will not take place. The step is supply of food to the consumer in a proper way that it should not be wasted. Fourth step is that it not only involve farming process but also includes how the food is managed, cooked, eaten balanced diet, nutrients rich foods consumed. Small scale vegetables should be grown and utilized properly.

Key Words: Sustainable, Innovative, Global Nutrition

ISBN : 978-93-92106-78-1

Evaluation of Gamified Food Cards' Acceptability: Improving Dietary Habits and Nutritional Knowledge Among Filipino Adults in Cebu

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Effective nutrition education is crucial for promoting healthy dietary habits, yet challenges remain in engaging adult populations. This study evaluated the acceptability of gamified food cards designed for nutrition education among Filipino adults in Cebu City. The study employed a mixed-methods approach. First, the food cards underwent expert validation. A questionnaire was then used to collect quantitative and qualitative data from adult participants. A profile of the beneficiaries, detailing their sex and age group distributions, was included in the preliminary discussion. The research focused on the food cards' acceptability by assessing their general impression, the clarity and relevance of their content, the effectiveness of their visual design elements, and their overall educational utility. This included visual design elements like color, layout, and text readability. The study gathered valuable feedback from field experts and participants to suggest improvements for enhancing the food cards' effectiveness and user experience. The results demonstrated high acceptability of the food cards, with participants responding positively to their design, clarity, and educational utility. Participants appreciated the incorporation of Filipino food culture and local dishes. However, suggestions for improvement included providing more detailed nutritional information, a separate guide for food categories, and enhanced visual design. The study concludes that gamified food cards are a promising and acceptable tool for nutrition education among Filipino adults. Culturally tailored approaches enhance their potential effectiveness in promoting healthier lifestyles.

Key Words: Dietary Habits, Food Cards, Meal Management, Nutrition Education, Nutrition Innovation

ISBN : 978-93-92106-78-1

Effects of *Pazhayadhu* and Prebiotic Fibre in an Ulcerative Colitis Rat Model: Fermented Foods and Fibre Intervention for Gut Health Trial in Inflammatory Bowel Disease - Ulcerative Colitis

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Background/Aim: Inflammatory bowel disease involves chronic gastrointestinal inflammation with complex genetic, environmental, and immunological factors. Traditional fermented foods such as *Pazhayadhu* have potential as cost-effective, safer alternatives. This study, a component of the FIGHT IBD-UC (Fermented Foods and Fibre Intervention for Gut Health Trial in Inflammatory Bowel Disease - Ulcerative Colitis), combines fermented beverage *Pazhayadhu* with partially hydrolysed guar gum (PHGG) prebiotic fibre. The aim of this study was to investigate the differential effects of *Pazhayadhu* monotherapy and *Pazhayadhu* combined with PHGG on experimental colitis rat model.

Methods: This preclinical study consisted of three phases involving 16 Wistar rats divided into three groups: the control group (CG), treatment group I (TG I - Pazhayadhu), and treatment group II (TG II - Pazhayadhu + PHGG). UC was induced via TNBS (50 mg/kg). Disease Activity Index (DAI) scores, histopathological evaluations, rectal and cecal lactic acid bacterial (LAB) abundances were analysed among all the groups.

Results: Compared to CG and TG I, TG II showed significant decreases in DAI scores. Histopathological analysis revealed complete remission in TG I rats and partial remission in TG II rats. LAB counts were higher in TG I and TG II than in CG, with TG II showing the highest cecal LAB counts.

Conclusion: This study revealed that the combination of *Pazhayadhu* and PHGG enhanced microbial proliferation and resulted in partial remission in UC rats. However, *Pazhayadhu* alone demonstrated superior histopathological remission. Further research is needed to explore the mechanisms underlying these differential outcomes in larger samples.

Key Words: Ulcerative Colitis; Dysbiosis; Probiotics; Prebiotics; Lactic Acid Bacteria

ISBN : 978-93-92106-78-1

Microbiological Quality and Safety Assessment of "Moron", A Traditional Filipino Delicacy

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Cultural heritage is not only reflected in traditions and lifestyle but also in its unique food. "Moron", a native delicacy, has been a staple of Leyte, Philippines food industry for over two decades. Made with locally abundant ingredients like sticky rice, coconut milk, sugar, and tablea, traditionally wrapped in banana leaves and often given as a "pasalubong" by both locals and tourists. The study investigated the microbiological quality and safety of "moron". Product sampling and environmental sampling were conducted in selected food business operators (FBOs) producing "moron". Results were compared to the standards set by FDA Philippines. Analyses indicated satisfactory results for finished products test for *Bacillus cereus* (2.30 to 2.41 log CFU/g), *E. coli* (after initial detection, <1.00 log CFU/g), coliforms (2.41 to 4.15 log CFU/g) and *Staphylococcus aureus* (<1.00 to 2.40 log CFU/g). Potential contamination risks were identified for *E. coli*, found on food contact (<1.00 to 2.48 log CFU/g) and non-food contact (2.43 to 2.46 log CFU/g) surfaces, while *Staphylococcus aureus* was present on food (4.40 log CFU/g) and non-food contact (4.15 log CFU/g) surfaces in one FBO. *Staphylococcus spp.* was found in both products and on tested surfaces (2.40 to >6.34 log CFU/g). *Salmonella spp.* tested positive in all finished products and on tested surfaces, across all FBOs. Further investigation traced the source of contamination in banana leaves. The supplier's wilting process lacked proper sanitation measures, potentially introducing the bacteria onto the banana leaves. The yeast, mold, and aerobic plate counts in finished products met the standards; water quality testing also met the standards while air quality testing revealed unsatisfactory levels of airborne microbes (2565 to 4314 CFU/m^3), across all FBOs. These findings highlight the need for improved hygiene practices, stricter supplier controls, and proper sanitation of banana leaves to ensure the safety of the product.

Key Words: Food Safety, Indigenous Food, "Moron", Microbiological Analysis, Banana Leaves

ISBN : 978-93-92106-78-1

Nutrition Intervention in Septic Patients in PICU: Adherence to Guidelines

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Sepsis in Pediatric Intensive Care Units (PICU) is a critical condition requiring a multidisciplinary approach, with nutrition playing a vital role in improving clinical outcomes. This study investigates the occurrence of malnutrition and identifies at-risk pediatric septic patients, utilizing the Screening Screening Tool for the Assessment of Malnutrition in Pediatrics (STAMP) and the WHO growth chart. Nutrition was initiated following the algorithm of nutrition and energy and protein achieved were monitored. A total of 24 pediatric patients (aged 2–16 years) diagnosed with sepsis were included. Nutritional support was provided following clinical guidelines, prioritizing oral intake and Enteral Nutrition (EN). Data on nutrition initiation, energy and protein targets, and patient outcomes were analyzed. Results showed that 58% of patients were undernourished at admission. Enteral nutrition was the primary mode of support for 66.6% of patients, while 33.3% received oral diets. Nutrition was initiated within 24 hours for 58.3% of cases. Despite challenges such as fluid restrictions, aspiration risk, and procedural delays, 76% of energy and 80.3% of protein targets were achieved within 7 days of admission. None of the patients required parenteral nutrition. Early enteral nutrition preserved gut integrity, reduced infection risk, and supported recovery. This study highlights the importance of timely and individualized nutrition in pediatric sepsis management. Adhering to evidence-based guidelines and overcoming barriers to adequate nutrition are essential for optimizing recovery, minimizing complications, and reducing PICU stays. A multidisciplinary approach that prioritizes nutrition early in sepsis care is crucial for improving outcomes in critically ill pediatric patients.

Key Words: Sepsis, Pediatric, PICU, Malnutrition, Enteral-Nutrition, Parenteral-Nutrition, Clinical Guidelines

ISBN : 978-93-92106-78-1

Multivitamin Supplement Improves Joint Health and Mobility Among Adults: Outcome from An Observational Study

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Nutrition is a critical component of health, and micronutrients play a vital role in various cellular processes. Supplementation with natural ingredients (*Boswellia serrata*) and essential micronutrients may improve joint health parameters and mobility. An observational study was conducted in India to evaluate the impact of regular consumption (at least 3 times a week) of multivitamin supplement (Centrum 50+; n=201) in improving joint health and mobility among Indian adults. Patients were recruited prospectively and retrospectively by practicing physicians (n=80; general physician, gynecologist, orthopedic surgeon), with regular consumption of 3 months or more. Joint health was assessed on parameters of pain and mobility where the visual analogue scale (VAS) 100 mm was used, while the mean number of intensities of joint pain over the past month was recorded. In addition, the EQ-5D was used to assess problems with mobility and discomfort. After 6 months of Centrum 50+ supplementation, mean joint pain scores decreased by 20 points (80 vs. 60; $p<0.05$). An increase in the number of hours doing physical activity in the past month was also reported (3.8 hours vs. 2.8 hours; $p<0.05$). Compared with baseline, a higher proportion of patients reported "no problems" with mobility (18% vs. 9%; $p<0.05$), pain and discomfort (11% vs. 1%; $p<0.05$). Regular multivitamin-mineral supplementation with Centrum 50+ at least three times a week improves joint pain with increased physical activity among Indian adults aged over 50 years.

Key Words: Micronutrients, Quality Of Life, Joint Health, Dietary Supplements, Vitamins, Minerals

ISBN : 978-93-92106-78-1

Multivitamin Supplements Improve Mental & Cognitive Parameters among Adults: Outcome from An Observational Study

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Micronutrients are essential for optimal cognitive function, improving memory and mental processing. Their roles in neurotransmitter synthesis, neural protection, and oxidative stress reduction are crucial for maintaining optimal brain functioning. An observational study was conducted in India to evaluate the impact of regular consumption (at least 3 times a week) of multivitamin supplement (Centrum Men; n=203, Centrum Women; n=210, and Centrum 50+; n=201) on cognitive function and parameters that evaluates stress level. Patients were recruited prospectively and retrospectively by practicing physicians (n=80; general physician, gynecologist, orthopedic surgeon), with regular consumption of 3 months or more. The Patient-Reported Outcomes Measurement Information System (PROMIS) short form 6a was used to assess cognitive function, while the visual analogue scale (VAS)100 mm was used to measure stress levels. After minimum of 3 months usage, there was a significant improvement in PROMIS T-scores (Centrum men: 55.2 vs. 41.9, $p<0.05$; Centrum women: 55.0 vs. 42.2, $p<0.05$; Centrum 50+: 48.4 vs. 36.8, $p<0.05$) and in all domains of the PROMIS short form 6a (sharp mind, memory, thinking fast, keeping track of active task, concentration, and thinking clearly for men, women, and adults 50+. Stress levels, as assessed by VAS, reduced significantly in all groups (men: 37.6 vs. 65.9, $p<0.05$; women: 66.3 vs. 38.5, $p<0.05$; 50+: 59.1 vs. 32.8, $p<0.05$). Multivitamin-mineral supplementation at least three times a week significantly improved cognition and reduces stress parameters among Indian adults.

Key Words: Micronutrients, Quality Of Life, Joint Health, Dietary Supplements, Vitamins, Minerals

ISBN : 978-93-92106-78-1

Collagen based Medications for Treating Various Health Complications: KAP Study

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In today's scenario there are lot of health-related problems and complications due to the lack or deficiency of collagen. There are various factors or causes that can lead to collagen deficiency such as stress, vitamin C deficiency, zinc deficiency, poor diet, antioxidant deficiency, oxidative stress, UV exposure, smoking, alcohol, long term inflammation, lack of sleep and collagen vascular disease. It cannot be directly measured that how much level of collagen a person has but due to its deficiency there are certain complications and issues. There are certain symptoms that indicates collagen deficiency which includes: - wrinkles, slow muscle recovery, gastrointestinal problems, thin or flat looking hair, joint pain, and slow injury recovery. Wrinkles are a direct cause of collagen loss which causes the skin to lose its elasticity. Collagen deficiency not only contributes to longer muscle recovery time but it can also result in the person losing his muscle mass. Collagen deficiency is linked to leaky gut syndrome which is an intestinal condition in which the intestinal walls allow bacteria and toxins to enter the bloodstream. Collagen provides essential nutrients to the hair follicles which makes the hairs healthy but collagen deficiency results in much slower delivery of these nutrients making the hair look thin and dull. Collagen repairs and rebuilds the cartilage in the joints therefore a deficiency can cause discomfort. Collagen deficiency results in slower injury recovery as the body produces collagen in the affected area to repair the damaged tissue. Cellulite is a condition in which the fat penetrates the layer of skin cells resulting in dimpled, lumpy or golf ball appearance, declining collagen level allows the fat to gain access into the skin. Another major complication due to collagen decline includes organ prolapse which is common in the uterus, bladder, vagina, bowel, and intervertebral discs. Studies have shown that collagen deficiency is a leading cause of organ prolapse. Low collagen level causes the eyes to sink, the cheeks too thin and a darkening of the skin around the eyes. Low level of collagen results in reduction of blood flow as the blood vessels change their shape or vascular ability.

Collagen is a natural protein that can be regenerated and rebuild by consuming the foods that promotes its production. Studies have shown that the consumption of collagen rich sources results in better collagen production and prevents the deficiency and the related symptoms. Key nutrients that serve as cofactors to produce collagen includes vitamin C, zinc, vitamin A, copper, and manganese. Foods that helps the body to produce collagen includes bone broth, chicken, fish and shellfish, egg whites, citrus fruits, berries, tropical fruits, garlic, leafy greens, beans, cashews, tomatoes, bell peppers. Sources of vitamin C includes guava, broccoli, oranges, lemon, papaya, and strawberry. Meat, shellfish, legumes, seeds, nuts and peanuts, dairy, eggs, whole grains, and dark chocolate are the good sources of zinc. Foods that are high in vitamin A are mangoes, papaya, carrots, sweet potatoes. Copper is found in shellfish, seeds, nuts, chickpeas, dark chocolate, shitake mushrooms. Oats, almonds. Soya bean, spinach and pineapple are extremely rich in manganese. To make collagen or any protein the body combines amino acids. These amino acids are obtained by eating and digesting protein rich-foods. Then the body can repurpose the amino acids into collagen. During the process of collagen repurposing, the body uses vitamins and minerals specifically vitamin c, copper, and zinc.

ISBN : 978-93-92106-78-1

From Citrus Waste to Sweet Treat: Honey Candied Orange Peel as a Sustainable Value-Added Product

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In India, citrus fruits are farmed in many tropical and subtropical regions; they are ranked second only to bananas and mangoes. With 3% of the world's orange production, India is the ninth-largest orange cultivator. With regard to the extraction of orange juice, the peel, which comprises cellulose, colours, pectin, and almost half the weight of the fruit, is a significant by-product. By turning leftover orange peels into honey candies, this project hopes to further value addition and sustainability in the food industry. In order to make candy, the peels must be submerged in sugar syrup; however, this study optimises the blanching process by using honey for refined sugar. Blanching is essential because it minimises microbial contamination, softens the texture, maintains colour, and lessens bitterness. In this research, orange peels were blanched thrice in a salt solution at 100°C for 10 minutes and then washed with fresh water. The blanched peels were steeped in honey syrup to create honey candied orange peels. Sensory evaluation using a 9–point hedonic scale showed that the developed candy was 'liked moderately' by panellists, achieving an overall acceptability score of 7.2. This study demonstrates a novel approach to repurposing agricultural waste while satisfying consumer demand for sweet treats, thus contributing to sustainability in the food industry.

Key Words: Citrus Fruits, Orange Peels, Honey Candies, Sensory Evaluation

ISBN : 978-93-92106-78-1

Performance Evaluation of a Turbulator-Enhanced Solar Dryer for Nutrient-Retentive Drying of *Moringa oleifera* Leaves

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Sustainable development is greatly aided by renewable energy technology, especially in decentralised food processing systems. The design and assessment of a Turbulator Enhanced Solar Dryer (TESD) developed for the effective drying of *Moringa oleifera* leaves are presented in this work. To improve convective heat transfer and overall drying efficiency, the TESD incorporates revolving spiral baffles inside the air heater to function as turbulators. With a final moisture level of 6.5%, the dried *Moringa oleifera* leaves demonstrated efficient moisture reduction that was appropriate for safe storage. With protein at 21.64%, fat at 6.16%, ash at 11.82%, crude fibre at 11.28%, carbs at 42.6%, and an energy value of 334.0 kcal/100g, proximate analysis showed significant nutrient retention. Results confirm that the TESD significantly preserves nutritional quality. The integration of passive thermal enhancements with clean energy technology makes TESD a viable, sustainable solution for post-harvest processing, especially in rural and off-grid settings. This study demonstrates the potential of solar thermal innovations to improve energy efficiency and food quality in renewable-based agro-processing.

Key Words: Turbulator Enhanced Solar Dryer (TESD), *Moringa oleifera*, Proximate Analysis, Solar Drying, Post-Harvest Technology, Sustainable Drying Systems

ISBN : 978-93-92106-78-1

Integrating Sustainable and Ethical Approaches in Food Supply Chains: A New Horizon for Food Safety and Public Health

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The evolution of food supply chains in the face of growing global demand has brought unprecedented challenges to food safety, public health, and ethics. Modern food systems, spanning from industrial agriculture to complex distribution networks, are vulnerable to contamination, environmental degradation, and ethical violations. This study explores the integration of sustainable practices and ethical compliance as dual pillars for advancing food safety. Beyond technical control, sustainability now serves as a framework for minimizing ecological impact and ensuring long-term food security. Ethical considerations—such as transparency, consumer rights, and corporate responsibility—are no longer optional but essential for maintaining public trust and protecting health. Emphasis is placed on eco-friendly agricultural methods, reduced chemical dependency, and fair labor practices, all contributing to a safer and more resilient food system. The findings underscore the necessity of a multidimensional approach that aligns food production with health-centered and ethically sound standards. Addressing these challenges holistically can transform the food industry into a force for both human and planetary well-being.

Key Words: Sustainable Food Systems, Ethical Compliance, Food Safety, Public Health, Supply Chain Integrity

ISBN : 978-93-92106-78-1

Advancing Vegetable Breeding: Fusing Modern Innovations and Conventional Wisdom for Resilient Food Systems

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The field of vegetable breeding has altered fiercely, developing from classical selection approaches to modern biotech techniques. This progression unfolds at a pivotal period as we deal with escalating food security challenges, climate adaptation, and nutritional needs. Initially, the breeders relied on observational selection and cross-hybridization, whereas today's researchers employ sophisticated methods like CRISPR-Cas9 editing, marker-assisted selection, and genomic selection to breed vegetables with improvements. Current research targets boosting key characteristics such as yield performance, stress tolerance, post-harvest quality, and nutrient density. Specifically, breakthroughs in polyploid breeding and transgenic methods aim to develop region-specific cultivars for diverse regional conditions. Notably, the most efficient strategies fuse these advanced technologies with traditional agricultural wisdom, creating sustainable outcomes that safeguard ecological integrity. As global demographics surge and climate changes, these innovations in vegetable breeding offer viable pathways to more robust food systems. The latest scientific innovations integrated with traditional wisdom provide a comprehensive approach to fulfilling our nutritional demands while maintaining agricultural biodiversity for future generations.

Key Words: CRISPR-Cas9, Food Security, Biotechnological Innovations, Molecular Markers, Agricultural Biodiversity

ISBN : 978-93-92106-78-1

Form Field to Family: A Socio-Economic Transformation of Food, Nutrition and Livelihood among Hill Korwa Tribes of Chhattisgarh

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This research paper goal is to explore the status of food, nutrition, and livelihood conditions of the Hill Korwa Tribe in Chhattisgarh, adopting a socio-economic approach that takes into account both traditional practices and modern developmental interventions. The Hill Korwa tribe was identified as a Particular Vulnerable Tribal Group (PVTG) by the Government of India. They face numerous food, nutrition, livelihood, and socio-economic challenges. The study will be conducted in Korba district, one of the regions with a significant Hill Korwa population. Traditionally reliant on forest resources and rudimentary agriculture, the Hill Korwa communities are experiencing significant shifts driven by external interventions, changing environmental conditions, and evolving socio-economic dynamics. It analyses how these shifts influence dietary diversity, nutritional security, and household income. Special attention is paid to the role of government schemes and non-governmental interventions in shaping access to food, healthcare, and livelihood opportunities.

The research also explores the impact of deforestation, land alienation, and climate variability on traditional resource bases and the subsequent implications for food availability and livelihood sustainability. Furthermore, the study delves into the socio-cultural dimensions of these transformations, examining changes in traditional knowledge systems related to food and resource management, shifts in gender roles within livelihood activities, and the influence of education and exposure to external cultures on dietary preferences and nutritional awareness.

A sample of respondents will be selected using random sampling techniques to ensure diversity across all age groups and genders, with an equal representation of males and females. The study will employ both qualitative and quantitative methods to generate a comprehensive analysis. Data collection will be carried out using a structured interview schedule.

Key Words: Hill Korwa Tribe, PVTG, Socio-Economic dynamics, Livelihood, Food and Nutrition

ISBN : 978-93-92106-78-1

From Seeds to Sustenance: Advancing Nutrition by Leveraging Agri-Innovations

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Although global agricultural productivity has risen, malnutrition remains a significant issue. Strategies like crop bio-enhancement, climate-smart crops, and holistic farming systems provide promising solutions to these problems. Boosting the nutrient composition of staple crops like iron-loaded beans, zinc rice, and beta-carotene-rich sweet potatoes, these interventions are beneficial in addressing micronutrient deficiencies, especially in resource-constrained regions. Incorporating precision agriculture techniques and digital technologies improves crop quality and lowers nutrient loss at each phase of the value chain. In addition, post-harvest innovations, food enrichment methods, and value-added processing are significant for ensuring the nutritional integrity of food. Achieving nutritional security demands a multi-sectoral approach, uniting agriculture, nutrition, and policy converge to ensure that food systems promote health goals. Integrating nutrition within agricultural policies can contribute to achieving nourishing populations and enhancing health outcomes.

Key Words: Agri-Nutrition Integration, Biofortified Crops, Precision Agriculture, Micronutrient Deficiencies, Food System Transformation

ISBN : 978-93-92106-78-1

Evaluation and Characterization of Potential Probiotic Bacterial Strains Isolated from Traditional Food Sources

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Background: In today's scenario, probiotic lactic acid bacteria (LAB) have gained attention towards promoting human health. Probiotics is considered to be vivacious group of live microbial strains that together, forms the host microbiome as a superorganism. Probiotics confer a beneficial role in the host's internal environment. Specifically, these strains modify the immunological response and impact the brain-gut metabolism.

Methods: The study were conducted to evaluate the probiotic characteristics of probiotic bacterial strain isolated from diary and non-dairy products. A total of fifteen Lactobacillus strains were initially isolated that were chosen further for detailed morphological and biochemical analysis based on their ability to produce gas in Durham tubes. These strains were further prioritized for probiotic evaluation due to their strong morphological similarity to lactic acid bacteria and promising traits, resistance to acidic and bile conditions.

Results: LAB exhibit promising probiotic potential, displaying resilience under stress conditions and suitability for use in nutraceutical development.

Key Words: Probiotics, Lactobacillus Strains, Bile Condition, Lactic Acid Bacteria, Biochemical Analysis

ISBN : 978-93-92106-78-1

Inhibitory Potential of Collagen-Derived Amino Acids from Mackerel Scad (*Decapterus macarellus*) as Anti-Aging Agents Targeting MMP-1

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Excessive skin exposure to UVB radiation can induce photoaging caused by an imbalance in oxidative stress and inflammatory responses, damaging the skin's structure. A previous study revealed that collagen and collagen hydrolysate extracted from the skin of Mackarel scads (*Decapterus macarellus*) exhibit antiaging effects in both in vitro and in vivo models. While these findings support for additional research into their prospective pharmaceutical applications, they also necessitate deeper investigations regarding the specific amino acid constituents and their corresponding targets to clarify the underlying process. This study investigated the antiaging activity of the mackerel scad's skin collagen (MSS-C) in both in silico and in vitro. The composition of amino acids from MSS-C was examined using HPLC. Furthermore, we investigated the inhibitory potential of antiaging by analyzing the molecular docking of amino acid compounds profiling MSS-C targeting MMP-1. The HPLC results indicated that MSS-C comprises glutamic acid, aspartate acid, arginine and glycine as the four predominant amino acids. Molecular docking involves drug-likeness prediction, exploration of protein or nucleotide, 3D structural modelling and binding affinity results. Proline and Arginine had the highest binding energy scores, with MMP-1 as the target protein. The study suggests that MSS-C could be developed as a new pharmaceutical product for antiaging.

Key Words: Collagen, Mackerel Scad, Anti-Aging, Molecular Docking, MMP-1

ISBN : 978-93-92106-78-1

The Dynamic Structure of Polychaetes in Relation to Physical-Chemical Parameters and Their Role in Marine Food Chain in Mariculture for Food Security and Sustainability

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Polychaetes play a pivotal role in marine ecosystems, particularly within mariculture systems, where they contribute to nutrient cycling and serve as essential components of the marine food web, especially for demersal fish. This study investigates the dynamic structure of polychaete communities in relation to varying physical and chemical parameters across mariculture environments at Teluk Awur coastal areas, Jepara, Central Java. Samples were collected from three main locations, i.e. the pier, mariculture, and mangrove areas. Samples of polychaetes were conducted using Ekman grab, thereafter placed into 25 x 25 cm zip bags. Observation of samples was carried out using a Nicon SMZ-25 stereo microscope. Eight species of polychaetes from 4 different families were identified. The most family found was Glyceridae (50 ind.m^{-2}). Based on the research results, 158 individuals (ind.m^{-2}) of Polychaetes from five different families were identified. The tests conducted on the physical and chemical parameters indicate that the water quality at Teluk Awur Beach is still relatively high, with the TDS being the exception. The results show that the TDS value of the Teluk Awur Beach is below the safe threshold, which is less than 1 g.L^{-2}, accordance with the provisions of government regulations, such as 0.218 for station I, 0.218 for station II, and 0.239 for station III. A high TDS value is proportional with the low value of Polychaetes abundance. Understanding these interactions supports the development of more sustainable and resilient mariculture practices, reinforcing food security, sustainability and ecological stability in coastal regions.

Key Words: Polychaetes, Teluk Awur, Water Quality

ISBN : 978-93-92106-78-1

Characterization and Purification of Bacteriocins from *Lactobacillus acidophilus* in Acidophilus Milk: Exploring Their Potential as Natural Biopreservatives

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Lactobacillus acidophilus, a well-established probiotic microorganism, is recognised not only for its ability to promote gut health but also for its remarkable capability to produce bacteriocins—bioactive antimicrobial peptides that exhibit significant promise as natural biopreservatives in food systems. This study presents a comprehensive examination of the bacteriocin profiling derived from acidophilus milk, with a dual focus on their probiotic efficacy and potential applications in food preservation.

The primary aim of this research was to isolate, purify, and characterize bacteriocins produced by *Lactobacillus acidophilus* sourced from specially prepared acidophilus milk. This milk, a traditional fermented dairy product, serves as an ideal matrix for cultivating probiotic bacteria and their metabolites. Using a systematic methanol-acetone extraction method, we successfully extracted bacteriocins from the fermented milk. During preliminary antimicrobial assays, these bacteriocins demonstrated strong inhibitory effects against a wide range of both gram-positive and gram-negative foodborne pathogens, including notable strains such as *Staphylococcus aureus*, *Escherichia coli* and *Salmonella typhi* These findings indicate that the bacteriocins not only have the potential to act as health-promoting agents via their probiotic activities but also as effective bioactive compounds for enhancing food safety.

To further explore the physicochemical characteristics of the bacteriocins, advanced chromatographic purification techniques, specifically Low-Pressure Liquid Chromatography (LCMS) and Nuclear Magnetic Resonance (NMR) spectroscopy, were employed. This multi-step purification process allowed us to fractionate the bacteriocins based on their unique properties and prepared them for detailed characterization. The purified fractions were subjected to mass spectrometric analysis, which facilitated the determination of their molecular weights and specific peptide sequences. The mass spectrometry results indicated the presence of novel bacteriocin with unique structural attributes that enhance their functional capabilities.

The implications of this research are far-reaching. It underscores the importance of leveraging advanced analytical techniques like LCMS and mass spectrometry, which are pivotal in unlocking the functional potential of probiotics, particularly in the realm of food biotechnology. The characterization of *Lactobacillus acidophilus*-derived bacteriocins lays the foundation for future studies aimed at exploring their use in various food applications, including as food preservatives and health-promoting agents.

In conclusion, this study illustrates the significant potential of bacteriocins produced by *Lactobacillus acidophilus*, highlighting their role in not only enhancing probiotic properties but also in ensuring food safety and preservation. As we move towards a broader application of probiotics in the food industry, this research encourages further exploration into the mechanisms of action of these bacteriocins and their incorporation into food products as effective, natural preservatives.

Key Words: *Lactobacillus acidophilus*, Acidophilus Milk, Bacteriocin, Antimicrobial Agents, Probiotics, Lcms, Mass Spectrometry, Bioactive Peptides

ISBN : 978-93-92106-78-1

What's on the Astronaut's Menu?: Exploring Nutrition in Outer Space

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Nutrition plays a crucial role in the success of space missions, influencing not just astronauts' physical well-being but also their mental resilience and team dynamics. Since the dawn of human spaceflight in the 1960s, experts have worked to design food that goes beyond basic sustenance and have grappled with the challenge of developing meals that must be nutritious, shelf-stable, safe, and easy to store and transport. Microgravity presents unique challenges, disrupting normal digestion and nutrient absorption, and even causing shifts in iron levels with redistribution of body fluids. Sustaining the immune, hormonal, and musculoskeletal systems become even more demanding on extended missions, where every nutrient must be precisely calculated. Additionally, the psychosocial aspects of eating such as the comfort and morale that familiar or enjoyable foods provide cannot be overlooked in one of the most extreme environments imaginable. Space food must therefore strike a delicate balance between physiological needs and psychological support, all while navigating the constraints of shelf life, minimal resource use, and overall mission safety.

ISBN : 978-93-92106-78-1

Emerging Trends in Proniosomal-Based Therapeutics

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Proniosomes have surfaced as a hopeful solution in new drug delivery systems, providing an effective and stable alternative to conventional niosomes and liposomes. These dry, free-flowing preparations form niosomes when hydrated, with increased stability, ease of storage, and increased bioavailability of hydrophilic and lipophilic drugs. Proniosomes are highly beneficial because they can overcome challenges of drug solubility, permeability, and degradation. They have controlled and sustained drug release, enhanced skin penetration, and lower dosing frequency, thus being effective in transdermal, oral, and parenteral use cases. They are becoming increasingly popular in the delivery of antifungal, anti-inflammatory, anticancer, and antihypertensive drugs, as indicated in current research, among other uses. In addition, proniosomal gels and powders find an increasing number of applications in topical and cosmetic formulations owing to their non-invasive characteristics and effectiveness in percutaneous drug permeation through the stratum corneum. Recent studies are also investigating the co-loading of two or more therapeutic agents in proniosomal systems for synergistic activity. With the incorporation of nanotechnology and green synthesis techniques, proniosomes have the potential to revolutionize drug delivery through patient-friendly and economical therapeutic choices.

Key Words: Proniosomes, New Drug Delivery System, Niosomes, Transdermal Delivery, Controlled Release, Bioavailability, Drug Stability, Targeted Therapy

ISBN : 978-93-92106-78-1

The Utilization of Artificial Intelligence in Food & Nutrition Research: A Review

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Proniosomes have surfaced as a hopeful solution in new drug delivery systems, providing an effective and stable alternative to conventional niosomes and liposomes. These dry, free-flowing preparations form niosomes when hydrated, with increased stability, ease of storage, and increased bioavailability of hydrophilic and lipophilic drugs. Proniosomes are highly beneficial because they can overcome challenges of drug solubility, permeability, and degradation. They have controlled and sustained drug release, enhanced skin penetration, and lower dosing frequency, thus being effective in transdermal, oral, and parenteral use cases. They are becoming increasingly popular in the delivery of antifungal, anti-inflammatory, anticancer, and antihypertensive drugs, as indicated in current research, among other uses. In addition, proniosomal gels and powders find an increasing number of applications in topical and cosmetic formulations owing to their non-invasive characteristics and effectiveness in percutaneous drug permeation through the stratum corneum. Recent studies are also investigating the co-loading of two or more therapeutic agents in proniosomal systems for synergistic activity. With the incorporation of nanotechnology and green synthesis techniques, proniosomes have the potential to revolutionize drug delivery through patient-friendly and economical therapeutic choices.

Key Words: Proniosomes, New Drug Delivery System, Niosomes, Transdermal Delivery, Controlled Release, Bioavailability, Drug Stability, Targeted Therapy

ISBN : 978-93-92106-78-1

Advancing Food Upcycling: Knowledge, Attitudes, and Practices Among Vegetable Retailers and Food Processors in Benguet

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Food upcycling is emerging as a promising strategy to reduce food waste by converting surplus produce and by-products into valuable products, aligning with environmental and economic sustainability goals. This study explores the knowledge, attitudes, and practices (KAP) toward food upcycling among vegetable retailers and food processors in Benguet, Philippines—a key agricultural region. A cross-sectional survey, validated by expert review (validity coefficient = 0.87) and showing strong internal consistency (Cronbach's alpha: knowledge = 0.76, attitude = 0.77, practices = 0.80), was administered to 400 participants selected using Cochran's formula. Descriptive statistics, linear regression, and Pearson correlation were used for analysis. Results indicate moderate knowledge (mean = 2.36), positive attitudes (mean = 3.88), and high practice levels (mean = 3.60). Sociodemographic variables showed limited but notable influence on KAP scores. Significant positive correlations were found between knowledge and both attitude and practice scores, suggesting that increased awareness is linked to greater acceptance and implementation of upcycling practices. These findings demonstrate a readiness among stakeholders to adopt food upcycling and emphasize the need for targeted educational programs and supportive policies. This offers valuable insights for promoting food upcycling in emerging markets, contributing to sustainable food systems and the advancement of circular economy.

ISBN : 978-93-92106-78-1

Assessment of Oral Health Related Quality of Life (OHRQoL) and Self Esteem among Cigarette Smokers of Different Nicotine Dependence Levels in Chennai: A Cross-Sectional Study

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Background: Cigarette smoking has a profound impact on oral health-related quality of life (OHRQoL) and self-esteem. Nicotine dependence exacerbates oral health deterioration, leading to dental issues such as periodontal disease and halitosis, which in turn affect psychological well-being.

Aim: To assess the impact of nicotine dependence levels on OHRQoL and self-esteem among cigarette smokers in Chennai.

Methods: A cross-sectional study was carried out among 160 cigarette smokers at a tertiary hospital-based tobacco cessation center. Participants were categorized into nicotine dependence levels using the Fagerström Test and carbon monoxide (CO) levels. Oral Health Impact Profile-14 (OHIP-14) was taken to analyse the OHRQoL while self-esteem was measured with the Rosenberg Self-Esteem Scale (RSES). Statistical analysis was performed with one-way ANOVA and Spearman's correlation coefficient were performed to determine associations.

Results: Higher nicotine dependence levels were significantly associated with poorer OHRQoL scores and lower self-esteem ($p < 0.001$). Functional limitation, psychological discomfort and physical pain were most affected. Participants with high nicotine dependence reported the lowest self-esteem due to oral health concerns and social stigma.

Conclusion: The results indicates the impact of oral health in association with self-esteem due to nicotine dependence where higher dependence to nicotine worsens OHRQoL and lowers confidence, emphasizing focus on targeting smoking cessation programs and interventions on oral health to improve overall well-being.

Key Words: Nicotine Dependence, Oral Health-Related Quality of Life, Self-Esteem, Smoking, OHIP-14, Tobacco Cessation

ISBN : 978-93-92106-78-1

Nanoemulsion Based Nutrient Carrier Incorporating Moringa oleifera and Flaxseed Oil Via High Energy Technique

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Flaxseed oil and *Moringa oleifera* essence are widely known for their brimming content of essential fatty acids and antioxidants with anti-inflammatory and anti-cancer properties. Flaxseed oil overall nutrient content increases with the addition of *Moringa oleifera* leaf essence, specifically by improving the vitamin, minerals and phenolic compounds constituents. This could enhance the therapeutic efficiency and enhance the oxidative stability of nanoemulsified oil. Despite its health benefits and disease-preventing ability, the demand for flaxseed oil is limited due to its hydrophobic nature and susceptibility towards oxidation. In this study, *Moringa oleifera* essence was incorporated into flaxseed oil nanoemulsions. To ensure the stability of nanoemulsion, physicochemical characterization was performed under different storage conditions. The nanoemulsion was prepared by using homogenization followed by an ultrasonication method. The *Moringa oleifera* leaf essence was added at 10% (E1), 12% (E2) and 14% (E3) (w/v) concentration to the optimized flaxseed oil nanoemulsion formulation (15% oil and 2.4% emulsifier). The formulated nanoemulsion E3 had a droplet size of 283.8±3.2 nm and a negative charge of -33.5±0.98 mV, respectively. The E3 nanoemulsion remained stable for 30 days under different storage temperatures, with no visible change in the functional group of flaxseed oil. Thus, the developed nanoemulsion offers a stable, synergistic delivery system for effective use in functional foods, dietary supplements, and pharmaceuticals.

Key Words: Flaxseed oil, Omega-3 fatty acid, Homoginization, Nanoemulsion, Ultrasonication

ISBN : 978-93-92106-78-1

Flaxseed Oil Nanoemulsion via Low Energy Emulsification Technique: A Promising Delivery System for Omega-3 Fatty Acids

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One of the major sources of omega-3 fatty acid is flaxseed oil (i.e. α-linolenic acid) which can accomplish the physiological needs of human health. Despite their brimming health benefits such as cardiovascular, blood sugar regulation, and improvement of digestion health. Flaxseed oil has poor stability at different temperatures due to its high susceptibility to oxidation. Hence, flaxseed oil nanoemulsion was formulated by low-energy emulsification with different mass ratios of oil and emulsifier Tween-20. The physicochemical stability of nanoemulsified oil was measured at different storage conditions. Within all the formulated emulsions, 1:1.3 nanoemulsion formulation showed a droplet size range 200 to 300±1.5 nm, monodispersed droplet distribution with stable droplet charges of approximately -34.03 mV. The physicochemical stability was measured by varying the temperature (e.g. particle size distribution, creaming index and zeta potential). Further, FTIR spectra showed that the nanoemulsion remained stable for 4 weeks with no visible change in the functional group of flaxseed oil. Delayed crystallization was observed for the nanoemulsion using differential scanning calorimetry. Thus, a flaxseed nanoemulsion was prepared with high stability and better physicochemical characteristics. Further, the nanoemulsion can be fortified into foods to develop novel tasty product formulations.

Key Words: Flaxseed oil, Omega-3 fatty acid, Nanoencapsulation, Emulsification, Nanoemulsion

ISBN : 978-93-92106-78-1

Microencapsulation of Pumpkin Seed Oil by Spray Drying Method and Enhance It's Stability

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Encapsulation involves enclosing ingredients like vitamins, flavours, probiotics, and oils within a protective coating to preserve sensitive components, control release, mask undesirable tastes, and improve stability. Microencapsulation is a technique that packs core bioactive compounds inside a capsule. Pumpkin seed oil (PSO), rich in polyunsaturated fatty acids, minerals, and fat-soluble vitamins like carotenoids and vitamin E, offers antioxidant benefits and protects against prostate cancer, urinary issues linked to benign prostatic hyperplasia (BPH), and kidney stone formation. However, PSO is highly susceptible to oxidation, limiting its shelf life and application. This study explores the microencapsulation of PSO using whey protein isolate (WPI) and maltodextrin (MD) to enhance stability and functionality. Fourier Transform Infrared Spectroscopy (FT-IR) confirmed the presence of triglycerides, unsaturated fatty acids, and esters in PSO. Thermogravimetric Analysis (TGA) showed that WPI and MD walls were thermally stable up to 200°C. WPI-encapsulated PSO particle size is between 2–40 µm and exhibited superior rehydration with better thermal stability. The highest encapsulation efficiency was observed in the WPI-encapsulated PSO. These results demonstrate that microencapsulation effectively preserves PSO's bioactive components, improves handling, and extends shelf life. This study lays the foundation for expanding PSO's use in functional foods, dietary supplements, and pharmaceuticals through advanced encapsulation technologies.

Key Words: Microencapsulation, Pumpkin Seed Oil, Bioactive Compounds, Spray Drying, Whey Protein, Maltodextrin

ISBN : 978-93-92106-78-1

Utilizing Nanotechnology to Create Antimicrobial Packaging Materials to Inhibit Microbial Growth

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A substantial amount of research into innovative packaging methods has been driven by the growing need for food safety and the extension of shelf life. The application of nanotechnology has emerged as a potentially fruitful strategy for the development of antimicrobial packaging materials that are capable of actively inhibiting the growth of microorganisms and ensuring the integrity of the product. The incorporation of nanoparticles into packaging films, such as silver, zinc oxide, titanium dioxide, and chitosan, results in the enhancement of the antibacterial capabilities of these materials against a wide variety of foodborne pathogens. The interactions that take place on a nanoscale between these chemicals and microbial cells result in the rupture of cell membranes, the elevation of oxidative stress, and the suppression of essential cellular activities. This article investigates current developments in the synthesis and application of nanocomposite materials in food packaging. It also evaluates the efficacy and safety of these materials, as well as the possible regulatory problems that they may provide. In addition to improving the preservation of food, the incorporation of nanotechnology into packaging is also in line with the objectives of modern food companies, which are to develop packaging solutions that are both intelligent and environmentally friendly.

Key Words: Nanotechnology, Create, Antimicrobial, Packaging

ISBN : 978-93-92106-78-1

Consumer Perception of Soya-Based Meat Analogues: A Comparative Sensory Evaluation with Chicken-Based Preparations using a Descriptive Analysis Approach

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The rising demand for sustainable and plant-based food alternatives has led to significant interest in meat analogues that replicate the sensory attributes of conventional meat. This study aimed to evaluate and compare the sensory characteristics of soy-based meat analogues—tempeh and textured vegetable protein (TVP)—with conventional chicken preparations using a trained sensory panel. Fifteen trained panellists conducted a Qualitative Descriptive Analysis (QDA) on coded and randomized samples of chicken nuggets, spiced chicken mince, TVP-based nuggets, tempeh and minced TVP preparations. Samples were evaluated for appearance, aroma, texture, flavor, and overall acceptability using a 10–point intensity scale. Attributes such as color, surface texture, meaty aroma, beany notes, firmness, juiciness, umami flavor, and fibrousness were rated. Descriptive comments were also recorded to support quantitative data.

The results revealed that chicken nuggets scored highest in overall acceptability (8.3±0.5), followed closely by TVP nuggets (7.6±0.7), while tempeh scored lower (6.4±0.8). In terms of specific attributes, TVP nuggets closely matched chicken nuggets in surface texture (TVP: 7.4, Chicken: 7.6) and firmness (TVP: 7.2, Chicken: 7.5). However, TVP lagged slightly in meaty aroma (6.8) and umami flavor (6.5) compared to chicken (8.0 and 7.8 respectively). Tempeh preparations exhibited stronger beany notes (8.2) and a fermented aroma, which were appreciated by some but diverged from traditional meat profiles. Spider plot visualization confirmed that TVP nuggets most closely mimicked chicken across key sensory dimensions, especially texture and color. Tempeh, despite its sensory deviation, may appeal to consumers open to fermented, nutty profiles.

The findings highlight the potential of soy-based analogues—especially TVP—in mimicking the sensory profile of chicken products. These results support the development of improved plant-based meat alternatives, considering consumer sensory expectations. Further work focusing on formulation refinement and flavor enhancement could help bridge the gap between plant-based analogues and traditional meat.

Key Words: Meat Analogues, Textured Vegetable Protein (TVP), Tempeh, Sensory Evaluation, Plant-Based Meat, Descriptive Analysis, Food Texture

ISBN : 978-93-92106-78-1

A Survey on Dietary Intake among Project DAREDEMO Beneficiaries in Cebu City

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This study investigated the dietary intake and nutritional status of Project DAREDEMO beneficiaries in three barangays in Cebu City, Philippines, where malnutrition prevalence is high. A secondary analysis of data from a previous study that focused on the dietary habits and nutritional status of residents in impoverished areas of Cebu City was utilized in this study. A quantitative approach was employed with a cross-sectional correlational design and total enumeration, utilizing relevant dietary intake and socio-demographic data. Data analysis included frequency, percentage, and Fisher's Exact Test to determine the association between food intake frequency and nutritional status. The study revealed a high prevalence of malnutrition among the respondents. Significant associations existed between nutritional status and the consumption of key food groups, including dairy products, beans, and salt. Frequent consumption of dairy products and beans was associated with normal nutritional status, highlighting the potential positive influence of these food groups on nutritional well-being. Dairy products are rich in calcium, vitamins B6 and B12, and other essential nutrients, with studies consistently linking adequate dairy consumption to improved nutrient intake and reduced risks of metabolic disorders. Beans, as nutrient-dense foods, provide dietary fiber, protein, and essential micronutrients, and their consumption is associated with improved nutritional outcomes and reduced risks of chronic diseases. In contrast, excessive salt consumption is a significant public health concern due to its link to hypertension and cardiovascular diseases. The study also examined salt preference factors, noting that health beliefs, cultural influences, and dietary habits shape it. These findings underscore the importance of considering dietary factors like dairy, beans, and salt intake in addressing malnutrition and designing effective and tailored nutrition interventions for vulnerable populations.

Key Words: Diet, Dietary Innovation, Dietary Intake, Malnutrition, Nutritional Status, Public Health

ISBN : 978-93-92106-78-1

3D Printing Technology in Pharmacy

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3D printing, also known as additive manufacturing, is a process that builds three dimensional objects layer by layer from a digital model. This technology offers rapid prototyping, customization, and efficient production compared to traditional subtractive manufacturing methods. It's widely used across various industries, including healthcare, aerospace, and consumer goods. Digital fabrication technology, also referred to as 3D printing or additive manufacturing, creates physical objects from a geometrical representation by successive addition of materials. 3D printing technology is a fast-emerging technology. Nowadays, 3D Printing is widely used in the world. 3D printing technology increasingly used for the mass customization, production of any types of open source designs in the field of agriculture, in healthcare, automotive industry, locomotive industry and aviation industries. 3D printing technology can print an object layer by layer deposition of material directly from a computer aided design (CAD) model. This paper presents the overview of the types of 3D printing technologies, the application of 3D printing technology and lastly, the materials used for 3D printing technology in manufacturing industry.

Key Words: 3D Printing, CAD, Healthcare

ISBN : 978-93-92106-78-1

Comparative Study on Benthic Biodiversity as a Strategy to Ensure Sustainable Seafood Supply Chains and to Support Nutrition Security and Sustainability

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Over the past two decades, aquaculture has experienced rapid development as a key provider of high-quality protein for human consumption. However, this expansion necessitates careful consideration of environmental carrying capacity to ensure long-term sustainability. The macrobenthic community, recognized as a crucial ecological indicator of marine environmental health, forms an integral part of marine food webs. Comprising taxa such as fish, mollusks, and crustaceans, these organisms significantly contribute to human nutrition either directly or through higher trophic-level predators. This study aims to conduct a comparative ecological assessment of macrobenthic community structures in two coastal regions of Central Java: Teluk Awur (Location I) and the Karimunjawa Islands (Location II). Emphasis is placed on evaluating differences in biodiversity and organismal abundance to support environmental assessments. At each site, three replicate sediment samples were collected using an Ekman grab sampler, and corresponding physicochemical parameters were measured. The relationship between biotic and abiotic variables was analyzed using the BIO-ENV procedure within Primer software. Results revealed higher macrobenthic diversity and greater environmental stability at Location I, indicative of a more balanced ecosystem dominated by gastropod and bivalve species. These taxa, such as *Cerithidea sp., Rissoina sp.*, and *Divalucina sp.*, are known to occupy vital positions in trophic networks and are valued for their nutritional content, including zinc, iron, omega-3 fatty acids, and vitamin B12—nutrients essential for human growth and health. Consequently, the composition and sustainability of macrobenthic communities directly influence both the availability and the nutritional quality of seafood resources. Among the measured abiotic parameters, total nitrogen (N-total) emerged as the most influential factor shaping macrobenthic community dynamics (BIOENV, Primer 6.1.5; $r = 0.117$). These findings underscore the critical role of benthic biodiversity conservation in maintaining sustainable seafood supply chains and enhancing nutritional security and sustainability for marine and coastal ecosystem.

Key Words: Macrobenthic Biodiversity; Seafood Availability; Human Nutrition; Benthic Ecosystem Health; Coastal Sustainability; Nutrient-Rich Marine Species

ISBN : 978-93-92106-78-1

Pharmacognostic, Phytochemical, Anti-Inflammatory, Andanti-Arthritic Activities of The Root Extract of *Asteracantha Longifolia* (L.) Nees.: A Review

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This study aimed to evaluate the pharmacognostic, phytochemical, anti-inflammatory, and anti-arthritic activities of the root extract of *Asteracantha longifolia* (L.) Nees. The root powder of *Asteracantha longifolia* exhibited bitter taste, dark color, and a strong odor, with a loss on drying of 6.39%w/w at 105°C. The extractive values for chloroform, ethyl acetate, ethanol, and water were determined as 7.15%w/w, 2.15%w/w and 4.565w/w respectively. Phytochemical analysis revealed the presence of phenols and flavonoids, quantified as 0.605 mg/100 mg and 0.794 mg/100 mg of dried extract, respectively, in the ethyl acetate extract. The ethanolic extract showed 0.529 mg/100 mg of phenols and 0.608 mg/100 mg of flavonoids, while the aqueous extract contained 0.251 mg/100 mg of flavonoids. The antioxidant potential was assessed using the DPPH assay, indicating significant scavenging activity with % inhibition 37.8 with comparison of ascorbic acid for the ethyl acetate extract. Anti-inflammatory were evaluated with carrageenan induced paw edema in rat with diclofenac sodium, and anti-arthritic activities were evaluated in complete Freund's adjuvant (CFA)-induced rats with indomethacin. Treatment with ethyl acetate extract significantly reduced serum levels of SGPT, SGOT, and SALP, indicating hepatoprotective effects. Additionally, the extract demonstrated positive effects on blood parameters, including RBC count, HGB levels, and WBC count in the carrageenan-induced paw edema model, suggesting anti-inflammatory potential. These findings suggest that *Asteracantha longifolia* root extract possesses pharmacological properties with potential applications in inflammation and arthritis. Further clinicalinvestigations are warranted to validate these effects and explore the extract's therapeuticpotential..

Key Words: Anti-Inflammatory, Anti-Arthritis Effect, Medicinal Plants, Herbal Medicines, Diclofenac Sodium, Indomethacin, CFa, Hepatoprotective, *Asteracantha longifolias*

ISBN : 978-93-92106-78-1

Exploring Invasomes: Novel Vesicular Carriers for Enhanced Transdermal Drug Delivery

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Invasomes represent a novel and promising approach in the field of transdermal drug delivery systems, offering enhanced penetration of active pharmaceutical ingredients through the skin barrier. Composed primarily of phospholipids, ethanol, and terpenes, invasomes are flexible lipid vesicles that improve drug solubility and bioavailability while maintaining biocompatibility. The synergistic effect of ethanol and terpenes disrupts the stratum corneum lipid structure, facilitating deeper skin penetration of both hydrophilic and lipophilic drugs. Compared to conventional vesicular systems like liposomes, invasomes demonstrate superior deformability and permeability, making them particularly advantageous for systemic delivery of poorly absorbed or unstable compounds. This paper explores the physicochemical characteristics, formulation strategies, mechanisms of action, and therapeutic applications of invasomes in delivering a wide range of pharmaceutical agents, including anti-inflammatory, antifungal, and anticancer drugs. With growing interest in non-invasive and patient-friendly drug delivery methods, invasomes offer a versatile platform that bridges the gap between targeted therapy and enhanced patient compliance.

Key Words: Invasomes, Transdermal Drug Delivery Systems, Bioavailability, Biocompatibility, Synergistic Effect, Hydrophilic And Lipophilic Drugs

ISBN : 978-93-92106-78-1

Nanogels as Smart Carriers for Targeted Drug Delivery: Advances and Future Perspectives

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Nanogel-based drug delivery systems have emerged as a cutting-edge platform in nanomedicine, offering unique advantages in the targeted and controlled release of therapeutic agents. Comprising three-dimensional, cross linked polymeric networks at the nanoscale, nanogels exhibit high water content, biocompatibility, and tunable physical properties that make them ideal carriers for a wide variety of drugs, including proteins, nucleic acids, and small molecules. Their ability to respond to physiological stimuli—such as pH, temperature, and redox conditions—enables site-specific drug release, thereby minimizing systemic side effects and enhancing therapeutic efficacy. This review highlights recent advancements in nanogel design, fabrication techniques, surface modifications, and their applications in treating cancer, inflammatory diseases, and neurological disorders. Additionally, the paper discusses current challenges in clinical translation, including stability, scalability, and regulatory hurdles. As research continues to address these limitations, nanogels hold significant promise in transforming conventional drug delivery paradigms toward more personalized and effective therapies.

Key Words: Nanoparticles, Nanomedicines, Nanogel, Nanoscale, Transdermal Drug Delivery Systems, Bioavailability, Biocompatibility, Synergistic Effect, Neurological Disorder, Hydrophilic and Lipophilic Drugs

ISBN : 978-93-92106-78-1

Economic Factors Affecting the Performance of Food Industry

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The food industry, a vital sector providing sustenance to the global population, is significantly influenced by a complex interplay of economic factors. These factors shape production costs, consumer demand, pricing strategies, and overall profitability. Understanding these dynamics is crucial for businesses operating within the food industry to navigate challenges and capitalize on opportunities. Inflation, the general increase in prices and fall in the purchasing value of money, has a pervasive impact on the food industry. Rising inflation leads to higher costs for raw materials (agricultural commodities, ingredients, packaging), energy, labor, and transportation. These increased input costs can squeeze profit margins for food producers, processors, and retailers. Interest rates affect the cost of borrowing for businesses within the food industry. Higher interest rates increase the cost of financing capital investments, such as purchasing new equipment, expanding facilities, or funding research and development. Higher rates make it more expensive for retailers and restaurants to purchase and hold inventory. Limited buying power and higher borrowing costs can threaten their survival. Businesses may opt for more frequent deposits to capitalize on higher yields on interest income or pay down high-interest credit lines. This can lead to less investment, expansion, remodeling, and mergers and acquisitions within the industry. Businesses facing increased financial pressure might reduce staff.

Key Words: Economic, Food, Industry, Businesses, Consumers

ISBN : 978-93-92106-78-1

IFERP Life Sciences
Explore Your Research Journey...

Nutri-Meals on Wheels: A Community-Driven Business Model for Breakfast Feeding Programs Utilizing the Pinggang Pinoy Framework

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Childhood malnutrition remains a significant concern in the Philippines, impacting health and educational outcomes. While school-based feeding programs (SBFPs) exist, many face challenges in funding, logistics, and sustainability. Breakfast, recognized as crucial for children's well-being and learning is often overlooked in existing SBFPs. This study introduced the "Nutri-Meals on Wheels" (NMOW) model, a subscription-based breakfast feeding program utilizing mobile food trucks and a centralized commissary. NMOW aimed for a sustainable operation from generating suspended meals for schoolchildren through a community-driven subscription model utilizing a "Buy One, Help One" (BOHO) initiative. The methodology involved a pilot simulation of the NMOW business model through a consumer survey involving a teacher-facilitated and parent-endorsed support system to fully implement a community breakfast feeding program among primary public-school children in Baguio City, Philippines. The survey gathered data on perceived meal quality by integrating the nutritional guidelines of the Pinggang Pinoy framework tailored for the age group, six to nine years old. The findings included perceptions into parental willingness to participate in a sustainable breakfast program, their preferences regarding meal options and delivery, and potential financial viability. This study benefits stakeholders by providing valuable data on the feasibility and acceptability of an innovative, community-driven breakfast feeding model that can contribute to improved nutrition and school readiness for Filipino public-school children. The findings also offered valuable insights for policymakers, non-governmental organizations, and potential social entrepreneurs in establishing effective and sustainable breakfast feeding initiatives in the Philippines potentially serving as a template for Public-Private-Partnership.

Key Words: Breakfast, Buy One Help One, Feeding Program, Pinggang Pinoy Framework

ISBN : 978-93-92106-78-1

Tradition and Innovation in Defining Contemporary Filipino Cuisine: *A Multi-faceted Analysis of Culinary Practices and Cultural Preservations*

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This research explores the evolving landscape of contemporary Filipino cuisine, emphasizing the critical interplay between tradition and innovation within a globalized context. It investigates how Filipino artisans and chefs in urban settings navigate the preservation of deep-rooted culinary heritage while integrating modern innovations and cross-cultural influences. Grounded in innovation-diffusion theory, the study analyzes perspectives from across the culinary ecosystem, including artisans (tradition keepers), chefs (innovation implementers), culinary students (future innovators), and consumers (adopters). Employing a qualitative methodology, the research involves on-site interviews with food artisans and chefs to understand their innovation processes, knowledge of traditional techniques and ingredients, and approaches to balancing tradition and modernity. Focus group discussions (FGDs) with culinary students and consumers further explore their views on culinary innovation, the importance of cultural preservation, and environmental stewardship. The findings of this study suggest that the successful diffusion of culinary innovation within Filipino cuisine necessitates a carefully balanced approach that deeply respects and honors tradition while thoughtfully embracing adaptation. Maintaining the relevance and enduring cultural significance of Filipino food traditions within contemporary contexts is identified as crucial for successful innovation. This research contributes to a nuanced understanding of the multifaceted forces shaping modern Filipino cuisine. Insights gained can potentially inform the development of best practices for culinary innovation and offers strategies for cultural preservation and the experience of Filipino food culture locally and globally. Ultimately, it highlights the potential effects on tourism and the broader perception of Filipino identity.

ISBN : 978-93-92106-78-1