



PROGRAMME BOOK

3rd IFRC

INTERNATIONAL FOOD
RESEARCH CONFERENCE 2024



***Sustainable Food Industry through Science,
Technology and Innovation***

6-8 August 2024 | Palm Garden Hotel, Putrajaya

Organised by: **FAKULTI SAINS DAN
TEKNOLOGI MAKANAN**
FACULTY OF FOOD SCIENCE AND TECHNOLOGY
فاكولتي ساءين دان تيكنولوگي ماکانن

Co-organised by:  **SEAMEO
SEARCH**



TDC

TDC Care

With a focus on creating sustainable impact for vulnerable community, TDC Group has been established and growing organically since 2016.

Business Arm of TDC that are certified by SIRIM as Shariah Based Quality Management (MS 1900:2004 and ISO 9001:2015), together with Certified Shariah Compliance Operational and Marketing Management by Lariba Consulting, more than 30,000 Dealers in Malaysia, Brunei and Indonesia enjoying lucrative income via the sales from a series of health food and beverage that nearly cross 5 million units sold to more than 330,000 customers. The certification of "Malaysia Book of Records" certification has verified us as the **Best Colostrum Milk Product Supplier in Malaysia**, while more than 50 Awards, Accreditation and Certification in these 7 years have made us one of the best Dealership System in Asia Pacific.

By the year of 2023, TDC Care Berhad is established as the Philanthropic Arm for TDC Group for the Collection, Distribution of Endowment (Waqf), Zakat, Donation and Sedakah focusing on empowering vulnerable communities in 4-Pillars: Health, Education, Livelihood and Physical Well-being (HELP).



Headquarters, Wisma TDC, Bukit Angkor, Kajang



East Coast Regional Office, Kota Bharu, Kelantan

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 2. **Lifetime** membership.
 3. Shariah Verified and Certified Business Model by Government and Third Party Consulting.
 4. Company Profit Allocation for Charity and Endowment as priority with more than RM12mil into Charity, Humanitary and Endowment work.
 5. No monthly maintain.
 6. Daily bonus payout **consistently** since 2016. More than RM120mil.
 7. Bonus Payout as per 2022 data.
 8. **Daily Bonus** directly into their respective account bank **365 days**.
 9. Fair opportunity and business potential.
 10. Business plan is **flexible, stress-free** and **easy to understand**.
 11. **Inheritable** business & make legacy.
 12. Incredible rewards, gifts and vacation packages offered.
 13. Funeral expenses are covered.
- and many more ...



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No.26, Jalan Aeta Utama, Kawasan Perindustrian Aeta, 43000 Kajang, Selangor
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Our Feature Products



C2Joy a mixture of skim milk drink with colostrum for strong bone & teeth.



BerryMix botanical beverage, pomegranate, blackcurrant & broccoli seed powder extract for long lasting antioxidant effect.



Colever a mixture of skim milk drink colostrum with Beta Glucan from yeast to boost immune system.



Alithera an energy drink based on red dates, tiger milk mushrooms and tongkat ali to tackle long covid syndrome.



NectarMax honey products consisting of propolis, ginger, cinnamon, cloves, black pepper and lemon to fight cold & cough.



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The Malaysian Palm Oil industry has always been committed to providing a high-quality edible oil for the global population, while upholding the five important pillars of sustainable development which are **People, Planet, Prosperity, Peace & Partnership**

TABLE OF CONTENTS

Foreword by the Vice Chancellor.....	1
Foreword by the Dean.....	2
Foreword by the Chairman.....	3
Acknowledgements.....	4
Programme at a Glance.....	5
Conference Floor Plan.....	6
Information for Presenters.....	8
Pre-Conference Workshops.....	9
Keynote Speaker Profile.....	10
Plenary Speaker Profiles.....	11
Invited Speaker Profiles.....	17
Full Conference Programme.....	30
Keynote Speaker Abstract.....	46
Plenary Speaker Abstracts.....	47
Invited Speaker Abstracts.....	53
ORAL PRESENTATION ABSTRACTS	
Food Analysis, and Food Safety and Quality (FASQ).....	68
Food Biotechnology (FB).....	77
Food Chemistry and Biochemistry (FCB).....	81
Food Heritage (FH).....	84
Food Operations Management and Consumer Science (FOMC).....	86
Food Processing and Engineering (FPE).....	89
Food Packaging and Shelf Life (FPS).....	95
Food Service and Hospitality (FSH).....	98
Food Security and Sustainability (FSS).....	101
Nutrition and Functional Food (NFF).....	103
Novel and Green Technologies (NGT).....	109
POSTER PRESENTATION ABSTRACTS	
Food Analysis, and Food Safety and Quality (FASQ).....	114
Food Biotechnology (FB).....	121
Food Chemistry and Biochemistry (FCB).....	122
Food Heritage (FH).....	125
Food Processing and Engineering (FPE).....	126
Food Packaging and Shelf Life (FPS).....	135
Food Service and Hospitality (FSH).....	138
Food Security and Sustainability (FSS).....	139
Nutrition and Functional Food (NFF).....	143
Novel and Green Technologies (NGT).....	149
VIRTUAL PRESENTATION ABSTRACTS	
Food Analysis, and Food Safety and Quality (FASQ).....	150
Food Processing and Engineering (FPE).....	151
Food Packaging and Shelf Life (FPS).....	152
Food Service and Hospitality (FSH).....	153
Food Security and Sustainability (FSS).....	154
Publication Opportunity.....	155
Organising Committee.....	156
Feedback Survey.....	160

FOREWORD BY THE VICE CHANCELLOR

Assalamualaikum W.B.T. and greetings,

On behalf of Universiti Putra Malaysia (UPM), it gives me great pleasure to welcome all of you to the Third International Food Research Conference 2024 (3rd IFRC 2024) at Palm Garden Hotel, Putrajaya, Malaysia. *Selamat datang!*

Following the resounding success of the 1st IFRC 2017 and 2nd IFRC 2019, it is highly encouraging to see the continual commitment demonstrated by the Faculty of Food Science and Technology (FSTM) in championing the food-related disciplines, both locally and internationally. I am entirely certain that the 3rd IFRC 2024 will be no exception in its success, achievement, and participation. Therefore, I wish to herein convey my heartfelt appreciation and congratulation to the management and staff of FSTM for your contribution, dedication, and enthusiasm in materialising UPM's Vision '*to become a university of international repute*', and its Mission '*to make meaningful contributions towards wealth creation, nation building, and universal human advancement through the exploration and dissemination of knowledge*'. Kudos to FSTM!



To mankind, food is the primary source of energy and, therefore, life. Since time immemorial, mankind has exemplified ardent interest and creativity towards food creation and consumption which sprang solely from basic instinct and natural curiosity. This curiosity consequently gave birth to what the modernists would now call food research. In Malaysia, UPM, as the forerunner higher education institution for food and agriculture since 1971, is tasked to spearhead the food research agenda. When COVID pandemic hit the world in the not so distant past, food research paradigm shifted heavily towards ensuring the food security of the world population. Taking this in our stride, UPM becomes more attuned with facing the imminent threat, and adapting to changes for its survival and continuity. This is made possible by UPM's trained expertise and diverse resources which could directly, actively, and efficiently contribute to food security through various academic programs, as well as research, innovation, commercialisation, and extension agendas post-COVID pandemic. In June 2024, UPM has launched its very own food security blueprint in the effort to further optimise its contribution to national food security agenda through trained human capital development, innovation that can increase productivity, and advanced technology transfer to the agro-community. The blueprint's ultimate objective is to serve as a reference and guide to all UPM entities towards the improvement of its contribution to national and global food security efforts.

To all participants, I would like to urge that you pro-actively participate and engage in the two-day conference by contributing your ideas and insights. The close interactions and continuous collaborations between food scientists, regulatory bodies, industry players, and end consumers are critically imperative and earnestly encouraged in the effort to transform the current food ecosystem into a sustainable, competitive, and resilient one for the ultimate and overall betterment of mankind, as highlighted by the 3rd IFRC 2024's theme "*Sustainable Food Industry through Science, Technology, and Innovation*".

I sincerely hope that all of you not only will have a productive conference, but will also have an enjoyable stay in Kuala Lumpur, and get to experience the warmth Malaysian hospitality.

"WITH KNOWLEDGE WE SERVE"

YBHG. DATO' PROF. DR. AHMAD FARHAN MOHD SADULLAH

Vice Chancellor

Universiti Putra Malaysia

FOREWORD BY THE DEAN

Assalamualaikum W.B.T. and very good day,

On behalf of the Faculty of Food Science and Technology, Universiti Putra Malaysia I am truly delighted to welcome all of you to the Third International Food Research Conference 2024 (3rd IFRC 2024).

As the earliest higher education institution offering food science and technology programs in Malaysia (since 1976), the Faculty has been tasked to spearhead the development of human capital as well as the direction in food research and innovation, around the same time the Government made UPM the centre of excellence for agricultural education in order to develop skilled manpower for the related industries. Therefore, over the years, the Faculty has undertaken various approaches and initiatives in ensuring that our undergraduate and postgraduate programs, as well as our end products, which are our graduates, remain relevant, resilient, and adaptable in the ever-changing food and nutrition ecosystem which encompasses production, commercialisation, and consumption. Among such approaches is through the organisation of research conferences such as this, where we gather the best minds in food researches from around the world for boundary-pushing, thought-provoking, and hypothesis-proving (or disproving for that matter) agendas and dialogues. The 3rd IFRC 2024 will be the Faculty's ninth international conferences, and the third one for the IFRC series. This utterly highlights the Faculty's ongoing commitment in leading the food research agenda nationally and internationally. With UPM currently leading the national food security agenda, the Faculty's position, support, and contribution have never been more pivotal.



Now, as we are almost nearing our 50th anniversary since the Faculty's inception, our graduate's number counts by the thousands, and are now in various food companies, policy-making entities, and academic institutions local and abroad. Our close connections and working relations with our alumni substantially contribute to ideas and insights from within the food ecosystem that have kept us abreast with the food-related challenges, current affairs, and interests of the modern world, and positioned us as expert panels and focal points when it comes to solving food-related issues and conundrums of the day, on top of our core business as academic qualification provider.

Globally, the food ecosystem is recovering from the huge impact of COVID pandemic which substantially changed the production and supply chain, operation, market and consumer behaviour, regulatory, and policy. To address this issue, collaboration and networking from academic institutions, scientific bodies, industry players, policy makers, and regulatory departments are of the utmost importance. Therefore, I sincerely hope that the 3rd IFRC 2024 would be successful in creating the much-needed platform for all of us to move forward. Let us all internalise the 3rd IFRC 2024's theme which is "*Sustainable Food Industry through Science, Technology, and Innovation*", and turn it into a collective practice.

To the 3rd IFRC 2024 Organising Committee, congratulations on your time, effort, and idea in reprising our successes during the 1st IFRC 2017 and the 2nd IFRC 2019. Your hard work and dedication have ensured that the Faculty's position and reputation nationally and internationally remain sterling and top-notch. To all participants, I sincerely hope that you would greatly benefit from the 3rd IFRC 2024, and in turn contribute to the betterment of society and country. Our task ahead in ensuring a resilient, competitive, and sustainable food ecosystem post-COVID pandemic is without doubt challenging, but together we can pave the way, and emerge victorious.

PROF. TS. DR. ANIS SHOBIRIN MEOR HUSSIN

Dean

Faculty of Food Science and Technology

FOREWORD BY THE 3rd IFRC 2024 CHAIRMAN

Greetings,

After months of careful planning and preparation, finally the Third International Food Research Conference 2024 (3rd IFRC 2024) is upon us. With over 200 participants from nearly 20 countries, the 3rd IFRC 2024 is now on full swing.

Following the huge success of the 1st IFRC 2017 and the 2nd IFRC 2019, Universiti Putra Malaysia through the Faculty of Food Science and Technology, as the country's forerunner institution in food and agriculture, is once again taking the initiative to organise the 3rd IFRC 2024. This global cooperative effort seeks to create a platform where all the great minds in food science and technology are gathered to discuss, decide, and drive the future directions of the food industry. Appropriately themed "*Sustainable Food Industry through Science, Technology, and Innovation*", the 3rd IFRC 2024 seeks to provide food researchers with the opportunity to exchange their opinions and views, as well as present their recent findings and innovations in the field of food, and identify the role of public-private partnership (public-private partnership) towards the sustainability of the food industry and food security by enhancing research collaboration, innovation, commercialisation, and internationalisation.



Having been tailored to cater to wider audience from the food sector, the 3rd IFRC 2024, which encompasses the major food areas such as Food Analysis, and Food Safety and Quality; Food Biotechnology; Food Chemistry and Biochemistry; Food Heritage; Food Operations Management and Consumer Science; Food Packaging and Shelf Life; Food Processing and Engineering; Food Security and Sustainability; Food Service and Hospitality; Automation and Digitalisation; Novel and Green Technologies; and Nutrition and Functional Food, is aimed to provide a platform on which we could all stand together and respond to the emerging challenges in food research post-COVID pandemic. This, we could achieve, by the continuous engagements and collaborations with our industrial partners, academic colleagues, and policy makers at the national and international levels.

To our Co-Organiser, Southeast Asian Regional Centre for Graduate Study and Research in Agriculture (SEARCA), Los Baños, Philippines; and all our sponsors, QL Foods Sdn. Bhd.; TDC Holdings Sdn. Bhd.; Malaysian Palm Oil Council (MPOC); Hiperbaric S.A., Spain; Crest Analytics Sdn. Bhd.; Interscience Sdn. Bhd.; Profes Lipid Sdn. Bhd.; Rompin Integrated Pineapple Industries Sdn. Bhd.; Koperasi Pekerja-Pekerja Kerajaan Sabah Bhd.; and Cool Juicery Sdn. Bhd., we extend our sincere gratitude and appreciation for the collaboration that makes the organisation of the 3rd IFRC 2024 possible.

Credit also goes to all keynote, plenary, and invited speakers for graciously sharing their vast knowledge and wisdom. Their years of experience in their respective fields are certainly an asset that will definitely enrich the 3rd IFRC 2024. To fellow academics, researchers, entrepreneurs, industry practitioners, policy makers, and students who participate in the 3rd IFRC 2024, I am entirely certain that you will all benefit from the arranged keynote, plenary and invited speeches as well as the oral and poster presentations. To the Organising Committee, you have my endless admiration for your months of effort and energy poured into materialising the 3rd IFRC 2024. A job well done!

To our guests and participants from abroad, have a pleasant stay in Malaysia!

PROF. DR. TAN CHIN PING, FASc

Chairman

3rd IFRC 2024 Organising Committee

ACKNOWLEDGEMENTS

On behalf of the Faculty of Food Science and Technology and Universiti Putra Malaysia, we would like to wholeheartedly convey our utmost gratitude and appreciation to everyone who have directly or indirectly contributed towards the success of the 3rd IFRC 2024. The 3rd IFRC 2024 would not have been possible nor materialised without the supports and contributions from our Co-Organiser and sponsors.

CO-ORGANISER

**SOUTHEAST ASIAN REGIONAL CENTRE
FOR GRADUATE STUDY AND RESEARCH
IN AGRICULTURE, LOS BAÑOS,
PHILIPPINES**



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Red Palm Oil
Made with heart, made for all

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**ROMPIN INTEGRATED PINEAPPLE
INDUSTRIES SDN. BHD.**



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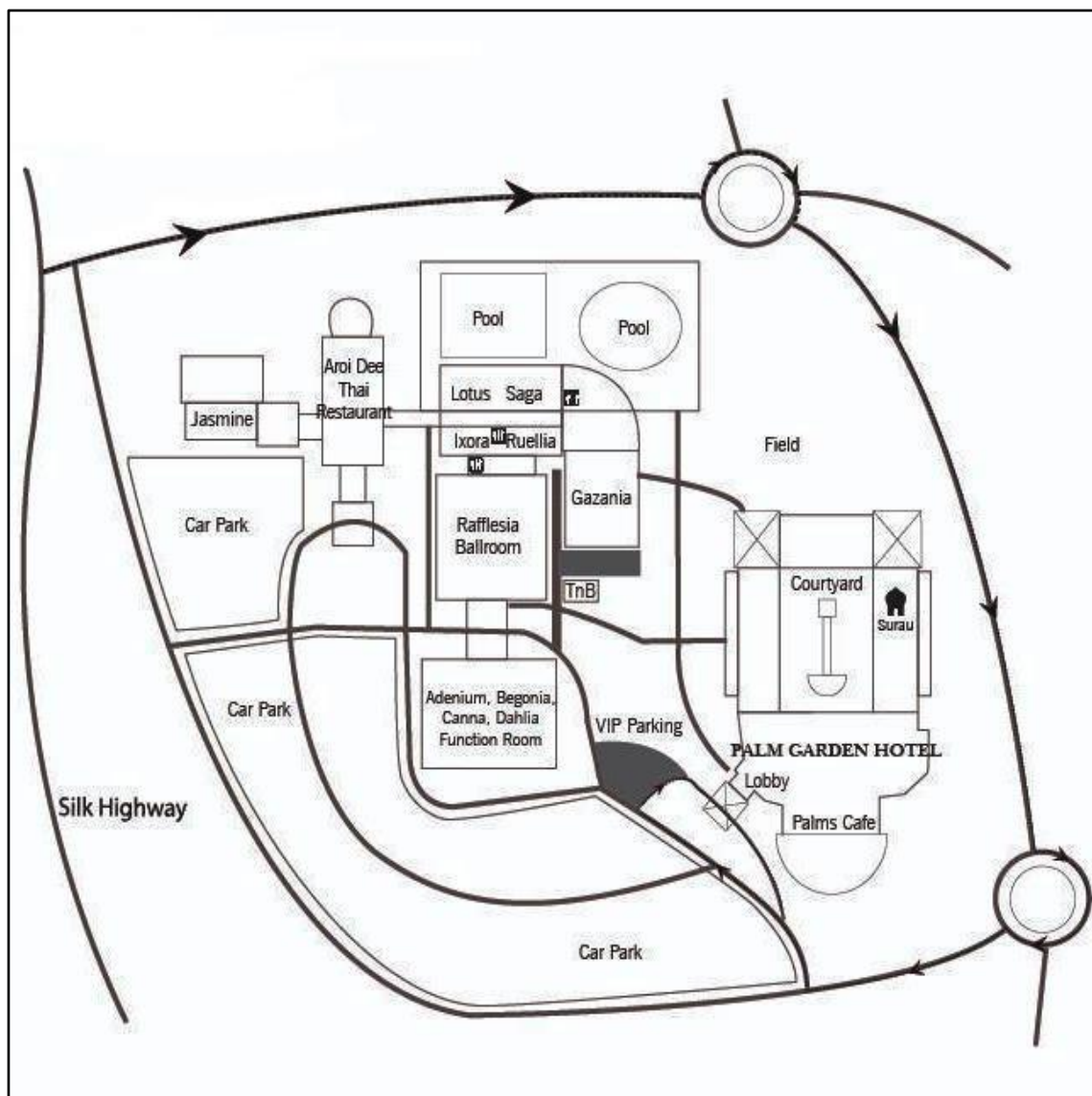


COOL JUICERY SDN. BHD.

PROGRAMME AT A GLANCE

DAY ONE – August 7 th , 2024 (Wednesday)					
0800	Registration / Poster Setup				
0845	Arrival of Guest of Honour				
0900	Welcoming Address Prof. Dr. Tan Chin Ping, Chairman, 3 rd IFRC 2024 <i>Rafflesia Ballroom</i>				
0915	Opening Address Dato' Prof. Dr. Ahmad Farhan Mohd. Sadullah, Vice Chancellor, Universiti Putra Malaysia <i>Rafflesia Ballroom</i>				
0930	Keynote Address Prof. Dr. Nazimah Hamid, Auckland University of Technology, New Zealand <i>Rafflesia Ballroom</i>				
1015	Tea and Coffee Break / Networking / Press Conference				
1030	Plenary 1: Prof. Dr. Soottawat Benjakul, Prince of Songkla University, Thailand Plenary 2: Dato' Dr. Ammar Abd. Ghapar, Ministry of Tourism, Arts and Culture, Malaysia Plenary 3: Prof. Emeritus Datuk Dr. Mad Nasir Shamsudin, Universiti Putra Malaysia <i>Rafflesia Ballroom</i>				
1230	Lunch talk by Malaysian Palm Oil Council (MPOC) <i>Rafflesia Ballroom</i>				
1300	Lunch / Poster Viewing / Booth Exhibition / Networking				
1415	Concurrent Session 1 Food Analysis, Food Safety and Quality 1 <i>Rafflesia A</i>	Concurrent Session 2 Food Chemistry and Biochemistry <i>Rafflesia B</i>	Concurrent Session 3 Food Processing and Engineering 1 <i>Rafflesia C</i>	Concurrent Session 4 Food Heritage <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1555	Tea and Coffee Break / Poster Viewing / Booth Exhibition / Networking				
1610	Concurrent Session 5 Food Analysis, Food Safety and Quality 2 <i>Rafflesia A</i>	Concurrent Session 6 Nutrition and Functional Food 1 <i>Rafflesia B</i>	Concurrent Session 7 Novel and Green Technologies 1 <i>Rafflesia C</i>	Concurrent Session 8 Food Security and Sustainability <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1750	Poster Viewing / Booth Exhibition / Networking				
DAY TWO – August 8 th , 2024 (Thursday)					
0800	Registration / Poster Setup				
0830	Plenary 4: Dr. Tatiana Koutchma, Guelph Food Research and Development Centre, Canada Plenary 5: Dr. Jeyaletchumi Ponniah, National Centre of Food Safety, Ministry of Health, Malaysia Plenary 6: Dr. Carole Tonello-Samson, Hiperbaric S.A., Spain <i>Rafflesia Ballroom</i>				
1030	Tea and Coffee Break / Networking				
1045	Concurrent Session 9 Food Processing and Engineering 2 <i>Rafflesia A</i>	Concurrent Session 10 Novel and Green Technologies 2 <i>Rafflesia B</i>	Concurrent Session 11 Nutrition and Functional Food 2 <i>Rafflesia C</i>	Concurrent Session 12 Food Operations Management and Consumer Science <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1240	Lunch / Poster Viewing / Booth Exhibition / Networking				
1400	Concurrent Session 13 Food Analysis, Food Safety and Quality 3 <i>Rafflesia A</i>	Concurrent Session 14 Food Biotechnology <i>Rafflesia B</i>	Concurrent Session 15 Food Packaging and Shelf Life <i>Rafflesia C</i>	Concurrent Session 16 Food Service and Hospitality <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1625	Closing Address and Award Ceremony				
1700	Tea and Coffee Break				

CONFERENCE FLOOR PLAN



*Opening Ceremony, Concurrent Sessions, and Closing Ceremony will take place at the **Rafflesia Ballroom**.*

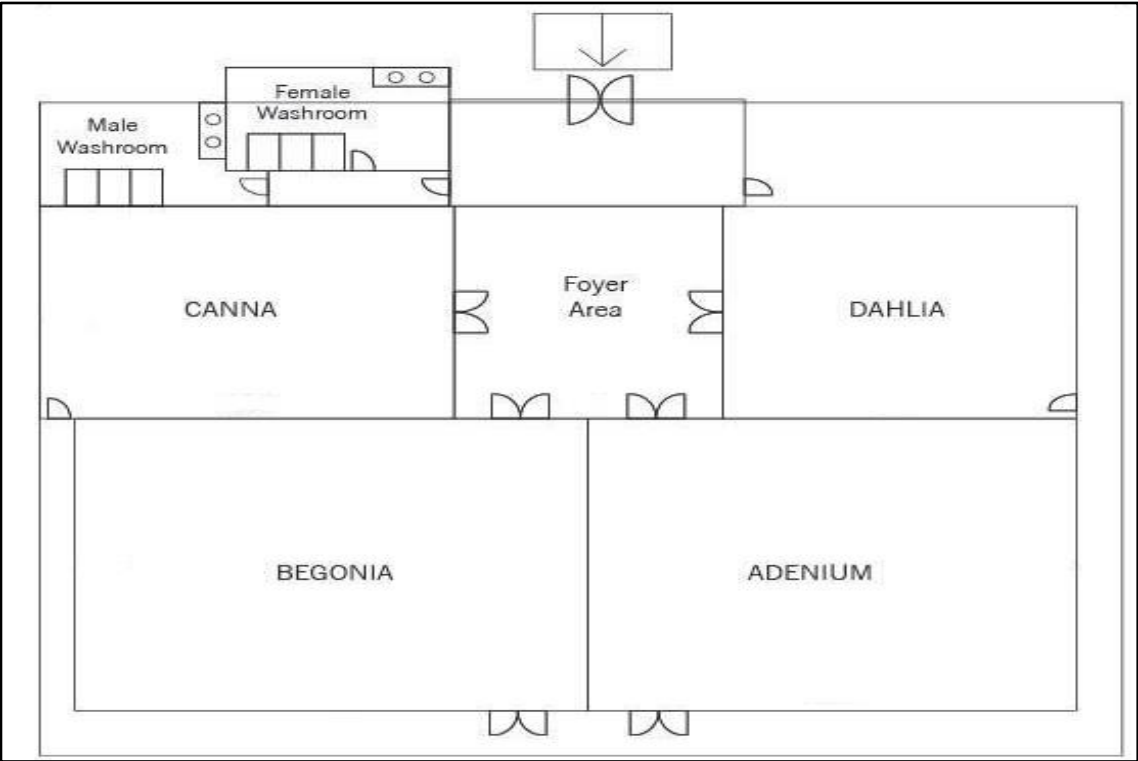
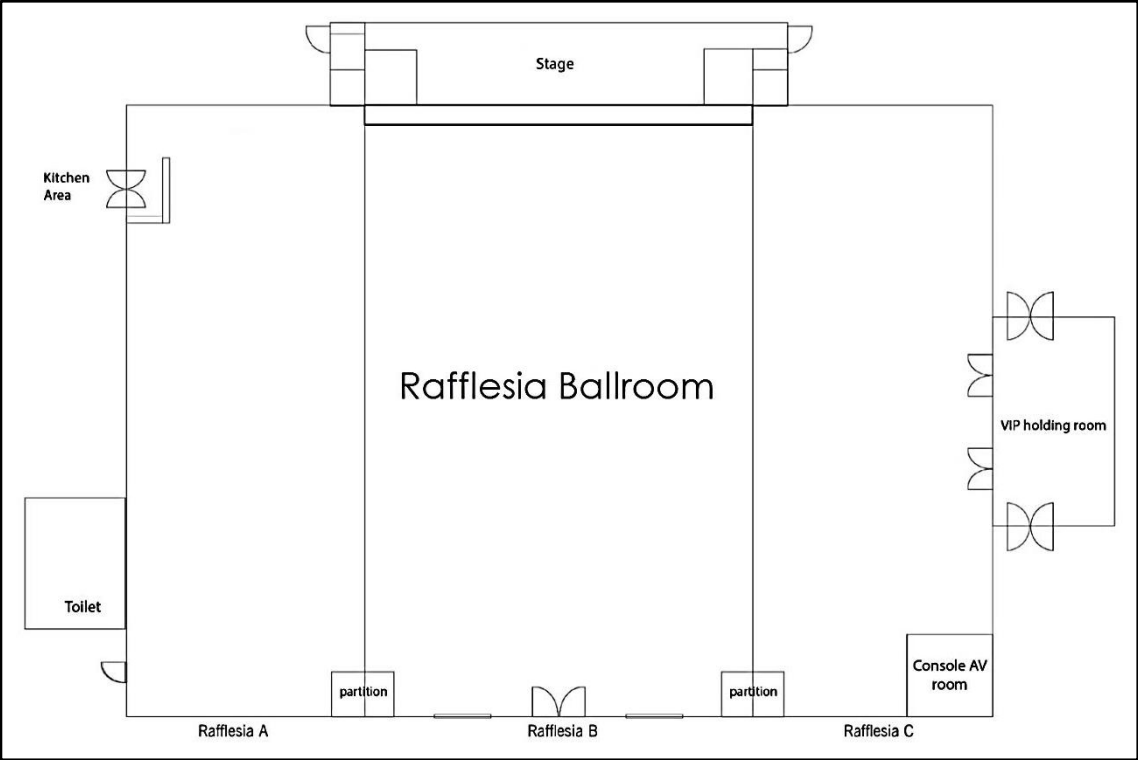
*Sponsor booths will be located at the **Adenium Function Room**.*

*Boards (physical posters) and projectors (virtual posters) will be located at the **Begonia Function Room**.*

*Mini oral presentation will take place at the **Canna Function Room**.*

***Dahlia Function Room** will serve as 3rd IFRC 2024 Operation Room for oral presenters to upload their presentation slides.*

*Lunch will be served at the **Palms Café**.*



INFORMATION FOR PRESENTERS

ORAL PRESENTER

- Presentation slides must be prepared in MS PowerPoint (MAC or PC).
- Please upload the slide at least one hour prior to your scheduled session time using the laptop provided at the designated concurrent session room.
- Please name your presentation slide based on your concurrent session number and sequence of presentation, for example, concurrent session 4 and presenter sequence 1, will be named as CS4_01.
- Please note that you will not be able to use your own laptop.
- You will be given a remote control to navigate your slides during your presentation.
- You are allocated 15 minutes for the presentation. The time allotted will be strictly observed.
- The timekeeper will ring the bell to signal the remaining time. The bell will ring as follows: once at the 10th minute, twice at 12th minute, thrice at 15th minute at which point you must end your presentation.
- Q&A session will be conducted at the end of each presentation.
- Sessions and venues are provided in this Programme Book, and also posted by the venues' entrance.
- Please refer to the 3rd IFRC 2024 Scientific Committee member at the designated concurrent session room for further assistance.
- All student oral presenters stand a chance to win the Oral Presenter Award.

POSTER PRESENTER

- Posters must be prepared using a standard size of A1 (594 × 841 mm) in portrait orientation only.
- Posters are allowed to be mounted on the exhibition boards at the designated area according to the presenters' poster themes and IDs.
- Posters must be displayed at least one hour prior to the poster session, and removed before 6.30 pm on the same day.
- Posters should be readable from a distance of five feet.
- The title and author(s) on the posters should match the accepted Abstract.
- All presentation must be delivered in English.
- The presence of the poster presenter is compulsory during the allocated poster judging schedule.
- Please refer to the 3rd IFRC 2024 Scientific Committee member at the poster exhibition area for further assistance.
- The poster exhibition area is Begonia Function Room, across the road from the Rafflesia Ballroom.
- All student poster presenters stand a chance to win the Poster Presenter Award.

PRE-CONFERENCE WORKSHOPS

DATE : August 6th, 2024 (Tuesday)
TIME : 0800 – 1300
VENUE : Faculty of Food Science and Technology, Universiti Putra Malaysia

TRAINERS AND TOPICS

AREA	TITLE	SPEAKER
Food Science	<i>Application of Flavour Analysis for Functional Food Development</i>	 PROF. DR. NAZIMAH HAMID Auckland University of Technology, NEW ZEALAND
Food Technology	<i>High-Pressure Processing (HPP) and High Pressure Thermal Processing (HPTP): Sustainable and Safe Food Preservation Techniques</i>	 DR. CAROLE TONELLO-SAMPSON Hiperbaric S.A., SPAIN &  DR. KAI KNOERZER Commonwealth Scientific and Industrial Research Organisation (CSIRO), AUSTRALIA
Food Service and Management	<i>Improving Productivity and Business Revenue: Where are the Business Opportunities and How to Manage your Operations</i>	 DR. BOO HUEY CHERN YTB Singapore Pte. Ltd., SINGAPORE

SPEAKER PROFILES

KEYNOTE SPEAKER



PROFESSOR DR. NAZIMAH HAMID

Deputy Head of School (School of Science)

Auckland University of Technology

NEW ZEALAND

Nazimah Hamid is a Professor of Food Science at Auckland University of Technology. She has nearly 30 years of research experience in Food Science. Her research encompasses how processing techniques can influence physical, chemical, and flavour qualities of food. Her expertise in sensory and flavour science uses a combination of sensory and instrumental flavour analysis to examine and predict the relationships between food composition, sensory perception, and flavour of a variety of processed and minimally processed foods. She has worked with a variety of foods - from sea urchin roe, black foot abalone, clams, apricots, and cherries in New Zealand, to durian and jackfruit in Malaysia, and earlier raspberries in Scotland. She also researches the role of auditory cues on flavour and the consumer perception of food.



PROFESSOR DR. SOOTTAWAT BENJAKUL

Director

International Centre of Excellence in Seafood Science and innovation (ICE-SSI)

Prince of Songkla University, Hat Yai

THAILAND

Soottawat Benjakul is a Professor of Food Science and Technology at the Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, Songkhla, Thailand. He received his PhD (Food Science and Technology) from Oregon State University, USA in 1997 under the support from the Fulbright Scholarship. After graduation, he joined the Department of Food Technology (PSU). He has focused his research on seafood science and technology. His major fields of interest are the seafood quality as well as the valorisation of fish processing by-products. He is interested in tackling the problem associated with seafood quality loss. He has currently focused his research on non-thermal processes and natural additives for shelf-life extension of seafood and products. Moreover, he has emphasised his research in the utilisation of seafood processing by-products via conversion to value-added products, especially functional ingredients or nutraceuticals. He established 'International Centre of Excellence in Seafood Science and Innovation (ICE-SSI) at PSU, where he has been the director since. This centre of excellence aims to strengthen the seafood research and extension in Thailand and southeast Asia.



DATO' DR. AMMAR ABD GHAPAR

Tourism Advisor to Secretary General for VM2026
Ministry of Tourism, Arts and Culture
MALAYSIA

36 years ago, Dato' Dr. Ammar Abd Ghapar joined Tourist Development Cooperation (TDC) now known as Tourism Malaysia as Tourism Officer, which paved his way into tourism industry which until 2019 has become the second largest foreign exchange earner for the national economy. Since then, he has developed his career and academic achievement by leaps and bounds, and has played a significant role in Malaysia tourism industry. Academically, he did his Diploma in Public Administration, Degree in Mass Communication (specialising in Public Relation), Master in Business Administration, and PhD in Hotel and Tourism Management. Throughout his service, he has served Tourism Malaysia Office in Osaka, Japan (1999-2005), Kedah/Perlis (2005-2007), and Moscow, Russia (2008-2010). His experience covers domestic tourism promotion, event management, research, strategic planning, finance, international marketing, and public relations. He was the head of judging committee for Malaysia Tourism Awards 2014-2015, and appointed as Head of The Main Committee for Malaysia Tourism Awards 2016-2017. He then again was appointed as the Head of Visit Malaysia 2020 before the campaign was called off in early 2020 due to the novel coronavirus (COVID-19) pandemic. In April 2023 he has been appointed as the Director General of Tourism Malaysia, and later on in March 2024 as the Advisor to the Secretary General of the Ministry of Tourism, Arts and Culture Malaysia on Visit Malaysia Year 2026.



**PROFESSOR EMERITUS DATUK DR. MAD NASIR
SHAMSUDIN, FASC**
Putra Business School, Universiti Putra Malaysia
MALAYSIA

Presently a Professor at Putra Business School and Professor Emeritus at the Department of Agribusiness and Bioresource Economics, Faculty of Agriculture, Universiti Putra Malaysia. He has taught and researched issues related to food security and agribusiness management, with recognition as a Fellow, Academy of Science Malaysia, and a member of the National Agriculture Advisory Council, Ministry of Agriculture and Food Security, and Deputy Vice Chancellor of Universiti Putra Malaysia. He has advised and evaluated several agricultural and food development projects in his home country of Malaysia as well as more broadly in the Asia Pacific region.

**DR. TATIANA KOUTCHMA**

Research Scientist

Agriculture and Agri-Food Canada, Guelph Research and Development Centre

CANADA

Dr. Tatiana Koutchma leads research in novel processing and food safety engineering. Previously, she has worked as a Research Associate Professor at the Illinois Institute of Technology, National Centre for Food Safety and Technology in Chicago, Illinois. Her activity focuses on the application of novel processing technologies to enhance microbial safety and functionality of foods and feeds, addresses issues of chemical safety including regulatory approvals, validation, and technology transfer. She initiates, directs and performs integrated fundamental and applied research, interacts extensively with international government agencies, and collaborates with industry and academia partners. She is an active promoter of novel food processing and science-based regulations to professional community. She is a Scientific Editor of Comprehensive Reviews in Food Science and Food Safety, Journal of Food Process Engineering, Food Science and Technology International, and Frontiers. She is a co-founder and co-chair of UV for Food Working Group of International UV Association (IUVA). She is the past Chair of Non-thermal Processing Division of Institute of Food Technologies (IFT), member of IFT leadership committee, and a former lead in food engineering track of Annual Meeting Scientific Program Advisory Panel (AMSPAP). She has authored and co-authored nine books, 14 book chapters, and more than 100 publications in peer reviewed and trade journals.



DR. JEYALETCHUMI PONNIAH

Deputy Director

Industrial Technology and Processing Division of the National
Centre for Food Safety, Ministry of Health

MALAYSIA

Dr. Jeyaletchumi Ponniah has a PhD in Food Safety Management from Universiti Putra Malaysia. She has 30 years of experience in the Food Safety and Quality Division of the Ministry of Health, Malaysia. She has worked at several states including Pahang, Selangor, and Sabah. She has also been involved as a lecturer and researcher at the Public Health Institute. With a great interest in research, she has made many presentations at National and International Scientific Conferences, and published many papers in national and international journals. Like many of her colleagues, she has been fortunate in receiving both her Bachelor and Master degrees from Universiti Pertanian Malaysia as it was then known before rebranded to Universiti Putra Malaysia, and is grateful for their excellence in the field of Food Science and Technology which has helped her a lot.



DR. CAROLE TONELLO SAMSON

Vice President of Business Development
Hiperbaric S.A.
SPAIN

Dr. Carole Tonello-Samson has been with Hiperbaric since 2003. The company is the world leader in designing, manufacturing, and marketing High Pressure Processing (HPP) industrial machines for food. She is also a member of the board of directors of the company. She has a PhD in food science on HPP microbiology. She has more than 30 years' experience in the HPP business, including research and development, and applications and sales. She is author or co-author of more than 20 scientific articles, and six book chapters on HPP and High Pressure Thermal Processing (HPTP). She is one of the co-inventors of two international patents related to HPP & HPTP. She is an active member of the Executive Committee of the Non-thermal Processing Division (NPD) of the Institute of Food Technology (IFT) for 17 years. She was the elected NPD Chair in 2012-2013.

Food Analysis, Food Safety, and Quality



ASSOC. PROF. DR. JORRY DHARMAWAN

Food, Chemical and Biotechnology cluster
Singapore Institute of Technology
SINGAPORE

Dr. Jorry is currently an Associate Professor at the Food, Chemical and Biotechnology (FCB) cluster, Singapore Institute of Technology (SIT), and teaching the Food Technology programme. He obtained his doctoral and bachelor's degrees in Food Science and Technology from the National University of Singapore (NUS). Prior to joining the SIT, Dr. Jorry had years of experience in food industry doing various roles, such as flavour analytical chemist, product safety and regulatory affairs manager for snacks, and technical application manager for dairy ingredients. His research interest includes product development for dysphagia and older population, flavour analysis and characterisation, as well as sensory evaluation.



DR. CHENGCHU (CATHERINE) LIU

Seafood Technology Specialist and Extension Professor College of Agriculture and Natural Resources
University of Maryland
USA

Dr. Liu is a tenured Seafood Technology Specialist and Extension Professor at University of Maryland College Park. She has 32 years' experience in seafood science and technology education, research, extension, and outreach service. Dr. Liu holds five patents, and has edited and co-edited nine books, co-authored 26 book chapters, published 88 peer-reviewed articles, and internationally presented 55 invited lectures. Her scientific achievements have earned invitations to influential international gatherings, such as the Joint FAO/WHO Expert Meeting on the Risk Assessment Tools for *Vibrio parahaemolyticus* and *V. vulnificus* in Seafoods, and Steering Committee of the UNESCO/IOC/WESPAC Project on Toxic Marine Organisms. Dr. Liu is also active in many professional organisations. She is a Fellow of the Institute of Food Technologist (IFT), Fellow of the International Academy of Food Science and Technology (IAFoST), President of the Chinese American Food Society, Board Director of the IFT-Maryland Section, Past Chair of the IFT Aquatic Food Products Division, and lifetime member of Phi Tau Sigma.

**PROF. DR. IRWANDI JASWIR**

International Institute for Halal Research and Training (InHART)
and Deputy Dean of Research Management Centre, International
Islamic University

MALAYSIA

Prof. Irwandi was awarded the prestigious 2018 King Faisal International Prize in Service to Islam by the King Faisal Foundation in Saudi Arabia. Renowned as a "Halal" Scientist, he has significantly contributed to the advancement of Muslim society through his extensive research on halal-related issues. Prof. Irwandi has conducted over 50 research studies, primarily focusing on halal food science. His research includes determining non-halal substances in food using FTIR, developing halal gelatine from various alternative sources, creating halal nanoparticles from camel gelatine (funded by Saudi Arabia), and designing a portable electronic nose for rapid detection of lard and alcohol in foods and beverages. His work is supported by various funding agencies such as Malaysia's Ministry of Education (MOE) and the Ministry of Science, Technology and Innovation (MOSTI), as well as the National Plans for Science and Technology (NPST) in Saudi Arabia. Prof. Irwandi has also secured research grants from Korea, Indonesia, Italy, and Japan. He has published over 250 scientific papers in reputable international journals, authored six books, contributed to 50 book chapters, and presented over 500 research papers at international conferences, including keynote addresses and invited lectures. His dedication to research has earned him nine patents and more than 60 scientific awards, including the 2010 Asia Pacific Young Scientist Award by Scopus. He serves on the Foundational Board of the Halal Centre at the Saudi Food and Drug Authority (SFDA), and consults on various halal industry projects funded by the Jeddah-based Islamic Development Bank.

**MR. GOH TOH SIN**

General Manager and Marketing Manager
Easy Pack Machinery Sdn. Bhd., Penang Science Park
Penang

MALAYSIA

Easy Pack Machinery is a leading provider of robotic and automated food processing and packaging machinery. The company specialises in the design, customisation, fabrication, integration, and automation of production lines for food manufacturing and processing companies. In his dual role, Mr. Goh manages the sales of the company's automation and robotic solutions, ensuring seamless operations and client satisfaction. Additionally, he serves as the primary liaison between Easy Pack Machinery and various government agencies, including MiGHT, the Northern Corridor Implementation Authority (NCIA), and SIRIM Berhad. His efforts focus on assisting Malaysian food manufacturers and entrepreneurs in adapting to advancements in science and technology, thereby enhancing their production capabilities and market competitiveness.



PROF. DR. NAZAMID SAARI

Faculty of Food Science and Technology
Universiti Putra Malaysia
MALAYSIA

Prof. Nazamid obtained his Bachelor's degree in Food Science and Technology from UPM, followed by a MSc in Food Biochemistry from Saga University, Japan, and PhD in Food Science with a specialisation in food enzymology from Kagoshima University, Japan. Throughout his tenure at UPM, he has held several strategic positions, including Deputy Vice-Chancellor of Research and Innovation and Dean of the Faculty. Prof. Nazamid's expertise encompasses food biotechnology and enzymology, food protein chemistry and technology, and functional food design. His scholarly contributions are substantial, with a Scopus *h*-Index of 51, indicating significant impact in his field. His ongoing research endeavours include the production of novel meat analogues from plant-based proteins and mycoproteins, the valorisation of local plant protein sources for plant-based food applications, and the enhancement of mushroom meaty flavours through chemical and physical techniques for use in plant-based meat products. He holds nine intellectual properties, including one notable for functional dairy-based food with anti-hypertension and microbiome modulation properties. As a country representative to the SEAMEO SEARCA Governing Board Meeting, Prof. Nazamid actively collaborates with the food industry, leveraging his extensive expertise to advance innovation and development in food science.



DR. SEETHA JAGANATHAN KING

Director
Agro-Biotechnology Institute
MALAYSIA

Dr. Seetha holds a BSc in Industrial Biotechnology with a focus on Medical Microbiology from Universiti Industri Selangor, and an MSc and PhD in Molecular Biology from Universiti Putra Malaysia. At the Agro-Biotechnology Institute, she oversees R&D operations within the National Institutes of Biotechnology Malaysia, under the Ministry of Science, Technology and Innovation. Leading a team of 20 researchers, Dr. Seetha ensures that research aligns with the National Biotechnology Policy, the 12th Malaysia Plan, and the Sustainable Development Goals. In 2011, Dr. Seetha was named Woman BioInnovator of The Year for her invention, "A Method for Differentiating Wild-Type vs. Vaccine-Type Microbial Strains (DIVA Assay)." She also received a Gold Award at the Pacific Rim Summit on Industrial Biotechnology and Bioenergy, and BioMalaysia for the same invention, and a Bronze Award at the World Innovation Forum (WIF) and BioMalaysia in 2012 for "A Universal Polymerase Chain Reaction." Her latest projects under the 12th Malaysia Plan include the development of vertical farming for medicinal plants to

explore their bioactive compounds as functional food to address food security issues, and the establishment of a BSL3 for the Zoonosis Anticipation and Preparedness Initiative to study potential zoonotic spillover in livestock affecting the agricultural ecosystem.

Food Chemistry and Biochemistry



ASSOC. PROF. DR. GAN CHEE YUEN

Deputy Director
Analytical Biochemistry Research Centre
Universiti Sains Malaysia
MALAYSIA

Dr. Gan is a distinguished figure in the field of food chemistry, renowned for his transformative impact in research, education, outreach, and leadership. With over hundreds of publications and high citations, he is a trailblazer in polysaccharide and peptide chemistry, fostering global collaborations and innovative products that have earned accolades and industry partnerships. Dr. Gan's roles as a visiting professor in China and India showcase his international influence, while his certification as a food analyst highlights his commitment to public health. Dr. Gan's leadership as Deputy Director of Analytical Biochemistry Research Centre at Universiti Sains Malaysia has been instrumental in its growth and prominence. Recognized as a World Top 2% Researcher by Stanford University in 2023, Dr. Gan's dedication to advancing science makes him an invaluable asset to the research field worldwide.



DR. XUANXUAN LU

Associate Research Fellow and Graduate Supervisor
Department of Food Science and Engineering
Jinan University
CHINA

Dr. Lu received her PhD in Food Science from Rutgers, The State University of New Jersey, US. Her main research interest is developing efficient delivery systems for various bioactive compounds to improve their stability, delivery efficiency, *etc.* She has published more than 30 SCI papers with 3 ESI papers and a total of over 2,000 citations in top SCI journals like Advanced Science, Cancer Research and Food Hydrocolloids. Her research has been reported by more than 40 media from over ten countries. She also served as a Guest Editor for SCI journal Frontiers in Nutrition, Foods, and Polymers.



PROF. DR. SHAHRIM AB KARIM

Faculty of Food Science and Technology
Universiti Putra Malaysia
MALAYSIA

Prof. Shahrir is a distinguished figure in the realm of Malaysian Heritage Food and Culture. With a passion for Malaysian culinary traditions, he has played a pivotal role in advancing the recognition and global dissemination of Malaysia's rich heritage cuisines. 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. Prof. Shahrir 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 cuisines, with a particular emphasis on traditional culinary delights. Prof. Shahrir maintains a diverse range of research interests, encompassing 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.



CHEF JOHARI EDRUS

Adjunct Professor
Faculty of Food Science and Technology
Universiti Putra Malaysia
MALAYSIA

Chef Johari Edrus holds a Diploma in Chef Training from ITM Shah Alam, and has furthered his education in food and beverage management through courses at the American Hotel and Motel Association and Cornell University, US. With a career spanning over 49 years, he has worked in various prestigious organisations worldwide, including Crown Plaza Shanghai, Holiday Inn Shanghai, Penang Mutiara Beach Resort, Hilton Petaling Jaya, and Hotel Royal in Geneva, among others. He has held significant positions such as Deputy Executive Manager of the Food and Beverage Division, Executive Chef, and Senior Executive Chef. Chef Johari is a regular juror on the reality show MasterChef Malaysia, and previously served as General Manager of SMTC Highway Mart Sendirian Berhad and Assistant Director of Food and Beverage Management at Tradewinds Corporation Berhad. He was also General Manager of Research and Development at Ayamas Restaurant and Retail. As a former President of the Malaysian Chef Association and a member of the Confrérie de la Chaîne des Rôtisseurs, he received the 'Craftsmanship' award from the Catering Institute of Australia. He has held academic titles such as Adjunct Fellow at Universiti

Utara Malaysia, and Adjunct Professor at Universiti Malaysia Kelantan and Universiti Putra Malaysia. Renowned as an expert consultant in the international hospitality industry, Chef Johari combines corporate expertise with culinary artistry.

Food Operation Managements and Consumer Science



DATO' INDRANI THURAISSINGHAM

Vice President and Legal Advisor
Federation of Malaysian Consumers Associations
MALAYSIA

Apart from being FOMCA's Vice President and Legal Advisor, Dato' Indrani is also the CEO of the National Consumer Complaints Centre. With a legal background and an MBA, she has been a dedicated consumer advocate for 29 years. She previously served as the Head of the Office for Consumers International (CI) in the Asia Pacific region, leading over 60 member organisations. Dato' Indrani is an expert on consumer rights, having written and spoken extensively on topics such as human rights, product safety, sustainable lifestyles, food security, financial services, e-commerce, health, and nutrition. She is skilled in stakeholder management, engaging with donors, politicians, policymakers, industry players, and community leaders. Her strategic global networking with civil society and international organisations further underscores her influence. In 2011, she led the development of the ASEAN Roadmap for capacity-building on consumer protection, and has contributed to key ASEAN publications like the ASEAN Handbook on Consumer Protection Laws and Regulations and the ASEAN Toolkit on Sustainable Consumption. Her consultancy work includes projects for the ASEAN Secretariat and GIZ-ASEAN. Based in Kuala Lumpur, Dato' Indrani maintains a vast network of consumer advocates across the Asia Pacific and Middle East regions, reflecting her extensive experience and commitment to consumer protection.



DR. HUEY CHERN BOO

Executive Director
YTB (Singapore) Pte. Ltd.
SINGAPORE

Dr. Boo holds a Master's degree in Restaurant, Hotel, Institutional and Tourism Management from Purdue University, US and a PhD in Hospitality Management from Pennsylvania State University, US. Before joining YTB, she worked at higher education institutions in Singapore and Malaysia. She taught Revenue Management, Hotel Project Management, Operations Management, and Change Management. Dr. Boo had previously worked with many hospitality industry partners including IHG, Pan Pacific Hotel, Hotel Andaz, Furama Riverfront Hotel, Association of Singapore Attractions, Majlis Ugama Islam Singapura (MUIS), PTS Impression Sdn. Bhd., and Sushi King Sdn. Bhd.



DR. PRAMOD V. MAHAJAN

Group Leader and Lead Scientist

Leibniz Institute for Agricultural Engineering and Bioeconomy,
Potsdam

GERMANY

Dr. Mahajan is a well-known expert in the field of horticultural engineering. He has a strong academic background in Postharvest and Food Process Engineering. Over the years, Dr. Mahajan has held a number of respected positions in research and academia in countries like Germany, Denmark, France, and Ireland. His positions have ranged from senior researcher and visiting scientist to research fellow and college lecturer. Dr. Mahajan has been a productive contributor to his field, securing multiple research funds, supervising PhD and MSc students, and hosting international conferences. His cognitive accomplishments are further shown by his notable papers in postharvest and process engineering, with 130 peer-reviewed papers and a Scopus *h*-Index of 33.



MR. ABDUL RAZAK JAHURY

Consultant

Packaging and Security Design Centre
SIRIM Berhad

MALAYSIA

Mr. Abdul Razak holds a BSc in Industrial Science from Northeast Missouri State University (now Truman State University), US and an MSc in Engineering Manufacturing and Management from Coventry University, UK. Since joining SIRIM Berhad in 2004, he has coordinated various programs, including the incubator and entrepreneurship initiatives, and conducted due diligence on tsunami-affected small industries in Sri Lanka for UNDP in 2005. Mr. Abdul Razak played a key role in the 'Third Country Training Programme (TCTP): SME Development for African Countries' in 2006 and 2007. He also contributed to the SME Outreach Programme in Sri Lanka while SIRIM Berhad was the secretariat of the World Association of Industrial and Technological Research Organizations (WAITRO). His expertise extends to technology commercialisation, where he evaluated and prepared technologies developed by SIRIM's researchers for commercialisation. At PSDC, he focuses on packaging development projects, and serves as a trainer in branding, packaging, and security printing. Mr. Abdul Razak has extensive experience in assisting entrepreneurs with packaging development through consultation and guidance.



PROF. TS. DR. ANIS SHOBIRIN MEOR HUSSIN

Dean

Faculty of Food Science and Technology

Universiti Putra Malaysia

MALAYSIA

Prof. Anis is a skilled professional in the field of food technology and biotechnology. She holds a PhD in Biotechnology Engineering from the International Islamic University, and has over 16 years of experience researching the microbial technology that interests her. Her focus is on developing and characterising fermented food products using functional food ingredients from plants that ensure the safety and quality of food. She has supervised 4 PhD and 6 MSc students, and is currently supervising 5 PhD students. She has also examined more than 30 PhD theses. With a Scopus *h*-Index of 23, Prof. Anis has published nearly 100 articles in indexed and 22 in non-indexed citation journals. Her expertise and contributions to food technology have been widely recognised and appreciated.



PROF. DR. CHIN-PING TAN

Faculty of Food Science and Technology

Universiti Putra Malaysia

MALAYSIA

Prof. Tan leads the Fats and Oils Technology research program at UPM. His research specialisations include palm oil, food nanotechnology, food emulsions, microencapsulation, the extraction of bioactive compounds from agricultural by-products, and HPP treatment of tropical fruits. He has published over 500 scientific articles, 15 book chapters, and one joint-edited book. With more than 20 patents and 350 conference presentations, Prof. Tan has earned over 40 national and international research awards, including the 2010 ProSPER.Net Scopus Young Scientist Award, and recognition as one of Malaysia's Top Research Scientists by ASM in 2013. An ASM Fellow since 2019, he is also among the top three ASEAN scientists listed in the Top 1% authors for the ESI by Clarivate Analytics. Since 2011, he has served as a Distinguished/Visiting Professor at various Asian universities.



PROF. DR. GLENN B. GREGORIO

Director, SEAMEO SEARCA; Professor, College of Agriculture and Food Science, UPLB; Academician, National Academy of Science and Technology (NAST)

PHILIPPINES

Prof. Gregorio's career was developed at International Rice Research Institute (IRRI) as Geneticist and Senior Plant Breeder for 29 years. He had a 3-year stint as crop breeding manager at East West Seed Company. He is a co-Founder and President of an agri-research start-up company. He has authored over 120 publications, and received several prestigious awards, including the Outstanding Young Scientist (OYS) award and The Outstanding Young Men of the Philippines (TOYM) award in 2004. He was conferred the title of Academician by the National Academy of Science and Technology Philippines, and honoured as a United Nations Food Systems Summit (UNFSS) Champion. In 2022, he was recognised as the University of the Philippines' Most Distinguished Alumnus. Recently, he was acknowledged as one of the world's top 2% researchers across all disciplines in 2023, based on his published work.



ASSOC. PROF. DR. KHANITTA RUTTARATTANAMONGKOL

Faculty of Agriculture Natural Resources and Environment, Naresuan University

THAILAND

Dr. Ruttarattanamongkol is an accomplished food process engineering professional with a strong background in academic research and industry consulting. As the Chief Technology Officer at Thai Ento Food Co., Ltd. and a lecturer/researcher at Naresuan University, she specialises in innovative food science, emerging technologies, and the development of value added products for global markets. Her expertise lies in the physical and engineering properties of foods, extrusion technology, protein texturisation, and the creation of novel food products from alternative protein sources. Dr. Ruttarattanamongkol earned her PhD in Food Science and Technology with a focus on Food Engineering from Cornell University, US. She has successfully collaborated with international universities and private companies on numerous projects. With her extensive experience in research, project management, and commercial product development, Dr. Ruttarattanamongkol continues to make significant contributions to the field of food science and technology, driving innovation and sustainable solutions in the industry.



DR. EERANG PARK

Vice-Chancellor's Research Fellow
School of Business and Law
Edith Cowan University
AUSTRALIA

Dr. Park's research specialisation is in food tourism, focusing on the intricate relationships between food, travel, and society from diverse stakeholder perspectives. Her current research projects explore community-based tourism and food and gastronomy tourism, particularly within emerging Asian tourism contexts. Dr. Park has authored over 40 research publications in top-tier international tourism journals and high-impact journals within the tourism field. She has co-edited two recent books: "Handbook on Food Tourism" (Edward Elgar, 2024) and "Food Tourism in Asia" (Springer, 2019), the latter being the pioneering work on food and gastronomy tourism in Asia from a non-Western perspective. After completing her doctoral studies at the Hong Kong Polytechnic University, Dr. Park has held academic positions at universities in Australia, New Zealand, and the UK.



PROF. DR. HASHIM FADZIL ARIFFIN

Faculty of Hotel and Tourism Management
Universiti Teknologi MARA
MALAYSIA

Prof. Hashim has been an esteemed member of Universiti Teknologi MARA's Faculty of Hotel and Tourism Management since 1995. He holds a PhD in Business Strategy and Performance from Universiti Malaya. He earned a Master's degree in Hotel and Foodservice Management from Florida International University, US, and completed his Bachelor's degree in Human Resources Management and Diploma in Foodservice Management at Universiti Teknologi MARA. With additional certification in Tourist Guide from the Malaysian Ministry of Tourism, he brings extensive experience in food and beverage service, including prestigious events like the Royal Wedding of the Sultan of Brunei's daughter and the Langkawi International Maritime and Aerospace Exhibition. Prof. Hashim has been the consultant for various restaurants and catering organisations, and gained international exposure at JW Marriott Hotel, Kuala Lumpur, and as a guest satisfaction agent with Royal Caribbean Cruise Line and Miami Hilton, US. He was the General Manager of INTEKMA Resort and Convention Centre, Shah Alam. Currently, as Head of Centre for Hotel and Tourism Management Studies at Universiti Teknologi MARA Pulau Pinang, he shares his expertise through training on business development, event management, social etiquette, customer service, and team building.



DR. KAI KNOERZER

Principal Research Scientist
Commonwealth Scientific and Industrial Research Organisation
(CSIRO)
AUSTRALIA

Dr. Knoerzer is a food process engineer with a BSc in Process Engineering, MSc in Chemical Engineering, and a PhD (*summa cum laude*) in Food Process Engineering from Karlsruhe Institute of Technology, Germany. His postdoctoral career started in 2006 with Food Science Australia, a joint venture between CSIRO and the Victorian Government, leading to his role as a Principal Research Scientist in CSIRO Agriculture and Food. Dr. Knoerzer specialises in innovative food processing technologies, including high-pressure thermal processing, ultrasonics/megasonics, and advanced extrusion. His scholarly contributions include over 100 peer-reviewed papers, conference proceedings, book chapters, seven patents, and more than 150 national and international conference presentations. He has edited five books, and is the Editor-in-Chief for “Innovative Food Processing Technologies – A Comprehensive Review.” His work also encompasses artificial neural networks and AI, heading the AI strategy for CSIRO’s Food Program. Dr. Knoerzer’s involvement in the International Division of IFT and various international awards highlight his significant impact on food science and technology.



ASSOC. PROF. TS. DR. NORANIZAN MOHD ADZAHAN

Faculty of Food Science and Technology
Universiti Putra Malaysia
MALAYSIA

Dr. Noranizan Mohd Adzahan is a distinguished member of the Department of Food Technology at Universiti Putra Malaysia (UPM), where she formerly served as Deputy Dean of the Faculty of Food Science and Technology. Her research focuses on the exploration and application of nonthermal processing technologies for fruits and vegetables. Her work encompasses various nonthermal methods, including ultraviolet light, food irradiation, pulsed light, ultrasonication, and high-pressure processing. Dr. Noranizan is dedicated to advancing innovation and technopreneurship within the food industry. She holds the position of Member-at-Large within the Nonthermal Processing Division of the Institute of Food Technologists, where she contributes to promoting the practical applications of nonthermal processes. She is actively involved in mentorship initiatives across Southeast Asia, sharing her expertise with students and technopreneurs to foster the development of marketable products that meet industry demands. Her commitment extends beyond academia and professional practice to supporting sustainable food production. She is a strong advocate for clean label food production practices and the valorisation of food waste, both of which are central themes in her ongoing research. Dr.

Noranizan's contributions to these areas demonstrate her dedication to fostering sustainable innovation in the food industry.

Nutrition and Functional Food



PROF. DR. FAROOQ ANWAR

Research Fellow
Faculty of Food Science and Technology
Universiti Putra Malaysia
MALAYSIA

Prof. Anwar has over 23 years of extensive research and teaching experience at both national and international levels. He has served as Director of the Office of Research, Innovation, and Commercialisation (ORIC), and Director of the Institute of Chemistry at the University of Sargodha, Pakistan. Prof. Anwar has supervised 14 PhD and 74 MPhil research students, and has published over 250 impact factor papers, garnering 32,400 citations on Google Scholar (*h*-Index 90), 14,700 citations on Scopus (*h*-Index 71), and 25,000 citations on ResearchGate (*h*-Index 84). He has also contributed 17 book chapters, and edited a book with foreign publishers. Recognised as a Productive Scientist of Pakistan, and a Fellow of the Chemical Society of Pakistan, Prof. Anwar has received several prestigious awards, including the Dr. Atta-ur-Rehman Gold Medal/Prize in Chemistry (2010) from the Pakistan Academy of Sciences, the TWAS Young Affiliate Fellowship (2009-2014) from TWAS, Italy, and the Research Excellence Award (2018) from Prince Sattam bin Abdul Aziz University, Saudi Arabia. Additionally, he is listed among the world's top 2% of scientists by Elsevier BV Stanford University, US. His exemplary contributions to the field of chemistry highlight his status as a leading scientist and academician.



PROF. DR. SUZANA SHAHAR

Dean

Faculty of Health Sciences

Universiti Kebangsaan Malaysia

MALAYSIA

Prof. Suzana is a distinguished Professor in Nutrition and Dietetics at the Healthy Aging and Wellness Research Centre, Faculty of Health Sciences, Universiti Kebangsaan Malaysia, as well as an Honorary Fellow of the Malaysian Dietitians' Association. She holds a BSc (Hons) in Dietetics from UKM, and an MMed Sci and PhD in Human Nutrition from the University of Sheffield, UK. Her research focuses on nutrition, wellness, and aging. Prof. Suzana has led significant projects, including the nationwide 'Neuroprotective Model for Healthy Longevity among Malaysian Elderly,' and a clinical trial to reverse cognitive frailty among older adults under the World Wide Finger Trial, both funded by the Ministry of Higher Education. She also spearheaded the Newton Impact Fund Scheme on Developing Salt Reduction Policy for Malaysia. She has filed patents for two formulations i.e. TP3in1 juice and *Cosmos caudatus* powder, aimed at improving oxidative stress and cognitive function in the aging population. With over 300 publications, Prof. Suzana contributes to various committees, including the International Research Networking on Dementia Prevention, WHO Working Guideline Committee on Risk Reduction of Cognitive Decline, and the Consortium on Longitudinal Study on Memory (COSMIC). She is the founder of the Centre for Healthy Aging and the Senior Citizen Centre (PAWE UKM) at UKM. Additionally, she collaborates with various industries and institutions such as Malaysian Biotropics Sdn. Bhd., Uno Nutrition, Mead Johnson, Alpro Pharmacy, Biosinergy, Sapura Kencana, MARDI and Perbadanan Putrajaya, as a consultant.

SCIENTIFIC PROGRAMME

FULL CONFERENCE PROGRAMME

TIME	PRE-CONFERENCE - August 6, 2024 (Tuesday)
0800 - 1300	Pre-Conference Workshops (Parallel Session): (1) Functional Food: Application of Flavour Analysis for Functional Food Development Speaker: Prof. Dr. Nazimah Hamid, Auckland University of Technology, New Zealand (2) High-pressure Processing (HPP) and High-pressure Thermal Processing (HPTP): Sustainable and Safe Food Preservation Techniques Speakers: 1. Dr. Carole Tonello Samson, Vice President of Business Development, Hiperbaric S.A., Spain 2. Dr. Kai Knoerzer, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia (3) Improving Productivity and Business Revenue: Where are the Business Opportunities and How to Manage your Operations Speaker: Dr. Boo Huey Chern, YTB (Singapore) Pte. Ltd., Singapore <i>Faculty of Food Science and Technology, UPM</i>
1400 - 1900	Poster and Booth Setup / Pre-Registration
	CONFERENCE DAY ONE – August 7, 2024 (Wednesday)
0800	Registration / Poster Setup
0900	Arrival of Guest of Honour
0900	Welcoming Address Prof. Dr. Tan Chin Ping, Chairman, 3rd IFRC 2024 <i>Rafflesia Ballroom</i>
0915	Opening Address Dato' Prof. Dr. Ahmad Farhan Mohd. Sadullah, Vice Chancellor, Universiti Putra Malaysia <i>Rafflesia Ballroom</i>
0930	Keynote Address Valorisation of Food Processing Waste into Valuable Functional Ingredients Prof. Dr. Nazimah Hamid, Auckland University of Technology, New Zealand <i>Rafflesia Ballroom</i>
1015	Tea and Coffee Break / Press Conference / Networking

1030	Plenary 1: Hydrolysed Collagen from Fish Skin: Process Development, Nutraceutical Properties, and Applications Prof. Dr. Soottawat Benjakul, Prince of Songkla University, Thailand				
1100	Plenary 2: Promoting Malaysia's Tourism Through Food Tourism, and Its Relationship to a Sustainable Food Industry through Technology and Innovation Dato' Dr. Ammar Abd. Ghapar, Ministry of Tourism, Arts and Culture, Malaysia				
1130	Plenary 3: Food Security: Supply, Demand, and Sustainability Prof. Emeritus Datuk Dr. Mad Nasir Shamsudin, Universiti Putra Malaysia				
1200	Q&A session Chairperson: Prof. Emeritus Dr. Jinap Selamat <i>Rafflesia Ballroom</i>				
1230	Lunch talk by Malaysian Palm Oil Council Mr. Abdullah Zawawi Mohamed, Head of Robotic and Product Development, SD Guthrie Berhad, Malaysia				
1300	Lunch / Poster Viewing / Booth Exhibition / Networking				
1415	Concurrent Session 1 Food Analysis, and Food Safety and Quality 1 (FASQ 1) Chairperson: Assoc. Prof. Dr. Nor Khaizura Mahmud @ Ab Rashid <i>Rafflesia A</i>	Concurrent Session 2 Food Chemistry and Biochemistry (FCB) Chairperson: Prof. Dr. Faridah Abas <i>Rafflesia B</i>	Concurrent Session 3 Food Processing and Engineering 1 (FPE 1) Chairperson: Assoc. Prof. Dr. Ismail Fitry Mohammad Rashedi <i>Rafflesia C</i>	Concurrent Session 4 Food Heritage (FH) Chairperson: Dr. Ahmad Fareed Ismail <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1415	IL FASQ 1 Swallowing Solutions: Harnessing the Role of Hydrocolloids in Texture-Modified Foods Invited Speaker: Assoc. Prof. Dr. Jorry Dharmawan (Singapore Institute of Technology, Singapore)	IL FCB 1 Insights into Food Peptide Properties and their Amino Acid Contributions in α -Amylase Inhibition Invited Speaker: Assoc. Prof. Dr. Gan Chee Yuen (Universiti Sains Malaysia)	IL FPE 1 Exploration of Lacto-Fermentation for the Potential of Fungal Inhibitors for Preserving Fruit Invited Speaker: Prof. Ts. Dr. Anis Shobirin Meor Husin (Universiti Putra Malaysia)	IL FH 1 Preserving the Taste of Traditions: The Malay Kuih in Mersing's Culinary Heritage Landscape Invited Speaker: Prof. Dr. Muhammad Shahrir Abdul Karim (Universiti Putra Malaysia)	Poster Session
1435	IFRC 2024: 079-163 Biodegradation of Aflatoxin B1 by Bacterial Isolates from Insect Gut and Fermented Foods Prof. Rethinasamy Velazhahan	IL FCB 2 Biomass Material Based Bioactives Delivery System Invited Speaker: Assoc. Prof. Dr. Xuanxuan Lu	IFRC 2024: 088-066 Synergism of Basil Seed Gum with Xanthan Gum and Locust Bean Gum on Physical Properties and Stability of Low-fat Mayonnaise	IL FH 2 Integrating the Rich Tapestry of Traditional Cuisines and Food Practices with Modern Sustainability Goals and Technological	

		<i>(Jinan University, China)</i>	<i>Dr. Nor Hayati Ibrahim</i>	Advancements Invited Speaker: Chef Johari Edrus (Universiti Putra Malaysia) IFRC 2024: 030-017	
1455	IFRC 2024: 174-157 Fermented <i>Cleome gynandra</i> : Unveiling its Antioxidants, Mineral Release and Cytotoxicity Dr. Siti Azima Abdul Muttalib	IFRC 2024: 005-003 Assessment of Calcium and Iron levels in Selected Fruits and Vegetables Consumed in Kano State, Nigeria Aminu Usman Sambo	IFRC 2024: 141-123 Immobilization of Lipase for Production of Diacylglycerols- Enriched Oil by Glycerolysis of Flaxseed Oil Prof. Dr. Yong Wang	Edible Landscape R(Evolution): Navigating Food Heritage and Embracing New Trends in Urban and Rural Planning for Sustainable Futures Agnieszka Jaszcak IFRC 2024: 264-251	
1510	IFRC 2024: 121-101 Development of Functional Mesoporous Nanomaterial for the Selective and Sensitive Determination of Biogenic Amines and Alkylphenols in Meat and Milk Hangzhen Lan	IFRC 2024: 037-025 Effect of pH, Temperature and Milk to Protein Ratio on the Clotting Properties of <i>Moringa</i> <i>oleifera</i> Seed Kernel Protein as Milk Coagulant Nur Atikah Muhammad	IFRC 2024: 127-164 Key Technologies for Developing Characteristic Functional Lactic Acid Bacteria Prof. Dr. Xiaoqun Zeng	A Comparative Analysis of Sensory, Chemical, and Microbiological Characteristics of Heritage "Dadih" Food across Different Regions in West Sumatra, Indonesia Nur Ahmad Habibi	
1525	IFRC 2024: 045-029 Design and Development of RFID-based Sensor for Food Packaging Wan Nur Fadhlina Syamimi Wan Azman	IFRC 2024: 078-057 The Physicochemical Properties and Consumer Preferences of Three Popular Durian Varieties Cultivated in Pahang Lim Soo Chin	IFRC 2024: 135-111 Physicochemical Properties of Wet Noodles Made from Composite Flour Blend of Sorghum, Modified Cassava (Mocaf), and Wheat Flours Eni Purwani	IFRC 2024: 296-273 Elucidating the Creative Intergration of Local Herbs in Modern Malaysian Cuisine: A Culinary Exposé Dr. Muhammad Rezza Zainal Abidin	
1540	IFRC 2024: 013-039 Effect of Different Composition of Coconut Milk and Prolong Processing of Beef Rendang on Oxidation Reaction of Lipid and Protein Siti Nabilah Karim	IFRC 2024: 130-106 Physicochemical Characteristics of Nata De Cassava with Variations in Fermentation and Concentration of Mung Bean Sprout Extract (<i>Vigna radiata</i>) as a Source of Protein Aan Sofyan	IFRC 2024: 281-266 Effect of Drying Temperature on the Physicochemical and Functional Properties of Immature Melon Manis Terengganu (MMT) Che Ku Nur Ain Mardhiah Che Ku Azman	IFRC 2024: 123-104 Integrating Local Culinary Heritage as part of Malaysia's Tourism Experiences: Content Analysis of Tourism Policies and Marketing Strategies Malisa Sahila Abdul Manap	

1555	Tea and Coffee Break / Poster Viewing / Booth Exhibition / Networking				
1610	Concurrent Session 5 Food Analysis, and Food Safety and Quality 2 (FASQ 2) Chairperson: Assoc. Prof. Dr. Maimunah Sanny <i>Rafflesia A</i>	Concurrent Session 6 Nutrition and Functional Food 1 (NFF 1) Chairperson: Prof. Dr. Roselina Karim <i>Rafflesia B</i>	Concurrent Session 7 Novel and Green Technologies 1 (NGT 1) Chairperson: Assoc. Prof. Dr. Noranizan Adzahan <i>Rafflesia C</i>	Concurrent Session 8 Food Security and Sustainability (FSS) Chairperson: Assoc. Prof. Dr. Nik Iskandar Putra Samsudin <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1610	IL FASQ 2 Effects of High Pressure Processing Technology on Shelf Life and Consumer Acceptability of Precooked Blue Crab Meat Invited Speaker: Dr. Catherine Liu <i>(University of Maryland, USA)</i>	IL NFF 1 Green Extraction of Functional Food Ingredients from Selected fruits and Agro-Wastes Invited Speaker: Prof. Dr. Farooq Anwar <i>(University of Sargodha, Pakistan)</i>	IL NGT 1 Engineering Advances - High Pressure Thermal Processing Invited Speaker: Dr. Kai Knoerzer <i>(Commonwealth Scientific and Industrial Research Organisation, CSIRO, Australia)</i>	IL FSS 1 Transforming the Landscape of Agricultural Research and Development in Higher Education Institutions: A New Chapter of Innovation and Resilience Invited Speaker: Prof. Dr. Glenn B. Gregorio <i>(SEARCA, Philippines)</i>	Poster Session
1630	IFRC 2024: 002-166 Reduction of Aflatoxin M1 (AFM1) in Buffalo Milk Yoghurt as Affected by Fat Percentage, Starter Culture and Processing Parameters Assoc. Prof. Dr. Rashidah Sukor	IFRC 2024: 167-151 Effect of Swiftlet Nest and Bioactive Swiftlet Nest as Potential Carbon Substrates for the Growth of Probiotic Bacteria Prof. Dr. Abdul Salam Babji	IFRC 2024: 049-032 Development of Microwave Heating Technology for Drying of Agricultural Products at Walailak University Dr. Mudtorlep Nisoa	IL FSS 2 Harnessing the Potential of Edible Insects: Novel Ingredients for Industrial Applications Invited Speaker: Dr. Khanitta Ruttarattanamongkol <i>(Naresuan University, Thailand)</i>	
1650	IFRC 2024: 179-162 FUnveilingermencin B2: A Novel Antibacterial Agent for Targeted Inhibition of <i>Staphylococcus aureus</i> Dr. Maolin Tu	IFRC 2024: 143-120 Investigating the Potential of Black Pepper as a Nutraceutical Agent for Diabetes Management Dr. Khew Choy Yuen	IFRC 2024: 162-156 Impacts of Cold Plasma Treated Chickpea Protein on the Rheological and Quality Properties of Allergen-free Muffins Dr. Lihui Du	IFRC 2024: 080-058 Developing a Roadmap for a Sustainable Urban Food System in Semarang, Indonesia Prof. Dr. Budi Widianarko	
1705	IFRC 2024: 228-218	IFRC 2024: 053-192	IFRC 2024: 065-049	IFRC 2024: 255-240	

	Detection of Soybean Adulteration Using HSV-Based Color Analysis with Artificial Neural Networks Farid R. Abadi	Disaccharides Lyoprotection Improved Physicochemical Stability and Bioactivities of Liposome Microparticles Loaded with Stone Fish-Derived Bifunctional Peptides Dr. Shehu Muhammad Auwal	Exploring the Potential of Natural Deep Eutectic Solvent (NADES) on Simultaneous Extraction of Phenolic Compounds and Carotenoids Qi Qi Koh	Sustainable Palm Oil and Its Fractions in Commercial Plant-Based Meat Analogues: Applications, Physicochemical Properties, and Challenges Dr. Hazrati Wazir	
1720	IFRC 2024: 223-212 A Bibliometric Analysis of Utilizing Infrared Spectroscopy Technology in Enhancing the Quality of Cocoa through the Use of Vosviewer Riana Listanti	IFRC 2024: 125-148 Effects of GOS, LNB, LNT II and their Combination on the Gut Microbiota Composition, Intestinal Barrier, and Metabolites of Weaning Sprague-Dawley Rats Xinru Yang	IFRC 2024: 163-178 The Study on Preparation, Modification, and Adsorption Characteristics of Algal Biochar for Efficient Removal of Phenanthrene from Aqueous Solutions Yuke Mo	IFRC 2024: 297-274 Sustainable Food Proteins and Peptides: Insights into Structure and Function Dr. Yu Fu	
1735	IFRC 2024: 210-202 Development of Appropriate QuEChERS Conditions for Efficient Determination of Multiple Mycotoxins in Processed Pork Products Jason Gica	IFRC 2024: 133-134 Identification, Screening and Taste Mechanisms Analysis of Two Novel Umami Pentapeptides Derived from Myosin Heavy Chain of Atlantic Cod (<i>Gadus morhua</i>) Qirui Liu	IFRC 2024: 116-096 Are we Ready for the Future Food? Group Discourse on the Intention to Consume Cultured Meat Firdaus Abd Hanan	IFRC 2024: 102-076 Unveiling the Challenges of Wastewater Reclamation in the Malaysian Food Industry: A Fuzzy Delphi Approach Nabiilah Mat Yusoff	
1750	Poster Viewing / Booth Exhibition / Networking				

TIME	CONFERENCE DAY TWO - August 8, 2024 (Thursday)				
0800	Registration/ Poster Setup/ Breakfast				
0830	Plenary 4: Food Processing: From Traditional Concepts to Current Challenges, Prospects and Recent Trends in Alternative Technologies Dr. Tatiana Koutchma, Guelph Food Research and Development Center, Canada				
0900	Plenary 5: Food Safety Research at National Centre for Food Safety Dr. P. Jeyaletchumi a/p S. Ponniah, National Centre of Food Safety, Ministry of Health Malaysia				
0930	Plenary 6: High Pressure Processing (HPP) for Sustainable and Innovative Food Products and Beverages Dr. Carole Tonello-Samson, Hiperbaric S.A., Spain				
1000	Q&A session Chairperson: Prof. Dr. Tan Chin Ping <i>Rafflesia Ballroom</i>				
1030	Tea and Coffee Break / Networking				
1045	Concurrent Session 9 Food Processing and Engineering 2 (FPE 2) Chairperson: Assoc. Prof. Dr. Radhiah Shukri <i>Rafflesia A</i>	Concurrent Session 10 Novel and Green Technologies 2 (NGT 2) Chairperson: Assoc. Prof. Dr. Norhayati Hussain <i>Rafflesia B</i>	Concurrent Session 11 Nutrition and Functional Food 2 (NFF 2) Chairperson: Assoc. Prof. Dr. Ahmad Faizal Abdull Razis <i>Rafflesia C</i>	Concurrent Session 12 Food Operations Management and Consumer Science (FOMCS) Chairperson: Assoc. Prof. Dr. Farah Adibah Che Ishak <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1045	IL FPE 2 Advances in Micro- and Nano-Structured Functional Lipids: From Preparation to Innovative Food Applications Invited Speaker: Prof. Dr. Tan Chin Ping (Universiti Putra Malaysia)	IL NGT 2 Leveraging Nonthermal Processes for Upcycling Food Waste: An Ultrasound Perspective Invited Speaker: Assoc. Prof. Ts. Dr. Noranizan Mohd Adzahan (Universiti Putra Malaysia)	IL NFF 2 Nutrition for Healthy Aging: Is There a Role for Functional Food? Invited Speaker: Prof. Dr. Suzana Shahar (Universiti Kebangsaan Malaysia)	IL FOMCS 1 Food Insecurity and Its Impact on Health Invited Speaker: Dato' Indrani Thuraisingham (ERA Consumer Malaysia and FOMCA Malaysia)	Poster Session
1105	IFRC 2024: 180-169 Lactic Acid Bacteria	IFRC 2024: 161-171 Preparation, Quality Evaluation	IFRC 2024: 262-246 Therapeutic Impact of Bitter	IL FOMCS 2 Application of Value Stream	

	Polysaccharides: Stress Condition, Bioactivity, Structural Modification and Applicability Dr. Yueqin Li	and Shelf Life Study of Spicy Cheese Spread using Black Pepper and Cumin Seeds Prof. Dr. Mian Anjum Murtaza	Gourd Seed Fortified Crackers on Alloxan-induced Diabetic Rats Assoc. Prof. Rana Muhammad Aadil	Mapping and Creative Matrix in Operations Management Invited Speaker: Dr. Boo Huey Chern (YTB (Singapore) Pte. Ltd., Singapore)	
1125	IFRC 2024: 170-181 Optimization of the Enzymatic Hydrolysis Process to Produce Functional Maltooligosaccharides from Purple Sweet Potato Var. <i>Ayamurasaki</i> Paste Prof. Dr. Elisa Julianti	IFRC 2024: 260-247 Single-Factor Analysis on the Efficacy of Water Electrolysis Ozone Treatment on Pesticide Residue Removal in Red Chilies (<i>Capsicum annuum</i> L.) Jacyntha Chuo Jiayi	IFRC 2024: 253-239 Development of Noodles Incorporated with Malaysian Green Seaweed <i>Caulerpa lentillifera</i> Dr. Patricia Matanjun	IFRC 2024: 097-149 Determining the Critical Components of a Smarter Food Safety Management System: a Delphi study Dr. Sarina Abdul Halim-Lim	
1140	IFRC 2024: 128-127 Zero-waste Biorefinery of <i>Litsea cubeba</i> (May Chang) as a New Woody Oil Plant Resources Based on the Green Extraction Concept and Techniques Ying Li	IFRC 2024: 169-153 Functionality Enhancement of Pea Protein Isolate Through Cold Plasma Modification: For 3D Printing Application Ye Liu	IFRC 2024: 193-185 Trehalulose-rich Stingless Bee (<i>Geniotrigona thoracica</i>) Honey Modulate Cytotoxicity and Glucose Uptake in HepG2, 3T3-L1 and SKMC Cell in Vitro Dr. Norhasnida Zawawi	IFRC 2024: 205-199 Consumers' Preferences for Local Food Attributes at Food Outlet Service: Evidence from a Discrete Choice Experiment in Sri Lanka Dr. Wan Norhidayah W Mohamad	
1155	IFRC 2024: 230-220 Enhancing Cold Tolerance and Quality Characteristics of <i>Carica papaya</i> Linn Through the Application of 1-methylcyclopropene, Geranium and Lavender Oil Meng Yi Loh	IFRC 2024: 275-260 Plasma-Activated Water: A Novel Approach to Salmonella Decontamination in Raw Chicken Meat Himashree Ponrajan	IFRC 2024: 214-204 Development and Quality Evaluation of Probiotic Beverage from Aromatic Brown Rice May V. Villaviza	IFRC 2024: 237-228 Understanding Consumers' Purchase Intention for Buffalo Milk-Based Yogurt Enriched with Stabilized Rice Bran in Negros Island, Philippines: A Correlation Study Dr. Angelita P. Caña	
1210	IFRC 2024: 071-053 Effect of Washing Cycles and Sodium Bicarbonate Washing Solution Concentrations on	IFRC 2024: 165-152 The Application of Cold Argon Plasma on Reducing Casein Antigenicity	IFRC 2024: 267-250 An Untargeted Metabolomics Approach in Distinguishing Non-diabetes, Prediabetes and	IFRC 2024: 240-230 Purchase Intention of Millennial and Gen Z Filipino Consumers towards Low	

	Functional Properties of Surimi from Catfish (<i>Clarias gariepinus</i> x <i>Clarias macrocephalus</i>) Maimanah Faizah Idris	Ruiyi Cai	Diabetes Mohd Naeem Mohd Naw	Glycemic Index Foods Dr. Riza Abilgos-Ramos	
1225		IFRC 2024: 094-083 Facile Green Synthesis of Biocompatible Carbon Quantum Dots from <i>Ginkgo biloba</i> Residue Leaves: A Sustainable Approach for Food Packaging Applications Ajit Kumar Singh		IFRC 2024: 048-044 Juice Packaging Label: A Visual Strategy Influencing Consumers' Buying Behaviour Sabandy Nuckcheddy Shabnam	
1240	Lunch / Poster Viewing / Booth Exhibition / Networking				
1400	Concurrent Session 13 Food Analysis, and Food Safety and Quality 3 (FASQ 3) Chairperson: Assoc. Prof. Dr. Nor Ainy Mahyudin <i>Rafflesia A</i>	Concurrent Session 14 Food Biotechnology (FB) Chairperson: Assoc. Prof. Dr. Farinazleen Mohamad Ghazali <i>Rafflesia B</i>	Concurrent Session 15 Food Packaging and Shelf Life (FPSL) Chairperson: Assoc. Prof. Dr. Nur Hanani Zainal Abedin <i>Rafflesia C</i>	Concurrent Session 16 Food Service and Hospitality (FSH) Chairperson: Prof. Dr. Muhammad Shahrim Ab Karim <i>Canna Room</i>	Poster Exhibition <i>Begonia Room</i>
1400	IL FASQ 3 Current Development in the Halal Authentication and Traceability Research Invited Speaker: Prof. Dr. Irwandi Jaswir (International Islamic University Malaysia)	IL FB 1 Latest Developments and Challenges in Food Peptide Research and Commercialization Invited Speaker: Prof. Dr. Nazamid Saari (Universiti Putra Malaysia)	IL FPSL 1 Digital Revolution in Packaging and Storage for Sustainable Food Futures Invited Speaker: Dr. Pramod V. Mahajan (Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Germany)	IL FSH 1 Harnessing Data Analytics for Enhanced Decision-Making in Foodservice Management Invited Speaker: Prof. Dr. Hashim Fadzil Ariffin (Universiti Teknologi MARA, Malaysia)	Poster Session
1420	IL FASQ 4 Malaysia Small and Medium-Sized Enterprises Food Industry Dilemma Invited Speaker:	IL FB 2 Exploring the Potential of Plant Bioactive Compounds for Enhanced Nutrition and Sustainable Food Security Solutions	IL FPSL 2 Brand and Regulation for Product Packaging Invited Speaker: Mr. Abdul Razak Jahury (SIRIM Berhad)	IL FSH 2 Unveiling the Status Quo of Global Food Tourism Phenomenon Invited Speaker: Dr. Eerang Park	

	Mr. Goh Toh Sin (Easy Pack Machinery Sdn Bhd., Malaysia)	Invited Speaker: Dr. Seetha Jaganathan King (Agro-Biotechnology Institute, ABI, Malaysia)		(Edith Cowan University Australia)	
1440	IFRC 2024: 051-051 Temperature-Induced Release of Salt from Double Water-In-Oil-In-Water Emulsion Made with Coconut Oil Nur Farra Adlina Mohamed Zakhari	IFRC 2024: 160-141 The Application of Electromagnetic Field-Assisted Low-Temperature Storage Technology in Aquatic Products Preservation Yutong Wu	IFRC 2024: 068-052 Development of a pH-Sensitive Film Based on Fish Gelatin and Blackcurrant Pomace Extract for Real-Time Monitoring of Chicken and Shrimp Freshness Maryam Adilah Zainal Arifin	IFRC 2024: 196-187 Validating Psychometric Properties of Scale Development: Mindset Scale to Become a Food-Based Social Entrepreneur Khairun Najihah Sabri	
1455	IFRC 2024: 109-090 Profiling of Indigenous Okpeye, a Nigerian Fermented Seasoning Uchenna Kalu Akpi	IFRC 2024: 189-184 Mechanism of Resistance to Freeze Drying Stress Regulated by Glycometabolism Pathway in <i>Lactobacillus acidophilus</i> Dr. Ruonan Yan	IFRC 2024: 089-080 Ultrasound-Assisted Extraction of Rambutan Peel Anthocyanin and Its Potential as Chemosensor for Intelligent Food Packaging Arum Widyastuti Perdani	IFRC 2024: 278-262 Career Intention Among Youth with Hearing Disabilities in Malaysia Hospitality Industry Norhayati Mat Yusoff @ Mohd Yusof	
1510	IFRC 2024: 122-114 Determination of Hazardous Compounds in Food Based on Functional Porous Nanomaterial Coated Solid Phase Microextraction and Portable Mass Spectrometer Wuyue Yu	IFRC 2024: 244-237 Exploring Coconut Yogurt Production: Impact of Coconut Varieties on Product Functionality Gengghatarani Gengan	IFRC 2024: 035-024 Chitosan-based Film Incorporated with Curry Leaf Essential Oil Foreseeing Repellency Potential Against Housefly (<i>Musca domestica</i>) Nur Fatin Nazurah Rekemin	IFRC 2024: 188-175 Investigating the Food Waste in Vegetarian Menu and All types menu between 2019-2021 in School Lunches: A Study from Uppsala Municipality Marina Hardiyanti	
1525	IFRC 2024: 184-177 Assessment of <i>Fusarium</i> mycotoxins and Toxigenic <i>Fusarium</i> species in Cereal Grains Marketed in Muscat, Oman Fatma Khuseib Hamed Al-Rashdi	IFRC 2024: 096-072 The Impact and Mechanism of Indigenous Microorganisms (IMO) Isolated from Fermented Banana Peel on the Growth and Bioactive Compounds of Mushrooms Nurul Solehah Mohd Zaini	IFRC 2024: 090-067 Influence of Exogenous Melatonin Impregnation on Sugar Metabolic Regulation and Oxalate Content Reduction in Carambola Farah Anum Mohd Yusof	IFRC 2024: 077-081 Consumer's View, Perception and Acceptance of Plant-Based Milk: Evidence from a Public University in Selangor Dr. Nurul Hanisah Juhari	
1540	IFRC 2024: 183-183 A Study on Antibiofilm and	IFRC 2024: 009-007 Photochemistry and Therapeutic	IFRC 2024: 158-133 Chitosan Films Enhanced with	IFRC 2024: 105-082 Sustainable Gastronomy	

	Prevalence of <i>Staphylococcus aureus</i> isolates from Meat Samples Collected in and around Tirupati Pathan Naswar Khan	Potential of <i>Moringa oleifera</i> Lam. against Some Food-Borne Pathogens of Clinical Importance Idris Sani Ibrahim	Sugar Kelp Extract for Inhibiting Lipid Oxidation in Cheese Packaging Dr. Manuel Vázquez	Tourism: Examining the Nexus of Tourist Loyalty, Electronic Word of Mouth (eWOM), and Halal Food Image in Promoting Eco-friendly Culinary Experiences Dr. Sara Abhari	
1555	IFRC 2024: 117-103 Effect of Sodium Alginate as a Fat Replacer in Low-Fat Pastry Margarine Maslia Manja Badrul Zaman	IFRC 2024: 136-109 Effects of Drying Methods on the Physicochemical, Functional, Thermal and Structural Properties of Kenaf (<i>Hibiscus cannabinus</i> L.) Protein Isolate Powder Nur Aqilah Hamim	IFRC 2024: 164-150 Bacterial Cellulose and Chitosan Multilayer Films Enhanced with Grape Bagasse Antioxidant Extract for Effective Lipid Oxidation Inhibition in Cheese Dr. Patricia Cazon	IFRC 2024: 016-087 Perceived Benefits and Cost-Benefit Perspectives on Service Digitalization: A Preliminary Study Among Fine Dining Restaurants in Bukit Jalil and Bukit Bintang, Kuala Lumpur Dr. Ahmad Fareed Ismail	
1610	IFRC 2024: 124-113 POCT Meat Authenticity Identification Based on High Throughput Rapid DNA Isolation, Lateral Flow Strip and Isothermal Amplification Techniques Cuiling Li	IFRC 2024: 150-140 The Antibacterial Effects of Surfactin-Based Composite Antibacterial Agents on Dominant Spoilage Bacteria in Aquatic Products and their Application in Preservation Shiqian Fu	IFRC 2024: 186-182 Valuation of Antimicrobial and Antioxidant Potential of Selected Traditional Pakistani Spices Dr. Iram Hafiz		
1625	Closing Address and Award Ceremony				
1700	Tea and Coffee Break				

POSTER PRESENTATION SLOTS

SESSION ONE – August 7, 2024 (Wednesday) Begonia Room

BOARD 1 (B1)	BOARD 2 (B2)	BOARD 3 (B3)	BOARD 4 (B4)
3rd IFRC 2024: [FASQ S 012-038] Detection of Antibiotic Residue in Raw Buffalo Milk in Malaysia Aimie Syahirah Ibrahim	3rd IFRC 2024: [FB S 252-242] The Development of Chicken Patty by Utilising Biomass Flour Of Ganoderma-Liquid Cultivated Biomass and <i>Pleurotus djamor</i> Nur Asyiqin Zahia-Azizan	3rd IFRC 2024: [FPE S 101-075] Improvement of Alkaline Chia Mucilage Extraction Parameters Using Ultrasound-Assisted Extraction Komati Rajentran	3rd IFRC 2024: [FSS S 208-226] Screening of Plant-Based Coagulants and Significant Formulation on Textural Properties of Plant-Based Cheese Analogue Anis Asyila Marzlan
3rd IFRC 2024: [FASQ S 062-048] The Impact of Food Safety Competency and Food Safety Leadership Styles in Sustaining FSMS Performance in SMEs Ain Fatini Majdi	3rd IFRC 2024: [FPE S 046-030] Impact of Different Extraction Techniques on Ginger Oleoresin Yield and Antioxidant Activity from Selected Countries Eng Yi Lin	3rd IFRC 2024: [FPE S 190-214] Physico-chemical and Rheological Characterization of Broken Rice Flour and Starch Modified via Heat-Moisture Treatment Nurul Akmal Abdullah	3rd IFRC 2024: [FSS S 103-093] Prevalence and Antibiotic Resistance of <i>Vibrio</i> spp. in Shrimps from Different Retail Markets Lee Epeng
3rd IFRC 2024: [FCB S 129-105] Chemical Composition and Characteristics of Organic Solvent Extracts from the Omani Seaweeds <i>Gelidium omanense</i> and <i>Melanothamnus somalensis</i> Abdullah Al-Nassri	3rd IFRC 2024: [FPE S 040-036] Effects of Hot Water and Steam Blanching on Polyphenol Oxidase and Peroxidase Activity, Antioxidant Attributes, and Phenolics Profile in Mangosteen Pericarp Giroon Ijod	3rd IFRC 2024: [FPE S 063-047] Functional, Thermal, and Rheological Properties of Barley-Bambara Groundnut Flour Blends Saheed Adewale Omoniyi	3rd IFRC 2024: [FH S 076-065] Adopting Digital Storytelling to Safeguard the Hawker Culture of Taman Selera in Petaling Jaya Old Town, Malaysia Rachel Yuen May Yong
3rd IFRC 2024: [FCB S 185-172] Effect of Different Types of Emulsifiers on the Physical Characteristics and Fat Bloom Stability of Dark Chocolate with Cocoa Butter Alternatives Chung Ying Xuan	3rd IFRC 2024: [FPE S 038-040] Influence of Different Drying Methods on Anthocyanins Composition and Antioxidant Activities of Mangosteen (<i>Garcinia mangostana</i> L.) Pericarps and LC-MS Analysis of the Active Extract Nur Izzati Mohamed Nawawi		3rd IFRC 2024: [FH S 166-158] Durian in Malaysia: A Brief Review of Cultivation, Culinary Delights, and Economic Significance Nurfatin Amirah Mohd Jamil

BOARD 5 (B5)	BOARD 6 (B6)	BOARD 7 (B7)	BOARD 8 (B8)
3rd IFRC 2024: [FSH S 016-009] Exploring Barriers and Drivers of Food Waste Management Digitalization in Malaysian Public and Private Hospitals Nur Farrah Ain Mahmud	3rd IFRC 2024: [FPS 152-249] Recent Advancements in Extruded Polylactic Acid-Based Composites for Food Packaging Dr. Han Lyn Foong	3rd IFRC 2024: [NFF 087-100] Vitamin D Fortified for Mass Cooking Oil in Malaysia Haniza Ahmad	3rd IFRC 2024: [FCB 229-219] Comparison of Soluble Polyphenol Oxidase and Membrane Bound Polyphenol Oxidase Activities Extracted from Hass Avocado (<i>Persea americana</i> Mill. cv. Hass) Assoc. Prof. Dr. Wong Chen Wai
3rd IFRC 2024: [FSH S 257-244] A Significant Systematic Review: Halal Supply Chain in Food and Tourism Industry Sharifah Azwani Syed Hamzah	3rd IFRC 2024: [FPS 198-194] Effect of Sterility Values and Retort Temperature on the Changes of Physico-Chemical and Sensory Properties of Kawah-Style Meat Curry Noor Zainah Adzaly	3rd IFRC 2024: [NFF 155-193] Cytotoxic Effects of <i>Polygonum minus</i> Extract on Colon Cancer Cells (SW480 and SW620) and Human Skin Fibroblast (HS27) Cell Lines Assoc. Prof. Dr. Ahmad Faizal Abdull Razis	3rd IFRC 2024: [FPE 064-271] Effect of Gamma Irradiation and Salt on the Physical Properties and Microbiological Quality of Turmeric Paste (<i>Curcuma longa</i>) Dr. Wan Zunairah Wan Ibadullah
3rd IFRC 2024: [NFF S 044-028] Health Implications of the Dietary Omega-6:Omega-3 Fatty Acid Ratio Soong Siew Wei		3rd IFRC 2024: [NFF 204-201] Development of Red Palm Oil Candy as a Tool for Vitamin E and Carotenes Delivery Dr. Teck-Kim Tang	
3rd IFRC 2024: [NFF S 075-071] Enhancing Anthocyanin Extraction from Roselle: Impact of Ultrasonic Duration on Total Anthocyanin Content and Antioxidant Activity Azwin Ahmad		3rd IFRC 2024: [NFF 250-241] Impact of Infusion Time on Physical Characteristics, Antioxidant Properties, and In-Vitro Antidiabetic Effects of Roselle Herbal Blend Tisane Tun Norbrillinda Mokhtar	

SESSION TWO – August 8, 2024 (Thursday)
Begonia Room

BOARD 1 (B1)	BOARD 2 (B2)	BOARD 3 (B3)	BOARD 4 (B4)
3rd IFRC 2024: [FASQ 098-070] Investigating Potential Sources of Sore Throat: Physico-Chemical Attributes and Microbial Contamination in Rambutan from Fresh Harvests and Retail Stores Assoc. Prof. Dr. Saiful Irwan Zubairi	3rd IFRC 2024: [FASQ 279-263] Exploring Rice Allergens - How Varieties and Conventional Cooking Method Affect their IgE-binding Profiles Dr. Nuzul Jambari	3rd IFRC 2024: [FASQ 155-130] Method Validation of Inorganic Arsenic Using HPLC-ICPMS and Assessing Its Contamination in Rice Sold in Malaysia Market Assoc. Prof. Dr. Ahmad Faizal Abdull Razis	3rd IFRC 2024: [NGT 274-259] Effects of Microwave Heating on FFA Reduction in Extracted Red Palm Oil Karaket Wattanasit
3rd IFRC 2024: [FASQ 172-176] Microbiological Surveillance of Foodborne Pathogens in Kampar Perak, Malaysia: Insights from <i>Salmonella</i> and <i>Listeria</i> spp. Studies Dr. Seow Hoon Saw	3rd IFRC 2024: [FASQ 289-269] Sustaining Food Security Using Biotechnology and Innovative Modern Food Technologies in Kuwait Dr. Jasem Alazemi	3rd IFRC 2024: [FASQ-P181-165] Antimicrobial Activity and Total Phenolic Content of Ginger Leaves (<i>Zingiber officinale</i>) At Different Maturity Stage Mohd Effendi Mohamed Nor	3rd IFRC 2024: [NGT 277-261] Portable Led Photometer for Determination of Carotenoid Content and Dobi of Red Palm Oil Kamonpan Wongyai
3rd IFRC 2024: [FASQ 248-253] Evaluation of <i>Moringa oleifera</i> Seed Protein with Antibacterial Activity Dr. Safiyyah Shahimi	3rd IFRC 2024: [FASQ P029-016] The Effects of Quality Changes in Vegetable Oils on the Formation and Absorption of Monochloropropanediol Esters (MCPDE) and Glycidyl Esters (GE) During Deep-frying of Potato Chips Nur Azwani Ab Karim	3rd IFRC 2024: [FASQ 251-243] Assessment of Antioxidant Traits in Coconut-Milk-Based Kefir Beverage Using an In-Vivo Animal Model Dr. Rahman Qadir	3rd IFRC 2024: [FSS 070-137] Opportunities and Challenges in Building Sustainable Insects Protein Supply Chains: A Review Dr. Nor Nadiah Abdul Karim Shah
3rd IFRC 2024: [FASQ 264-257] Quality and Food Safety Evaluation of Bada Fish Flour as Local Food for Stunting Management Eva Yuniritha	3rd IFRC 2024: [FASQ P054-099] Physical Property Characterization of Adult Dairy Nutritional Products for Powder Reconstitution Wei Wang	3rd IFRC 2024: [FASQ 247-248] Determination of Total Iodine in Iodized Table Salt Using High-Performance Liquid Chromatography with Diode Array Detector Mohd Azerulazree Jamilan	3rd IFRC 2024: [FSS 287-270] Halal Framework for Transforming Fruit Waste Biomass into Plant-Based Products Dr. Radhiahtul Raehan Mustafa
BOARD 5 (B5)	BOARD 6 (B6)	BOARD 7 (B7)	BOARD 8 (B8)

3rd IFRC 2024: [FSS 052-035] Consumers' Purchase Intention and Sensory Analysis of Fruit Waste Based Meat Analogue Wai Ga Yarn	3rd IFRC 2024: [NFF 145-188] Evaluation of Toxicity and Safety of <i>Crescentia cujete</i> L. Extracts Using Zebrafish Embryo Toxicity (ZFET) Assay for Future Applications as Functional Food Ingredient Dr. Nurul Shazini Ramli	3rd IFRC 2024: [FPS 050-191] Effect of Storage on Physicochemical, Microbiological and Sensory Evaluation of Sponge Cake with Butter and Coconut Milk Nur Farah Hani Muhamad	3rd IFRC 2024: [FB-P272-258] Impact of Alkaline Solubilization on Microalgae Protein Extract's Functional Properties Ng Jun Wei
3rd IFRC 2024: [FSS 061-046] Utilizing Microwave Technology to Increase the Sustainability of Food and Health Goods Manufacture from Palm Oil Sirinya Thungtong	3rd IFRC 2024: [NFF 031-018] The Development of High-Calcium Guava Candy Using Eggshell Powder Dr. Thed Swee Tee	3rd IFRC 2024: [FPS 152-189] Supercritical Solvent Impregnation of Pomegranate Peel Extract Into Polyethylene Films: Effect of Pressure Dr. Han Lyn Foong	3rd IFRC 2024: [FCB 182-167]] Comparative Assessment of Enzymatic and Chemical Routes for Preparing Sesaminol Concentrate from Sesame Meal Dr. Hsin-Ya Tsai
3rd IFRC 2024: [FSS 126-209] Development of Gluten-Free Muffin from <i>Dioscorea alata</i>: Physicochemical and Sensory Characterization Dr. Nor Afizah Mustapha	3rd IFRC 2024: [NFF 031-019] Freeze-Dried Pandan-Flaxseed Oil Powder: Development and Characterization Dr. Thed Swee Tee	3rd IFRC 2024: [FPS 107-216] Improving the Properties of Gelatin/Graphene Oxide/Cinnamon Bark Oil Food Packaging Films: Effect of Ferulic Acid Concentration Assoc. Prof. Dr. Nur Hanani Zainal Abedin	3rd IFRC 2024: [FCB- P173-170] Caffeine, Chlorogenic Acid and Antioxidant Properties in Different Clones of Green and Roasted Liberica Coffee Bean Extracts Dr. Mirfat Ahmad Hasan Salahuddin
3rd IFRC 2024: [FSS 209-200] <i>Hermetia illucens</i>, Black Soldier Fly Larvae as an Early Diet for Tilapia, <i>Oreochromis</i> sp. in the Nursery Stage Amatul Samahah Md. Ali	3rd IFRC 2024: [NFF- P095-074] Sarawak Black Pepper Throat Drops: A Product Development Research Jing Jing Ling		3rd IFRC 2024: [FPE-P202-197] Ginger Postharvest and Process Mechanisation System Dr. Masniza Sairi

BOARD 9 (B9)	BOARD 10 (B10)		
3rd IFRC 2024: [FPE 100-073] Pulsed Electric Field (PEF) Preservation of Bovine Colostrum and Influence on Its Quality <i>Dr. Adriana Lobacz</i>	3rd IFRC 2024: [FPE 219-207] Effects of Dry Milling, Wet Milling and Semi-Dry Milling Techniques of Brown Rice Flour on the Physicochemical Properties, Cooking Quality and Sensory Acceptability of Brown Rice Noodles <i>Prof. Dr. Roselina Karim</i>		
3rd IFRC 2024: [FPE 110-091] Quality Features of Ripened Rennet Cheeses in Comparison with Plant-Based Alternatives <i>Prof. Dr. Justyna Zulewska</i>	3rd IFRC 2024: [FPE 219-208] Effects of Different Types and Levels of Hydrocolloids on Physicochemical Properties and Sensory Acceptability of Extruded Brown Rice Noodles <i>Prof. Dr. Roselina Karim</i>		
3rd IFRC 2024: [FPE 137-110] Molecular Encapsulation of Aroma Compounds in V-type starch: Ordered Structure, Release properties, and Application <i>Dr. Qing Gao</i>	3rd IFRC 2024: [FPE- P270-254] Evaluation of Shelf Life of Ready-To-Eat Retort Processed Grilled Beef <i>Wan Nur Zahidah bt Wan Zainon</i>		
3rd IFRC 2024: [FPE 224-213] Enhancing Nile Tilapia (<i>Oreochromis niloticus</i>) Flesh as Alternative for Traditional Pork-based Tocino Production: A Value-Added Approach <i>Lara Millen S. Pengson</i>	3rd IFRC 2024: [FPE 276-265] Production of Hybrid Enoki Mushroom (<i>Flammulina filiformis</i>) Patties Incorporated with Meat from Different Animal Species <i>Assoc. Prof. Dr. Ismail-Fitry Mohammad Rashedi</i>		

VIRTUAL PRESENTATION SLOTS

3rd IFRC 2024: [FASQ 268-256] Evaluation of a Novel Complex Oleogel for Improved Physicochemical Properties and Bioavailability of Fish Oil <i>Tan Chui Xuan</i>	3rd IFRC 2024: [FPS 028-095] Red Tilapia Fish Scale Gelatin Incorporated with Kesum (<i>Persicaria odorata</i>) Leaf Powder as an Antioxidant Packaging Film <i>Dr. Roseliza Kadir Basha</i>	3rd IFRC 2024: [FPE 083-062] Optimization of Erythritol Production Using <i>Yarrowia lipolytica</i> and Pure Glucose as a Substrate <i>Assoc. Prof. Dr. Farah Saleena Taip</i>	3rd IFRC 2024: [FSS 058-050] Food Insecurity Instrumentation Review in Malaysia (FIIRM): A Systematic Review <i>Nur Anis Amirah Mohd Fozi</i>
3rd IFRC 2024: [FSS S 060-054] Food Security Challenges in Home-Based Cafe (HBC) at Terengganu Marine Parks: Implementation Best Practices Food Security Framework <i>Nur Fatimah Adriana Shamsull Anuar</i>	3rd IFRC 2024: [FSH 016-086] Exploring Factors Influencing Digitalization in Front-of-House (FOH) and Back-of-House (BOH) Among Full-Service Restaurants in IOI City Mall Putrajaya, Malaysia <i>Dr. Ahmad Fareed Ismail</i>	3rd IFRC 2024: [FSH 192-180] Relationship Between Food Safety Knowledge and Mothers's Optimistic Bias Regarding Foodborne Disease in Slum Areas of Yogyakarta City <i>Bella Khairunisa Al-Iatiff</i>	

KEYNOTE LECTURE SESSION

Valorisation of Food Processing Waste into Valuable Functional Ingredients

Nazimah Hamid

Centre for Future Foods, Auckland University of Technology, New Zealand

With the escalating demand for fresh and processed food, the generation of substantial quantities of waste from various food processing activities has become a great concern. These prevalent by-products pose significant environmental and sustainability challenges when improperly managed. However, these food processing residues contain a wealth of bioactive compounds that hold immense potential as valuable functional ingredients in the food industry. Through innovative techniques such as fermentation and enzymatic conversion, food processing waste can be transformed into high-value functional ingredients. Avocado seeds, a waste stream of avocado oil processing in New Zealand, hold remarkable potential as functional ingredients. They contain high levels of dietary fibre, antioxidants, and bioactive compounds such as phenolics and flavonoids. Research has shown that avocado seeds can be transformed into functional ingredients with antioxidant, antimicrobial, and anticancer properties. These bioactive compounds have the potential to be incorporated into a range of applications, including functional foods, nutraceuticals, and dietary supplements. Additionally, other protein-rich waste resources such as apricot seeds, spent grains, and fish waste in New Zealand offer substantial opportunities for valorisation. Utilising techniques like fermentation, enzymatic hydrolysis, and extraction, protein-rich waste can be transformed into valuable bioactive compounds. Fermentation of protein-rich waste can yield bioactive peptides with antioxidant, antimicrobial, and anti-inflammatory properties, while enzymatic hydrolysis can enhance protein functionality and bioavailability through the breakdown of proteins into smaller peptides. The valorisation of food processing waste presents an exciting opportunity to turn these by-products into valuable functional ingredients. Embracing these approaches can contribute to waste reduction, resource efficiency, and the development of sustainable and innovative food products in line with the circular economy principles.

PLENARY LECTURE SESSIONS

Hydrolysed Collagen from Fish Skin: Process Development, Nutraceutical Properties, and Applications

Soottawat Benjakul

Faculty of Agro-Industry, Prince of Songkla University, Thailand

During deskinning process, a large amount of skin is generated as the leftover. Fish skin can be used as the potential raw material for production of hydrolysed collagen (HC) or collagen peptides. Nevertheless, lipids distributed throughout the skin have adverse impact on quality by rendering undesirable fishy odour/flavour in the HC, mainly due to their oxidation. The use of pulsed electric field (PEF) for pretreatment of skin prior to lipid hydrolysis using lipase with the aid of vacuum impregnation could remove lipid from skin potentially. HC from defatted skin had the drastic decrease in fishy odour/flavour associated with the lowered abundance of volatile oxidation compounds. HC can be produced by various processes, which determined the bioactivities differently. Antioxidant activity of HC was governed by amino acid sequence and size of peptides. HC could reduce the DNA damage induced by oxidants such as H_2O_2 in a dose dependent manner. HC from fish skin was able to induce in vitro fibroblast cell proliferation and collagen production. Production of Type I and IV collagens was stimulated when rats were fed with diet containing HC. HC also exhibited wound healing property, especially at higher concentrations. HC also showed the preventive effect toward osteoporosis via induction of mineralisation of osteoblast cells. Since HC has a wide range of bioactivities or nutraceutical properties, it can serve as functional ingredient or nutraceutical for health benefits. It can be used to fortify in drinks to enhance the bioactivity. Overall, the skin from the fish processing industry can be fully exploited and sustainability of aquatic resources can be achieved.

Promoting Malaysia's Tourism through Food Tourism, and its Relationship to a Sustainable Food Industry through Technology and Innovation

Ammar Abd Ghapar

Ministry of Tourism, Arts, and Culture, Malaysia

With the current trend of experiential tourism, tourists have transitioned from just seeking the "4 S's" to immersing themselves in food tourism. Food tourism, also referred to as gastronomy tourism, is engaged by the tourists who sampled the local food to broaden their understanding of a culture or lifestyle while travelling. To ensure the tourists enjoyed the food safely, food technologies are essential in shaping and structuring the safety and hygiene standard in the food preparation and handling. Using Malaysia's diverse cuisine and gastronomy to promote tourism, offers a special chance to draw tourists from around the globe which will boost the local economy, food producers and restaurants. Tourists can be enticed by Malaysia's vibrant culinary tapestry, which is influenced by Malay, Chinese, Indian and the indigenous people. Through the application of innovation and technology, Malaysia has the potential to improve the attractiveness of its cuisine and support sustainability. The promotion of food tourism can be taken to another level by utilising the food technology to market the Malaysian traditional food paste and the Ready-to-Eat Meals (RTE) products that covers prepared food and meals that can be eaten as is or after minimal preparation. These products can preserve Malaysia's culinary traditions while also appealing to the potential consumers looking for convenience and authenticity. RTE meals made using traditional recipes will provide the potential consumers with a simple way to sample Malaysian food and will encourage them to plan to visit Malaysia to taste the real deal. Made with ingredients that are sourced locally, these meals have the potential to be marketed internationally, introducing Malaysian flavours to a global audience and potentially inspiring travel to Malaysia. These pastes and RTEs can be also be promoted to the tourists as souvenirs to bring the taste of Malaysia back home and to share with families and friends. By expanding the gastronomic adventure beyond their trip and sharing with families and friends it will encourage return travel and possibly convert new tourists to visit Malaysia. By using local produce and cutting down on food waste through effective manufacturing techniques, these pastes or RTEs can be made in an environmentally friendly manner. These products' packaging may also use environmentally friendly materials, in keeping with the current trends of sustainability. These efforts are further enhanced by the food industry's integration of technology. Technological advancements in food processing and preservation guarantee the authenticity and nutritional value of RTEs and food pastes, while also ensuring their quality and longevity. The products' reach can be increased through social media, digital platforms and e-commerce, making them easily accessible to consumers worldwide and promoting a global appreciation of Malaysian cuisine. The potential market can be further expanded if the products are ensured to be sustainably sourced, organic and halal. To make these efforts a success, the partnership between the government and private sector are essential. The government can spearhead the promotion with the collaboration of MATRADE, FAMA and Tourism Malaysia by participating in the international food and beverage fairs, food and culture festivals, consumer shows, cooking shows, and food demonstrations. In conclusion, showcasing Malaysia's cuisine and gastronomy to potential tourists can help build a compelling story that is bolstered by technological advancements and environmentally friendly practices. Malaysia's provision of RTEs and traditional food pastes not only highlights its rich culinary legacy but also plays a sustainable role in the food industry, thereby augmenting the country's appeal to tourists worldwide.

Food Security: Supply, Demand, and Sustainability

Mad Nasir Shamsudin

Putra Business School, Universiti Putra Malaysia, Malaysia

The food sector in developing economies including Malaysia is facing a challenging landscape in terms of supply, demand, and sustainability to provide sufficient food to meet growing population and rising per capita income as well as dietary changes, eradicating hunger and food insecurity. In the supply side, underinvestment in agriculture research, small scale farms with low level of technology, entrepreneurship, climate change, and depleting resources have affected food supply. In terms of demand, the trends in food consumption have been an increase in the consumption of a greater variety and volume of higher value and higher protein foods. Consumers also now demand new food products, new packaging, more convenience, new delivery systems, and safer and more nutritious foods. Changes in tastes and lifestyles, market development and occupation also may be an important influence on food demand. Other than the supply and demand parameters, global mega trends are also affecting the landscape of food security and its sustainability. These include accelerating urbanisation, climate change and resource constraints, demographic shifts and income growth, technology breakthrough, and distribution system. Added to these megatrends, new dimensions in the price equation are the environmental impacts of modern agriculture. These effects create further constraints on the sustainability of food supply. The new theme for the food sector goes beyond its basic functions, but to enhance resource conservation, environment, preserve farm communities and to alleviate poverty. The multi-functionality raises its worth more than just economics. To move forward in enhancing food security, policy responds should consider a comprehensive food security strategic framework of food availability, accessibility, utilisation, and stability.

Food Processing: From Traditional Concepts to Current Challenges, Prospects, and Recent Trends in Alternative Technologies

Tatiana Koutchma

Agriculture and Agri-Food Canada, Guelph Research and Development Centre, Canada

Food processing applies different types of energy to transform agricultural products into ready to eat products and preserve their quality during distribution and storage. Over the last decades, food processing technologies have evolved to provide alternatives to traditional treatments and to enhance safety, extend shelf life, and to improve quality, nutritional content and consumer acceptability of food products. These alternative processing approaches include advanced thermal, mild and nonthermal methods such as electromagnetic heating, ultra-high pressure, light-based treatments, plasma and combined processing. Alternative processing techniques are also reducing thermal abuse on foods, lowering carbon footprint and substantially reducing water volumes used in heat transfer processes. However, performance capabilities of available processing technologies differ broadly depending on the types of food that can be treated, microbial efficacy, desired and undesired effects on quality, their economics, environmental impact and regulatory status. The overall objective of this talk is to briefly review key concepts of food processing and the NOVA system to classify processed foods. Science-based information will be presented to review and assist in evaluation of relative capabilities of alternative minimal processing that are commercially available and technologies-in-development. Areas covered in the talk include: (1) assessment of alternative and emerging high-technological processing techniques for their potential use by the food industry; (2) current regulatory status, validation and other commercialisation challenges; and (3) overview of light-based processing technologies. The presentation will provide an update of the state-of-the art of ultraviolet (UV) light technologies using monochromatic and polychromatic sources (conventional and emerging), discuss their efficiency related to the applications for disinfection of surfaces and food liquids and beverages, mechanisms of action and safety concerns. The results of multiple studies to inactivate pathogenic organisms and fungi, enzymes, and destroy mycotoxins, effects on quality and nutrients parameters of foods, beverages and grains will be presented. The case study of coconut water treatment using various UV light sources will be briefly presented. The presentation will conclude with an overview of future prospects and research needs related to novel processing technologies and their potential applications in the food industry and in crisis situations.

Food Safety Research at National Centre for Food Safety

Jeyaletchumi, P., and Khairuddin M.T.

National Centre of Food Safety, Ministry of Health, Malaysia

The National Centre for Food Safety (NCFS) which is located at Salak Tinggi, Selangor, is the scientific arm of the Food Safety and Quality Programme. The aim of the Centre is to generate scientific data through research, laboratory analysis and risk assessment to ensure food safety controls along the supply chain can be carried out more effectively. The NCFS project was approved under the 4th Rolling Plan of the Tenth Malaysian Plan (RMK-10) with a contract value of RM130 million and constructed under a Design and Build plan. Allocation for procurement of equipment under RMK-12 and project construction of NCFS totalled RM67.5 million. NCFS will be involved in the preparation of food standards through development of new formulation, product verification and simulation of food processing. In this era of globalisation, there are many new products and innovations by the food industries which necessitate the need to constantly update and amend existing regulations. NCFS would also be involved in the development of policy and new legislation on food safety through risk assessment and research. Data will also be generated to assist investigations on food safety issues that can affect health of consumers and threaten global food trade. The Analytical Division of NCFS would be involved in the Preparation of Certified Reference Material (CRM) and Proficiency Testing (PT) Programme for quality assurance in the technical field of food analysis. Capacity building will also be implemented through training and consumerism. NCFS will also provide training facilities for International Food Safety Training Centre (IFSTC) Malaysia and a placement for ASEAN Risk Assessment Centre (ARAC) under NCFS. It is hoped that NCFS will fulfil its goals of assisting the Food Safety and Quality Programme provide support to ensure sustainable food industries in this nation while protecting the rights of our consumers.

High Pressure Processing (HPP) for Sustainable and Innovative Food Products and Beverages

Carole Tonello

Hiperbaric S.A., Burgos, Spain

High Pressure Processing (HPP) is a cutting-edge technology that utilises high pressure, up to 600 MPa, to preserve food and beverages. This non-thermal method processes products in its final packaging, significantly reducing or even eliminating the need for additives. As it does not involve heat, HPP's primary advantage is its minimal impact on the sensory and nutritional properties of food, leading to healthier products. It is particularly effective for preserving a broad range of foods, including fruits, vegetables, meats, seafood, and dairy. Furthermore, upcycling through HPP can result in the creation of new food products, such as fruit juices or bars, from by-products or "ugly fruit". HPP is advantageous not only for ensuring food safety and quality but also for promoting environmental sustainability. As a clean technology, it relies solely on electricity and water, with most of the water being reused. It does not generate effluents or residues. Moreover, since HPP is entirely electrified, a company that powers its HPP operations with 100% renewable energy will also have low CO₂ emissions. When compared to traditional thermal processes, HPP can result in energy savings as it requires less energy per kilogram of food. Furthermore, HPP extends the shelf life of foods, significantly reducing food waste and decreasing transportation frequency, which in turn reduces carbon emissions. Although HPP requires the use of flexible, waterproof packaging materials, typically plastic, which can raise environmental concerns, solutions are emerging. Innovations in packaging, such as the incorporation of recycled materials and bioplastics, or the use of kegs for larger volumes (which reduces the amount of plastic per litre), along with advancements in HPP equipment that enable bulk beverage processing, are addressing this environmental issue. In conclusion, HPP contributes to a more sustainable and efficient food system, reducing food waste and improving safety and nutritional quality.

INVITED LECTURE SESSIONS

ILFASQ1**Swallowing Solutions: Harnessing the Role of Hydrocolloids in Texture-Modified Foods**

Jorry Dharmawan

Singapore Institute of Technology, Singapore

Dysphagia is a medical condition that affects the ability to swallow, commonly experienced by someone who has suffered a stroke or other neurological disorders, and it is also prevalent among the elderly. Those having difficulties swallowing tend to eat or drink less or take a long time to finish their meals due to fear of choking. This leads to loss of appetite and subsequent atrophy, dehydration, aspiration pneumonia and malnutrition. The use of thickened liquids and texture-modified foods (TMF) are current interventions used for dysphagia patients to promote safe and efficient swallowing. The modification of food texture can be achieved through simple processes such as chopping, blending and mincing to get the right textured food for the patients. To ensure acceptable consistency of the TMF, hydrocolloids are commonly used as thickening and gelling agents for texture-modification purposes due to their cross-linking and water entrapment abilities. Hydrocolloids are hydrophilic polymers extracted from plant, animal, or microbial sources, which exhibit high affinity for water molecules. There are many commercially available instant thickeners and thickening agents that can be added in the TMF to provide various degrees of thickening and gelling effects, depending on their chemical composition and structures. The most common hydrocolloids used in commercial thickeners are xanthan gum and modified starches. However, there are some limitations in their applications. With dysphagia management gaining traction because of ageing populations, it is worthwhile exploring other hydrocolloids as potential thickeners in the development of suitable and yet affordable TMF. Some opportunities and challenges of using various types of hydrocolloids will be presented in this talk.

ILFASQ2**Effects of High-Pressure Processing Technology on Shelf Life and Consumer Acceptability of Precooked Blue Crab Meat**

Chengchu Liu¹, Caleb Nindo², Barry Nash³, Evelyn Watts⁴, Jackie Takacs¹, Samata Bhetwal², Byungrok Min², and Yiming Feng⁵

¹Maryland Sea Grant Extension Program, College of Agriculture and Natural Resources, University of Maryland, USA

²Center for Food Science and Technology, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, USA

³North Carolina State University, USA

⁴Louisiana State University, USA

⁵Virginia Tech, Virginia Seafood Ag Research and Extension Center, USA

The blue crab (*Callinectes sapidus*) is a highly valuable wild fishery species, offering significant culinary and economic value in the U.S. High pressure processing (HPP) is a non-thermal, green technology that subjects food to a high pressure using cold water as the pressure transfer medium. The purpose of this study was to evaluate the effects of HPP on the quality and shelf life of precooked freshly picked blue crab meat on a commercial scale. Fresh crab meat was purchased from three FDA-registered commercial processors. The HPP treatment was conducted at 600 MPa for 3 min. The HPP-treated products were immediately covered by ice, transported, and stored under refrigerated conditions until used for shelf-life and consumer acceptability tests. Consumer acceptability was evaluated by sensory surveys using an IRB approved protocol. The microbiological and physicochemical quality attributes were determined by using ISO methods.

Although HPP did not significantly affect the physicochemical quality attributes (i.e. pH, colour, drip loss, water holding capacity, texture, lipid oxidation), the treatment greatly extended the shelf life of fresh crab meat by inhibiting the growth of total bacteria and yeast. Based on Maryland Health Department's acceptable aerobic plate count limit for fresh blue crab meat (<100,000 CFU/g), the shelf life of control samples was 4-8 days. After the HPP treatment, the shelf life was extended to 19-24 days. In addition, no coliform, *E. coli* or *Listeria monocytogenes* were detected for all samples. The sensory quality of HPP samples were well accepted throughout the three-week sensory study. From week 1 to week 3, all sensory attributes (appearance, aroma, texture, and flavour) were scored predominately from 5 to 7 on a 7-point Hedonic scale, indicating good to excellent ratings. HPP treatment successfully extended the shelf life of precooked fresh blue crab meat by two weeks without significantly affecting its physicochemical and sensory quality.

ILFASQ3

Current Development in the Halal Authentication and Traceability Research

Irwandi Jaswir

International Institute for Halal Research and Training, International Islamic University Malaysia

Nowadays with the advancement of science and technology, food processing has become more complex and foods may contain ingredients and additives from questionable sources. With efficient transportation more new products are introduced onto the shelves in the market across the sphere and somehow, somewhere foods can be lost in the food chain or not traceable at all. It becomes a crisis when food causes a hazard to humans and food product recall is summoned to curb distribution and stop its consumption. In this case, the assurance of authenticity is prime to fix the source and ascertain the producer. The need for proper control and monitoring of authenticity of food is a serious matter to the authority and the food manufacturers. Strong commitment and continuous support from the government through various agencies would ensure the integrity of the food itself, both in terms of safety and quality. People of all faiths have a consensus in consuming food and drink of vegetable origin. In Islam, all things created by God (Allah) are permitted or halal to be eaten, with a few exceptions that are specifically prohibited (haram) which are pork, blood, carrion and animals slaughtered without invoking the name of Allah. Islamic food laws are based on cleanliness, sanitation and purity. All utensils must be clean and free of contamination from any unlawful or harmful substances. Islam does not prohibit vegetable foods, with the exception of what is fermented, either it be grapes, dates, barley, or any other substances, as long as it remains in the unfermented state; similarly, Islam prohibits anything which intoxicates, affects the functioning of the brain, or harms the body (Al-Qaradawi, 1984). However, with regard to foods derived from animal sources, people and nations have held widely varying attitudes. Hence, the importance of establishing laboratories and using analytical techniques (methods) of authenticity in food for ensuring food safety and protecting consumers from fraud and deception as well as for product recall purposes should not be overlooked. Halal analytical laboratory facilities should fit the purpose and ensure competent personnel and equipment. Laboratory data may help define the overall scope of work, levels of worker protection, as well as remediation and disposal methods. The laboratory information management system should be stated in such a way that allows matching analytical results with relevant field data. Instrumental methods in detection of contamination and/or adulterants in food would clarify any doubt to Muslims and information can be disseminated for consumer transparency giving better trust and confidence to the authority. The advancement of Science and Technology for the development of food for the future, however, creates great concern and awareness on the issue of the halal traceability. Traceability as defined by ISO 9000 (2005) standards is "the ability to trace the history, application or location of that which is under consideration". Traceability may refer to the origin of materials and parts, the processing history, and the distribution and location of the product after delivery as further defined by the ISO guidelines. Halal traceability is crucial in ensuring the integrity and sanctity of product and services that are produced are not only certified as halal or permissible by a credible internationally recognised certification body but also safeguard the fatwa (an official statement from the religious

leader) passed by the committee of Halal advisors on issues related to Halal and Haram for products or services put forward by the parties concern or by consumers who are doubtful of the halalness of the product and services that are available in the market.

ILFASQ4

Malaysia Small and Medium-sized Enterprises Food Industry Dilemma

Goh Toh Sin

Easy Pack Machinery Sdn. Bhd., Penang Science Park, Penang, Malaysia

The adoption of science and technology within the Malaysian small and medium-sized enterprises (SME) food industry remains notably lower compared to sectors such as semiconductors, electronics and electrical (E&E), and oil and gas. This disparity is primarily attributed to the slim profit margins that characterise the food industry. To elevate the standards of the Malaysian food industry, it is imperative to bridge the gap between industry and academia, fostering the integration of scientific principles into food processing practices. Malaysian SME food manufacturers typically adhere to a "see to believe" philosophy, in contrast to other sectors that embrace a "believe to see" approach. Thus, it is incumbent upon academic institutions to lead collaborative efforts, facilitating the transfer of knowledge derived from research into practical applications within the food industry. Through such partnerships, SME food manufacturers can produce high-quality, healthier products with extended shelf lives, devoid of preservatives, and utilising suitable packaging materials. This advancement will empower SMEs to compete in international markets, overcoming the current constraints that confine them to local sales due to stringent export criteria and suboptimal product quality. The collaboration with academic experts will not only enhance product quality but also indirectly promote and establish careers in food science, such as food technologists, as highly sought-after professions. Interns and academic professionals will play a pivotal role in addressing industry challenges. To foster the success of this initiative, it would be beneficial for university management to explore opportunities for industry collaboration, which could involve leveraging their laboratories and equipment as necessary. In return, SMEs should commit to employing university graduates as interns or full-time staff, thereby embedding scientific expertise within their operational processes.

ILFB1**Latest Developments and Challenges in Food Peptide Research and Commercialisation**

Nazamid Saari

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There is a growing global demand for bioactive peptides which is valued at \$90.1 billion in 2023 to \$157.5 billion by the end of 2028. In addition to their significance as a source of amino acids for the body's building blocks, these bioactive peptides can exert multiple health-beneficial properties and thus have attracted interest among scientists and food industries over the past two decades for various food and non-food applications. Bioactive peptides can be derived from animal- and plant-based proteins as well as via microbial fermentation. As the composition and nature of proteins from different sources vary, the biological activities of peptides thereof are expected to behave differently. Hence, different strategies of protein extraction/isolation are extremely critical and have to be designed for maximum protein recoveries prior to peptide production. This presentation will focus on the latest developments and challenges in food peptide research and commercialisation in relation to the nature of proteins from different sources and their techno-functional properties, protein extraction strategies, peptide productions, stability and efficacy in food systems.

ILFB2**Exploring the Potential of Plant Bioactive Compounds for Enhanced Nutrition and Sustainable Food Security Solutions**

Seetha Jaganathan King, Norsharina Md. Saad, Siti Rokhiyah Ahmad Usuldin, Nurul Ashikin Md Hazmi, Nur Atiqah Khirul Anuar, Nazrien Kaman, and Muhammad Ammin Mohd Nordin
Agro-Biotechnology Institute, National Institutes of Biotechnology Malaysia, Malaysia

Nutrition plays a pivotal role in addressing global challenges related to food security, as it ensures the availability of essential nutrients and contributes to overall health and well-being. According to the State of Food Security and Nutrition in the World report (SOFI 2023), more than 3.1 billion people globally cannot afford a healthy diet, 148.1 million children under 5 years of age were stunted, 45 million children were wasted, and 37 million children were overweight. Malaysia faces the threat of a double burden: stunting and obesity; 20.7 percent of children under five suffer from stunting and 11.5 per cent from wasting, 12.7 percent of children (5–19 year olds) are obese due to poor diet. Plant-based foods serve as a rich source of bioactive compounds, which play a crucial role in enhancing the nutritional quality and health-promoting properties of the human diet. The consumption of plant-based foods has gained significant attention due to their nutritive value and the presence of bioactive components such as polyphenols, flavonoids, carotenoids, and phytochemicals, that possess a myriad of beneficial properties that exhibit antioxidant, anti-inflammatory, antimicrobial, and other bioactive properties that can help alleviate nutritional deficiencies, combat malnutrition, enhance immune function and improve food quality. Integrating plant-derived bioactive compounds into food systems enhances their nutritional profile and promotes sustainable agriculture practices and biodiversity conservation. The Agro-Biotechnology Institute, National Institutes of Biotechnology Malaysia houses over 80 species of medicinal plants and has been actively exploring functional food ingredients. In the context of eradicating issues in food security, the utilisation of bioactive compounds from plants presents a promising avenue for addressing malnutrition, food scarcity, and health-related challenges. By exploring the potential of these natural compounds and incorporating them into dietary strategies and food production processes, we can pave the way towards a more resilient and nourished global population.

ILFCB1**Insights into Food Peptide Properties and Their Amino Acid Contributions in α -Amylase Inhibition**

Gan Chee Yuen

Analytical Biochemistry Research Centre, Universiti Sains Malaysia, Malaysia

α -Amylase (AA) inhibitory peptides are a new class of anti-diabetic therapeutic agents. However, the mechanism and the properties of the peptides are yet to be explored. In this study, AA inhibitory peptides were randomly chosen from the databases and recent publications. Subsequently, they were evaluated based on structure-activity relationship by using in silico approach. The AA hotspots were initially reviewed, and found that Trp58, Trp59, Tyr62, His299 and Asp300 (i.e. substrate analogues catalytic site) were highly bound, in general. However, when the data were analysed based on the peptide length, short peptide (SP) has one less preferred hotspot (His299), whereas long peptide (LP) showed 2 additional hotspots (Asp96 and Arg195). When reviewing the properties of the peptides, it was found that these peptides were highly hydrophobic, which contained amino acids with aliphatic side chains, followed by polar neutral regardless of peptide length. In general, proline, leucine, and serine were the top 3 reactive amino acid residues in the peptides. However, different prevalent amino acids were found in SP (proline, leucine and serine), medium peptide (MP) (proline and leucine) and LP (glutamine, alanine and serine). When the terminal positions (i.e. ultimate (N1 and C1), penultimate (N2 and C2) and antepenultimate (N3 and C3) positions) were assessed, the data showed different preferences in the amino acid residues based on the peptide length. The details of interaction were also elaborated in this study based on the molecular docking analysis, in which hydrophobic interactions, salt bridges and hydrogen bonds were involved. In conclusion, this study provided the way of identifying the AA inhibitory peptides and offered fundamental and practical information for designing or discovering the peptide-based AA inhibitory agent from food materials.

ILFCB2**Biomass Material Based Bioactives Delivery System**

Xuanxuan Lu

Department of Food Science and Engineering, Jinan University, China

A lot of bioactive components have been proved to possess a variety of biological activities, which are crucial to human health. But many bioactives have poor stability, absorption and bioavailability, which limit their biological activities. Biomass materials are widely used in the food industry because of their wide range of sources, biodegradability, good biocompatibility and non-toxicity. Biomass materials, such as starch, cellulose, chitosan, gelatine, *etc.*, have shown many advantages in constructing various delivery systems for bioactive substances, such as nano/submicron colloidal particles, Pickering emulsion systems, 3D printed foods, *etc.* This presentation will introduce the application of biomass materials in the development of 3D printed food, Pickering emulsion delivery system, composite particle delivery system for anti-cancer gene sequence. Through analysing the structural, physicochemical and nutritional properties of biomass materials, as well as their interactions with other components, this work provides some guidance for the development of biomass materials-based delivery system for bioactives.

ILFH1**Preserving the Taste of Traditions: The Malay Kuih in Mersing's Culinary Heritage Landscape**

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Malaysia's culinary landscape is steeped with colourful heritage. Such heritage enlists numerous delicacies and traditional Malay kuih as one of the cherished treasures, particularly within the Malay community. Despite their dynamic flavours, traditional Malay kuih are progressively declining due to unclear definitions across Malaysia. The lack of a clear definition is causing these delicacies to fade from everyday life, with fears of nearing extinction. This study explores the constituents of Mersing's traditional Malay kuih and intricacies in its production practised for its long-term preservation. Qualitative research design was employed with phenomenological case study approach to excerpt the valuable experiences in preserving the traditional values of the Mersing's Malay kuih. Empirical data were gathered through in-depth interview sessions, both face-to-face and in focus group discussion with esteemed experts of Malay kuih in Mersing. Thematic Analysis was conducted using NVivo software, employing the Constant Comparative Technique to extract the themes as findings. The findings underscore a deep-rooted connection between Malay kuih and local crops, as well as reflections of East Coast traditions and the fusion of indigenous cultures. Essentially, the production of Malay kuih is predominantly preferred to be carried out using traditional methods and techniques, with limited and only basic innovations involved to preserve as much of its traditional essence as possible. These findings collectively play a vital role in preserving the traditional values and distinction of Mersing's Malay kuih. Additionally, this study reveals the emergence of various culinary traditions, both mutual and unique to Mersing, which have not been well-documented before. This contributes to the richness and diversity of traditional kuih in Mersing and, ultimately, to Malaysia's culinary landscape. This study not only sheds light on the cultural and culinary significance of traditional Malay kuih but also offers insights into strategies for its preservation, ensuring its continued existence for generations to come.

ILFH2**Integrating the Rich Tapestry of Traditional Cuisines and Food Practices with Modern Sustainability Goals and Technological Advancements**

Johari Edrus

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

By embracing the interconnections between heritage foods and the goals of a sustainable food industry, the conference can explore a rich field of opportunities for innovation. Science and technology not only offer tools for preserving and revitalising traditional food systems but also pave the way for their integration into the global quest for food sustainability. The dialogue between the past and the present, facilitated by this theme, can inspire a future where food is produced, consumed, and valued in a way that nourishes both people and the planet. This talk will cover the following topics: (1) understanding the roots of sustainability in heritage foods, (2) promoting biodiversity through traditional crops and livestock, (3) innovation in preserving and enhancing nutritional value, (4) reviving and adapting traditional food processing and preservation methods, (5) culinary innovation and global food systems, (6) community and economic development, and (7) educational initiatives and cultural preservation.

ILFOMC1

Food Insecurity and its Impact on Health

Indrani Thuraisingham

Federation of Malaysian Consumers Associations, Malaysia

An overview of the food insecurity situation in Malaysia due to climate change, geopolitical factors, consumer behaviour, trade relations; people's nutritional status and the impact on health of consumers. Moving forward with recommendations.

ILFOMC2

Application of Value Stream Mapping and Creative Matrix in Operations Management

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As the market competition intensifies and the profit margin continues to shrink, companies need to improve their productivity to ensure business sustainability. In Operations Management, the concept of Value Stream Mapping (VSM) is especially useful for eliminating wastes, reducing process cycle times, and improving operation processes. Although emanated from the manufacturing industry, i.e., Toyota, VSM has been increasingly applied in the service industry, including healthcare centres, hotels, and restaurants. When developing solutions, it would be helpful to have some brainstorming tools that can guide the process. Creative Matrix (CM), a Design Thinking tool, has demonstrated its powerful capability to generate an array of creative solutions. This presentation illustrates how VSM and CM have been employed in several hospitality projects.

ILFPS1

Digital Revolution in Packaging and Storage for Sustainable Food Futures

Pramod V. Mahajan

Leibniz Institute for Agricultural Engineering and Bioeconomy, Germany

This talk will explore the digital transformation of postharvest processes, centring on the dynamic and perishable nature of fresh produce after harvest. Beginning with foundational concepts, the presentation will discuss the integral role of mathematical modelling in optimising packaging and storage processes, thereby extending shelf life and minimising food losses. It will further extend to various sensor technologies deployed in the horticultural supply chain, facilitating real-time monitoring and offering crucial insights for data-driven decision-making. A particular focus on digital twins will illustrate the fusion of live-sensor data for real-time predictions and simulations within the supply chain. The discussion will cover monitoring and controlling gas concentrations during varying temperature conditions in fruit storage containers and the development of a wetness sensor for measuring condensation on fruit surfaces. Additionally, developments in in-situ measurement of fresh produce respiration, prediction of oxygen, carbon dioxide, and ethylene within fruit packages, and the application of mathematical modelling for predicting shelf life will also be covered. Highlighting ongoing projects, the presentation will finally address specific challenges like monitoring heat transfer and condensation in apple storage, together with the digital twin platform.

ILFPS2

Brand and Regulation for Product Packaging

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Product packaging is one of the most important elements in daily life. Without packaging it will be difficult for a person to carry, move, store, guarantee quality, protect a product. Therefore, product manufacturers need packaging for this purpose. Entrepreneurs who produce products, especially food and beverages, will get repeat customers through the product's taste, brand and product packaging. Sellers will ensure that buyers will regularly buy their products to increase their sales and business. In principle, a product will be sold based on the brand name, quality and presentation of a more innovative packaging design, complying with acts and regulations and following market trends. Almost all countries have regulations to follow for their packaging. In Malaysia the regulation for food and beverages packaging must follow the Food Act 1983 under the Ministry of Health Malaysia. In SIRIM we follow all regulations available when providing advisory to entrepreneurs regarding packaging. The combination of brand elements, trends, quality, innovative technology and regulation can have a positive impact on the products produced by entrepreneurs such as increasing market sales. In addition, entrepreneurs can develop and improve the appearance of products to place their products in the local and international market. SIRIM Berhad has more than 25 years of experience in helping boost the status of every entrepreneur through a package of human capital improvement programs and product development. SIRIM Berhad is very pleased to work with any agency to produce more local entrepreneurs who are viable, creative and innovative and ready to grow and compete in the local and global markets.

ILFPE1**Exploration of Lacto-Fermentation for the Potential of Fungal Inhibitors for Preserving Fruits**

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Mangoes are prone to fungal diseases, which reduces their postharvest life. Preservatives are used to increase their shelf life, but these contain chemicals that pose health risks to consumers. To solve this problem, a natural antifungal coating was developed using five different types of lactic acid bacteria to prevent the growth of fungi on mangoes. The bacteria were grown in agricultural by-products and fermented with palm kernel cake to produce a fermented palm kernel cake that could inhibit the growth of two types of fungi. Response surface methodology (RSM) was employed to optimise substrate amount, temperature, and fermentation time conditions. The antifungal compounds were identified using ¹H-Nuclear magnetic resonance (NMR) spectroscopy. Polysaccharide-based polymers were added to PKCL1 and PKCL2 to develop edible coatings for higher stability. The formulations' impact on mango fruit quality and postharvest life was assessed. Two strains of lactic acid bacteria, *L. plantarum*, and *L. fermentum*, were grown in PKC and pineapple peel substrates. They showed vigorous antifungal activity against *C. gloeosporioides* and *B. theobromae*. Mangoes treated with the PKCL1 and PKCL2 substrates had a lower disease incidence, severity, and total conidia concentration. The optimal fermentation conditions included a substrate ratio of 24.75%. PKCL1 and PKCL2 had higher lactic acid concentrations, moderate acetic acid concentrations, and bioactive peptides. Fungi cells treated with PKCL1 or PKCL2 significantly differed in protein, DNA, and sugar concentrations. In experiments involving different polysaccharide-based polymers, significant decreases in ergosterol levels were found in fungi. The best carrier was identified as chitosan (CH), which could sustain the release of antifungal compounds. Coatings made with CH and containing PKCL1 and PKCL2 demonstrated strong inhibition against *C. gloeosporioides*, as evidenced by prominent inhibition zones.

Advances in Micro- and Nano-Structured Functional Lipids: From Preparation to Innovative Food Applications

Tan Chin Ping

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At the nanoscale, particularly below 100 nm, a significant shift occurs in the fundamental laws of physics and chemistry compared to bulk systems, resulting in the emergence of unique properties. This phenomenon opens doors for deliberate engineering of materials with precise characteristics. While the food industry traditionally focused on macro- and microscale lipid substances, the integration of nanoscale science presents a potential paradigm shift in the field. Recent years have witnessed a growing interest in both the fundamental principles and practical applications of lipid nanodispersions. These nanodispersion systems play an important role in encapsulating bioactive compounds, safeguarding them from degradation, and enhancing their bioavailability. This paper delves into the diverse methods employed for the preparation of such nanodispersions. During the nanodispersion preparation process, two important factors that heavily influence the final product's quality are the processing and formulation parameters. Consequently, this paper provides an extensive exploration of the processing and formulation parameters commonly utilised by researchers in this context. Following nanodispersion formation, the logical next step involves characterising its physicochemical properties. Researchers frequently employ various analytical techniques to achieve this, and thus, this paper offers a comprehensive overview of the commonly used analytical techniques for nanodispersion characterisation. However, the utility of a nanodispersion relates to its stability over a defined period and under varying environmental conditions. Hence, this paper also addresses the stability of nanodispersions concerning storage time and different environmental factors. Lastly, while examples of nanodispersion applications in diverse food products and systems remain limited, this paper highlights a few instances to showcase their potential in the food industry.

ILFSS1**Transforming the Landscape of Agricultural Research and Development in Higher Education Institutions: A New Chapter of Innovation and Resilience**

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Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Philippines

Enhancing food security in Southeast Asia amidst population growth and the challenges posed by climate change and by the COVID-19 pandemic requires sustainable agricultural practices that optimise yield, income, and social inclusivity while minimising inputs, energy consumption, and environmental impacts. This presentation highlights the crucial need for Research and Development (R&D) programs to align with both demand and supply aspects of food security within agricultural value chains. Understanding public needs is emphasised as the foundation for agricultural R&D initiatives. Key research priority areas to drive agricultural transformation and bolster food security and socio-economic development, particularly in pandemic resilience, are outlined. These include creating interdisciplinary research platforms, incentivising impactful scientific contributions, and empowering researchers in intellectual property rights and technology transfer. Moreover, fostering collaborations among academia, industry, and government is essential to bridge research outcomes with practical applications within agricultural value chains. The proposed Academe-Industry-Government (AIG) interconnectivity model advocates for shared resources and collaboration to maximise the impact of research endeavours in addressing current and future challenges in agriculture and related sectors, promoting sustainable economic development and resilience against unforeseen disruptions.

ILFSS2**Harnessing the Potential of Edible Insects: Novel Ingredients for Industrial Applications**

Khaniitta Ruttarattananamongkol

Faculty of Agriculture, Natural Resources and Environment, Naresuan University, Thailand

Edible insects have gained significant attention in recent years as a sustainable and nutritious alternative to traditional protein sources. Beyond their potential in the food industry, insects offer a wide range of novel ingredients with promising applications in various industrial sectors. This presentation explores the diverse compounds derived from edible insects and their potential uses in industries such as pharmaceuticals, cosmetics, and materials science. Insects are rich in proteins, lipids, chitin, and other bioactive compounds that can be extracted and purified for specific applications. For instance, insect-derived proteins exhibit unique functional properties, such as emulsification, foaming, and gelling, making them suitable for use in food formulations and biomaterials. Insect lipids, particularly those high in omega-3 fatty acids, present opportunities for the development of nutritional supplements and pharmaceutical products. Moreover, the exoskeletons of insects are composed of chitin, a valuable biopolymer with applications in wound healing, tissue engineering, and drug delivery systems. Chitin and its derivative, chitosan, possess antimicrobial, antioxidant, and anti-inflammatory properties, making them attractive candidates for biomedical and cosmetic applications. The presentation will highlight the processes and methods employed to obtain these novel ingredients from edible insects. It will also discuss the challenges and opportunities associated with scaling up insect processing to meet industrial demands. Furthermore, the environmental and socio-economic benefits of utilising insect-derived ingredients will be addressed, emphasising their potential to contribute to sustainable development goals. By showcasing the diverse range of novel ingredients from edible insects and their industrial applications, this presentation aims to stimulate further research and innovation in this emerging

field. It will provide valuable insights for researchers, industry professionals, and policymakers interested in exploring the untapped potential of insects as a source of sustainable and functional materials.

FOOD SERVICE AND HOSPITALITY (FSH)

ILFSH1

Harnessing Data Analytics for Enhanced Decision-Making in Foodservice Management

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In today's dynamic foodservice landscape, data analytics emerges as a critical compass, guiding strategic decisions amidst shifting consumer preferences and operational complexities. This keynote illuminates how data analytics revolutionises decision-making processes within foodservice management, driving efficiency, profitability, and customer satisfaction. Attendees explore the transformative potential of data analytics, uncovering actionable insights from vast data streams to inform strategic initiatives. From predictive modelling to trend analysis, this keynote showcases how data-driven approaches empower businesses to anticipate trends, mitigate risks, and capitalise on emerging opportunities. Moreover, attendees discover how data analytics enhances operational efficiencies, optimising inventory management, supply chain logistics, and staffing levels. Through real-world examples and practical strategies, this keynote equips foodservice professionals with the tools to thrive in an increasingly data-driven landscape, ensuring their businesses remain competitive and adaptable in an ever-changing industry.

ILFSH2

Unveiling the Status Quo of Global Food Tourism Phenomenon

Eerang Park

School of Business and Law, Edith Cowan University, Western Australia

An increasing number of food-enthusiastic tourists visit places, and their experience-seeking behaviours in loco become more intense. Especially in Asia, the proliferation of food-themed media and the focus of much of the media coverage on food(ways) have ignited the popularity of food tourism in the region, and tourists become more knowledgeable about local food. The food service and hospitality sector in destinations likely faces those demanding food tourists more frequently. The rapid development of food-related activities has diversified food experience spaces and sites in a destination, which means that food-related tourism activities go beyond the scope of conventional tourism and hospitality and thus, are essential to the formation and evolution of destination foodscapes. Food is believed to be the complex experience of the culture, history, and people of the destination. However, a business-driven approach to the food tourism phenomenon tends to overlook the important contextual backgrounds and the underlying mechanisms through which tourists' food experiences are constructed, interpreted, and sustainably consumed in local contexts. Food tourism activities are linked to various social settings, including multicultural communities, diverse industries and economies of societies, historical settings, and environmental settings, all of which generate meanings via the (co)production and (co)consumption of food between locals and tourists. The food service and hospitality sector is, therefore, at the heart of the co-creation process of local gastronomic experiences. Dr Eerang Park will delve into the meanings of tourists' food experiences and discuss the implications for food services and hospitality in food destinations, as evidenced by multiple research projects that have been primarily conducted in Asia.

ILNGT1

Engineering Advances - High Pressure Thermal Processing

Kai Knoerzer

Commonwealth Scientific and Industrial Research Organisation, Australia

Innovative food processing technologies, such as high pressure processing at low and elevated to high temperatures, have gained increasing interest over the last decade as they can be applied to manufacture safe foods with better sensory and nutritional properties, and in fact induce textural changes in the product that cannot be achieved by any other means. While high pressure processing at low temperatures (HPP) has been commercially applied for >15 years, high pressure thermal processing (HPTP) is yet to be commercialised due to the lack of equipment available that operates at high temperatures and industrial scale. HPTP has been hailed as the next disruptive technology in the food industry and will play an important role towards satisfying consumer demand for high quality, safe and innovative products. The presentation will highlight recent advances in HPTP engineering, leading, for the first time, to the commercial availability of the technology at industrial scale.

ILNGT2

Leveraging Nonthermal Processes for Upcycling Food Waste: An Ultrasound Perspective

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Researchers are exploring innovative food processing methods to promote sustainable food production and establish a circular economy. There is growing interest in using food waste and its by-products, like shells, peels, pomace, and seeds, as valuable resources. Extracting compounds such as starch, protein, minerals, and bioactive materials from these waste streams shows promise for the ingredient and packaging industries. Nonthermal processes, traditionally used for preservation, now serve multiple functions including extraction, structure formation, texture modification, and crosslinking. Ultrasound technology, an example of a nonthermal process, is relevant for sustainable practices. This presentation discusses how ultrasound technology can contribute to upcycling efforts, using case studies of cockle shells and blackcurrant pomace. It emphasises repurposing food waste for the nutraceutical and packaging sectors, promoting eco-friendly and resource-efficient practices in food processing.

ILNFF1

Green Extraction of Functional Food Ingredients from Selected Fruits and Agro-wastes

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Efficient extraction of functional ingredients (FIs), such as plant phenolics, is a key step toward investigating their potential nutraceutical applications. Because of variations in chemical structures, biological activity, and source availability, extraction of phenolics from different plant sources using a single analytical technique is challenging. Traditional solvent extraction of plant phenolics may pose serious food quality and safety concerns. The functional food and nutraceutical industry is currently experiencing an increase in demand for pure and healthy natural products/extracts produced by green extraction. This lecture covers various types of functional food ingredients, with a particular focus on plant phenolics, as well as the principles and applications of specific green extraction methods such as ultrasound-assisted extraction, supercritical fluid extraction (SFE), enzyme-assisted extraction, and plant milking technology. In particular, ultrasound-assisted-extraction and enzyme-assisted SFE of phenolics from fruits and agro- wastes, as well as their GC-MS and LC-MS characterisation, are covered. Ultrasonic-assisted extraction was demonstrated to be a viable green route for extracting phenolics from olives and jujube fruit. Optimised enzyme-assisted extraction using response surface methodology (RSM) and artificial neural networking (ANN) techniques was found to be an effective method for recovering phenolic acids and flavonoids from Capparis fruit, balsam apple, and mulberry leaves. While, enzyme-assisted SFE has been shown to be an effective green method for extracting non-extractable polyphenols (NEPPs) from black tea residue and pomegranate peel. Field-emission scanning electron microscopy (FE-SEM) revealed significant changes in the ultrastructure of residual materials, indicating that enzymatic pretreatment effectively cleaved cell wall glycosidic connections, facilitating NEPPs liberation. The devised green extraction methods can be utilised to effectively recover polyphenols from a variety of fruits and agricultural wastes, with potential functional food and nutraceutical uses.

Nutrition for Healthy Ageing: Is There a Role for Functional Food?

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The rapid ageing of the global population makes increasingly necessary the promotion of healthy lifestyles to prevent/delay the onset of age-related diseases. Consuming a balanced diet that includes nutrient-rich foods, such as fruits, vegetables, whole grains, lean proteins, and healthy fats, has been linked to a lower risk of chronic diseases and better overall health in older adults. Specific dietary factors that have been found to be beneficial for healthy ageing include adherence to a Mediterranean-style diet, Okinawa diet, Dietary Approaches to Stop Hypertension (DASH) diet, and caloric restriction as well as the healthy eating index. The use of functional foods could also significantly help to maintain physical and cognitive function and prevent age-related disease, particularly among high-risk groups. Ageing is associated with excessive production of reactive oxygen species (ROS), accelerated by incorrect eating and behavioural habits, which are considered causal elements of oxidative stress, leading to tissue and organism ageing. Functional food such as green tea, gingerol, microalgae, tropical fruits, vegetables and herbs have been studied for its properties in prevention of health-related diseases. Nevertheless, scientific evidence from human clinical trials is still lacking. Clinical trials using functional foods provide several challenges than conventional trials: from the initial, implementation and final dissemination of findings of the trials. Thus, it is important for the researchers to design and plan the trial to provide strong experimental evidence to establish causal relationships between functional food components and health and disease/ disease risk. Particular attention should be given in optimising the quality of the data. Studies should be short enough to optimise subjects' compliance and cost effective; but they should also be lengthy enough to ensure biological efficacy; by taking into the consideration of the active food ingredients. A well designed clinical studies, is very much needed to highlight the health benefit of a wide range of functional foods available, particularly in the region; leading to substantial health claims that has the potential to promote the nation's agroindustry and improve the health and wellbeing of the ageing population.

ORAL PRESENTATION SESSIONS

FASQ 3rd IFRC 2024 002-166**Reduction of Aflatoxin M1 (AFM1) in Buffalo Milk Yoghurt as Affected by Fat Percentage, Starter Culture and Processing Parameters**Aimie Syahirah Ibrahim¹, Rashidah Sukor^{1,2*}, Anis Shobirin Meor Hussin¹, Aliah Zannierah Mohsin¹¹Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Laboratory of Food Safety and Food Integrity, Institute of Tropical Agriculture and Food Security, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Buffalo milk is a widely consumed dairy product known for its creamy texture and nutritional benefits. However, concerns regarding aflatoxin contamination have emerged, posing significant food safety challenges. This study aims to evaluate the effect of fat percentage of milk, different types of starter culture, heat treatment and incubation time to the stability of aflatoxin M1 (AFM1) in buffalo milk yoghurt. Buffalo milk samples were collected from Hulu Langat, Selangor and tested for presence of AFM1. Buffalo milk yoghurts were prepared at 1, 3.5 and 7% of fat percentage. Each sample was spiked with 2.5 and 5.0 ng/mL of AFM1. The samples were then inoculated with two different types of mixed inoculums (ESY and YMT), treated at 60°C, 30 min and 90°C, 10 min and incubated at 40°C for 12, 14 and 16 h. Aflatoxin M1 analyses in the buffalo milk yoghurt were conducted using enzyme-linked immunosorbent assay (ELISA) with a quantitation range of 25 – 500 pg/mL. The AFM1 were found to be significantly reduced ($p < 0.05$) among fat content, showing more profound reduction at lower fat percentage. Meanwhile, different inoculums did not show much difference in terms of AFM1 content in all % of fat. Aflatoxins are known as a thermostable compound, it was affirmed in this study that AFM1 were stable after treatment of heat at 60°C, 30 min and 90°C, 10 min. In contrast, longer incubation time resulted in reduced AFM1 concentration in most samples. These findings highlight the importance of selection of starter culture and processing parameters in manufacturing of yoghurt from buffalo milk to lessen the food safety risk. Frequent monitoring and controlling AFM1 levels in buffalo milk through farm management is imperative to ensure consumer safety and compliance with food safety standards. Further research and intervention strategies are essential to mitigate aflatoxin contamination risks in buffalo milk and other dairy products.

Corresponding author: rashidah@upm.edu.my*Keywords: aflatoxin M1, yoghurt, buffalo milk, processing parameters, ELISA****FASQ 3rd IFRC 2024 013-039****Effect of Different Composition of Coconut Milk and Prolong Processing of Beef Rendang on Oxidation Reaction of Lipid and Protein**Siti Nabilah Karim¹, Rashidah Sukor^{1,2*}, Nuzul Noorahya Jambari^{1,2}, Maimunah Sanny^{1,2}, Alfi Khatib³¹Institute of Tropical Agriculture and Food Security, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia³Department of Pharmaceutical Chemistry, Kulliyyah of Pharmacy, International Islamic University Malaysia, 25200 Kuantan, Pahang, Malaysia

Rendang is a traditional food cuisine that is commonly served during festivals especially in Indonesia, Brunei, Singapore and Malaysia. This cuisine normally contains meat protein, either chicken or beef, cooked in a prolonged cooking time of up to 5 hours in a sauce mainly made from various spices and coconut milk. Despite the rich flavour, aroma and scrumptiousness of rendang, the prolonged processing introduces oxidation reactions from the ingredients of protein and fat. Lipids and proteins when heated, undergo hydrolytic, oxidative, polymeric, and other degradative changes, which could modify their physical and biological properties, therefore promoting lipid oxidation and protein co-oxidation reaction. This study aims to evaluate the effect of different percentages of coconut milk and heating time on the oxidation reaction of lipid and protein in beef rendang. Rendang samples were prepared in different percentages of coconut milk (0%, 25%, 50%, 75%, 100% and 125%) and cooked at 120 °C at different stages from 0-4 hours of cooking time (control, wet, dry, intermediate floss and floss). The freeze-dried rendang samples were subjected to the anisidine value (AV) and conjugated dienes (CD) analysis for lipid oxidation reaction, while total soluble protein and carbonyl content were analysed for protein co-oxidation reaction. The results showed that there was a significant difference ($p < 0.05$) for conjugated dienes and anisidine values after prolonged heating of control (0 h) to 4 hours of beef rendang at different percentage of coconut milk. The lipid oxidation values were in good correlation with the protein co-oxidation results. There is a potential health risk of consuming oxidised food such as beef rendang, this study provides a new knowledge to consumers regarding selection and proportions of ingredients as well as cooking conditions for beef rendang in terms of food safety aspects.

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This review paper explores the recent developments in the design and development of Radio-Frequency Identification (RFID)-based sensors for applications in the realm of food spoilage. As the demand for efficient and intelligent packaging solutions continues to rise, RFID technology has emerged as a promising avenue to address critical challenges related to food quality, safety, and traceability. The paper begins by providing an overview of the fundamental principles of RFID technology, its components, the types of tags available, and its operating frequencies. It delves into the diverse applications of RFID systems in the spoilage section to monitor key parameters such as temperature, humidity, gas composition, and freshness within food packaging environments. The review encompasses a thorough analysis of existing RFID-based sensor prototypes, exploring their design architectures, sensing mechanisms, and integration approaches. Special emphasis is placed on the advantages offered by RFID-based sensors, including real-time monitoring capabilities, non-intrusive data acquisition, and seamless integration with information systems. The review also addresses challenges associated with energy harvesting, communication range, multi-tag collision and cost-effectiveness, proposing potential strategies to mitigate these limitations. Furthermore, the paper highlights the significance of RFID-based sensors in ensuring food safety by providing accurate and timely information throughout the supply chain. In conclusion, this comprehensive review paper not only surveys the current state of RFID-based sensors for food packaging but also identifies key research directions and potential avenues for future developments. The insights provided in this review contribute to the ongoing efforts to harness RFID technology for creating smarter and more efficient solutions in the field of food packaging, ultimately promoting a safer and more sustainable food supply chain.

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Keywords: food packaging, RFID, RFID sensors, food spoilage, food safety

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Double water-in-oil-in-water (W1/O/W2) emulsion can be used to control the release of sodium chloride (NaCl) encapsulated within the internal aqueous (W1) phase via destabilisation of the droplets that can be achieved through the phase transition of coconut oil at different temperatures. This system can potentially be applied for the development of low salt foods as the immediate release of salt during gustation may enhance perception. In this study, droplet stability, thermal properties, and the release of NaCl from coconut oil based W1/O/W2 emulsions with change in temperatures were investigated. Emulsion samples were prepared by using a two-step homogenisation process with different ratios of W1/O to W (1:1, 1:2, 1:3 and 1:4) containing various concentration of NaCl ranging from 0% to 0.60% w/v. Double emulsion prepared with ratio 1:1 and at higher salt concentration was found to be most stable with change in temperatures and during 4 weeks of storage whereby significant change ($p < 0.05$) was only observed after 2 weeks of storage for its physical characteristics in terms of droplet size measurement, viscosity as well as creaming index. The rheological analysis of samples prepared with 1:1 ratio at different NaCl concentrations showed a pseudoplastic behaviour whereby increase in viscosity was observed with increase in salt concentration. Moreover, significant increase ($p < 0.05$) in the percentage of salt released was observed as the temperature increased to 37 and 40°C. In addition, the melting points of samples containing salt were in the range of 24-25°C as compared to samples without salt. Photomicrographs showed extensive droplet destabilisation and increase in the fluorescence intensity of the W2 with change in temperature. The results indicated that the controlled release of salt from coconut oil-based double emulsions can be achieved with change in temperature due to extensive droplets destabilisation whereby this system can potentially be used in the development of low salt food products.

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Keywords: coconut oil double emulsion, emulsion stability, rheological properties, encapsulation efficiency, salt release

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Aflatoxins are carcinogenic mycotoxins produced predominantly by *Aspergillus flavus* (*A. flavus*) and *Aspergillus parasiticus* (*A. parasiticus*) as secondary metabolites and secreted through exocytosis. Aflatoxin contamination in food products and poultry and livestock feeds is a global concern due to its harmful effects on human and animal health. Among the different types of aflatoxins, aflatoxin B1 (AFB1) has been identified as the most threatening foodborne mycotoxin. Biodegradation of AFB1 using beneficial microorganisms and medicinal plant products has been reported as one of the effective, economical and environmentally friendly approaches to reduce the toxic effects of AFB1 in food and feed products. We studied the potential of probiotic bacteria isolated from fermented foods and symbiotic bacteria obtained from the gut of the rice weevil (*Sitophilus oryzae* L.) for the reduction/detoxification of AFB1 under in vitro conditions. Bacteria were isolated from fermented foods (yoghurt, laban, idli batter) and gut of the rice weevil (*Sitophilus oryzae* L.; Coleoptera: Curculionidae), and tested for their potential to inhibit *A. flavus* and to remove/detoxify AFB1 under in vitro conditions. The degradation of AFB1 was confirmed by liquid chromatography-mass spectrometry (LC-MS) analysis. A few isolates of *Bacillus* spp. and *Pseudomonas aeruginosa* obtained from the rice weevil gut showed direct antagonistic effects on a toxigenic isolate of *A. flavus* and induced morphological abnormalities in the fungal hyphae. These bacterial isolates could remove AFB1 up to 84% from the culture medium after incubation at 30°C for 48 h. The cell-free culture supernatants of the bacterial isolates showed degradation of AFB1 in vitro. The degradation of the toxin was further confirmed through LC-MS analysis, which identified numerous degradation products. The beneficial bacteria isolated in this study may be promising candidates for application in food and feed industries to remove/degrade AFB1.

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Keywords: detoxification, LC-MS analysis, mycotoxins, rice weevil, *Sitophilus oryzae*

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Fermented condiments are integral to West African culinary traditions, enriching dishes nutrition and sensory aspects. Among these, fermented okpeye, crafted from *Prosopis africana* seeds, stands out for its unique flavour and aroma. Microbial enzymatic activity during fermentation contributes to its distinct qualities. However, minimal information on okpeye profiling has been found. This study aims to assess the fundamental information and quality of okpeye seasoning from different manufacturers. Okpeye samples from various sources in Nsukka L.G.A, Enugu State, Nigeria, and one produced in Universiti Kebangsaan Malaysia (UKM) were analysed for their physicochemical characteristics such as proximate composition, amino acid composition, Gama-aminobutyric acid (GABA) content, volatile compounds, textural attributes and colour analysis. The proximate revealed the presence of higher crude protein (54.2 – 58.9 %), moisture (11.8 – 21.0 %), crude fibre (1.5 - 2.8%), fat (3.5 – 8.0 %), ash (5.0 – 6.0 %) and carbohydrate content (9.82 – 16.4 %) in okpeye. The amino acid profile of the fermented okpeye was found to contain histidine (4.65 – 6.35%), lysine (1.40 -1.74%) methionine (0.47 – 0.77%), phenylalanine (0.78 – 0.98%), valine (0.69 – 0.86%) and isoleucine (0.64 – 0.81%) and non-essential amino acids; serine (2.50 – 3.26%), hydroxyproline (2.09 – 2.39%) and glutamic acid (1.83 – 2.29%). This study showed variations in GABA content among samples, with okpeye C exhibiting the highest concentration of 480.6 ± 62.4 g/L and okpeye D with the lowest concentration of 228.6 ± 56.7 g/L, with potential implications for optimising fermentation conditions. Volatile compounds, dominated by dimethyl trisulphide, differed between samples, influenced by fermentation conditions. This research provides valuable insights into the quality and nutritional aspects of fermented okpeye seasoning. It offers a foundation for further study and potential improvements in its production, contributing to both culinary traditions and the health and well-being of those who consume it.

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Keywords: GABA, fermented foods, okpeye, *Prosopis africana*, indigenous food, West Africa

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The World Health Organization (WHO) estimates that by 2025, approximately 167 million people are overweight or obese. Obesity leads to a range of non-communicable diseases (NCDs), such as type 2 diabetes, cardiovascular disease, hypertension, stroke, cancers, and mental illness. The rise of obesity and diseases linked to obesity in many countries has pushed food companies to come up with new products that have less fat. Fat content contributes to the fat crystal network in pastry margarine, which is responsible for its texture. Decreasing the fat content indirectly will increase the water content in margarine, which could lead to a soft texture and water separation. When the fat content of pastry margarine is reduced, the puff pastry becomes less flaky, crispy, and has a dry texture. These problems can be solved by structuring the water phase in pastry margarine through incorporation of long-chain polysaccharide molecule due to its thickening ability. In this study, the effects of sodium alginate (SA) as a fat replacer through water phase structuring in low-fat pastry margarines were studied. Low-fat pastry margarines containing SA in different fat/aqueous phase ratios (60:40; 70:30; 80:20) were formulated, and their physicochemical properties including fatty acid compositions (FAC), slip melting point (SMP), solid fat content (SFC), iodine value (IV), oil binding capacity, texture profile, and energy content were determined. The results showed that addition of SA in low-fat pastry margarine has significantly ($p < 0.05$) changed its hardness and energy content. In comparison to the other low-fat pastry margarines, the pastry margarine 60:40 2% SA had the hardest texture and the lowest energy content. Therefore, this formulation was applied in puff pastry applications and was compared with puff pastry made of full-fat pastry margarine. The puff pastries were evaluated on physical properties and nutritional content. Sensory evaluation was also conducted to access consumer preference. It was observed that puff pastries prepared from pastry margarine 60:40 2% SA had significantly higher thickness and pastry lift ($p < 0.05$). Besides exhibited significantly lower energy ($p < 0.05$) and fat content as compared to puff pastries made from margarine 85:15. Sensory evaluation results showed that puff pastries made from pastry margarine 60:40 2% SA was significantly ($p < 0.05$) preferred in terms of appearance, volume, texture, flavour and overall acceptability than pastries made from pastry margarine of higher fat content. In conclusion, as a fat replacer, SA contributed to the desirable properties of low-fat margarine which further enhanced the performance and acceptance of the developed puff pastry. As low-fat pastry margarine contains higher moisture compared to full-fat pastry margarine, future studies are recommended to carry out shelf life study and microbiological test on the low-fat pastry margarine and puff pastries throughout the storage period.

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Keywords: bakery products, low calorie, obesity, physicochemical properties, stabiliser

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BAs are widely presented in meat and fish because of the bacterial decarboxylation of amino acids where the -carboxyl groups are removed from precursor amino acids. Excessive intake of BAs can cause adverse effects on the human nervous and respiratory systems, even anaphylactic shock and death. Alkylphenols (APs) are a diverse group of chemical compounds that presence a substituted phenolic ring and an alkyl chain, with a carbon number ranging from 1 to 12. APs are generally stable, and they can enter living organisms through the food chain, disrupt normal endocrine function and alter genetic information, leading to carcinogenic, teratogenic, and mutagenic effects in humans. Development of more selectivity and sensitivity methods for the determination of BAs and APs from the complicated sample matrix, e.g., meat, fish and milk, is still needed. First, hydrophobic mesoporous silica MCM-T-H with excellent adsorption capacity and fast kinetic extraction to BAs was synthesised based on mesoporous MCM-41 and was then utilised as the coating material of the SPME Arrow. Compared to the commercial SPME fibre, the MCM-T-H-SPME Arrow has the advantages of being low cost, robust and higher extraction capacity. The MCM-T-H-SPME Arrow GC-MS method developed can accurately monitor the variation of BAs in pork and fish samples with good recovery, which provides a promising alternative to conventional BA detection methods and extends the application of the SPME Arrow to food safety. Second, 4-pentylbenzoic acid modified mesoporous UiO-66 (4-meso-UiO-66) was synthesised through a post-modification strategy. It has high specific surface area and mesoporous structure. XPS and nitrogen sorption-desorption results show that the extraction mechanism of 4-meso-UiO-66 to APs is the electrostatic interaction of APs with Zr-O and the size exclusion effect. The optimised and validated SPME Arrow-HPLC-UV method achieved high sensitivity and good repeatability for analysing APs in milk.

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Keywords: SPME, mesoporous materials, food safety

FASQ 3rd IFRC 2024 122-114**Determination of Hazardous Compounds in Food Based on Functional Porous Nanomaterial Coated Solid Phase Microextraction and Portable Mass Spectrometer**

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Animal-derived foods are an indispensable part of daily diets, but in recent years, there has been a surge in food safety issues. It is crucial to effectively detect harmful substances in food. Rapid detection technology is a key technology for "source control," "on-site control," and "end-to-end control" from farm to table, aimed at harmful residue. It is an important component of the national food safety assurance technology system. We synthesised hydrophobic mesoporous metal-organic frameworks as selective coating materials for SPME Arrow and conducted HPLC-UV detection. This method exhibits strong selectivity and high sensitivity. Additionally, we coupled the SPME-Arrow prepared by coating blade spray method with a portable mass spectrometer to achieve short analysis time and on-site in-situ mass spectrometric analysis. Furthermore, we developed efficient, rapid, and cost-effective hydrophobic mesoporous silica solid-phase microextraction arrows for enriching biogenic amines, as well as mesoporous MOF materials with high adsorption selectivity for adsorbing alkylphenols in milk.

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Keywords: on-site detection, SPME arrow, biogenic amines and alkylphenols

FASQ 3rd IFRC 2024 124-113**POCT Meat Authenticity Identification Based on High Throughput Rapid DNA Isolation, Lateral Flow Strip, and Isothermal Amplification Techniques**

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Authenticity is a critical quality attribute of food. However, the issue of adulteration in meat products remains a significant concern worldwide, as evidenced by incidents such as China's "Beef Paste Incident" and Europe's "Horse Meat Fiasco Incident," which have drawn public attention and highlighted the lack of guaranteed authenticity in meat. Consequently, there is a growing demand for the development of simple, accurate, and efficient authenticity identification techniques for meat. In our group, we have developed several meat authenticity identification methods: (1) We developed a mesoporous UIO-66-NH₂-coated solid-phase microextraction (SPME) device for rapid DNA extraction. This device enables the isolation and purification of DNA from meat samples within 1 minute, with DNA concentration and purity comparable to that of commercial kit methods. Furthermore, we fabricated a high-throughput SPME system comprising 96 SPME devices, allowing for the simultaneous extraction of DNA from 96 meat samples. (2) We utilised latex microspheres and colloidal gold as visual tracer signals to develop lateral flow strip (LFS) assays, combined with multiplex PCR and multiplex recombinase polymerase amplification (RPA). These LFS assays enable quantitative identification of meat species in less than 10 and 15 minutes, respectively. (3) We evaluated four mainstream isothermal amplification techniques-loop-mediated isothermal amplification (LAMP), cross-priming amplification (CPA), strand exchange amplification (SEA), and RPA. Among these techniques, LAMP was identified as the most cost-effective and suitable rapid detection technique for single-weight detection. Subsequently, we developed a rapid assay based on LAMP and cleavable molecular beacon technologies for identifying chicken-derived components, allowing real-time amplification detection within 17 minutes. These studies offer significant advantages for point-of-care testing applications, providing rapid, accurate, and efficient methods for identifying meat authenticity.

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Keywords: meat authenticity, SPME DNA extraction, isothermal amplification

Fermented *Cleome gynandra*: Unveiling its Antioxidants, Mineral Release, and Cytotoxicity

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Cleome gynandra, commonly known as “cat’s whisker,” or “maman” has been processed into several Malaysian cuisine such as rendang and pickles. However, the presence of anti-nutritional compounds such as oxalate may limit the potential health benefits of most green leafy vegetables. Therefore, this research aims to explore the antioxidant activities, lactic acid bacteria (LAB), oxalate content, and mineral content of fermented *Cleome gynandra* (FCG) and pasteurised-fermented *Cleome gynandra* (PFCG). Three antioxidant assays including FRAP, ABTS, and DPPH Assays were used to determine the antioxidant capacity of the samples. The effect of pasteurisation and fermentation of the sample on the release of oxalate and mineral content was assessed spectrophotometrically and by Atomic Absorption Spectroscopy (AAS) respectively. The potential toxicity of fresh *Cleome gynandra* (CG), FCG, and PFCG using Brine Shrimp Lethality Assay (BSLA) was also determined. The findings reveal that FCG has the significant ($p < 0.05$) lowest EC50 indicating the highest antioxidant concentration compared to CG and PFCG in all antioxidants tested, namely DPPH (1.85 ± 0.02 mg/mL), ABTS (0.183 ± 0.004) and FRAP (0.45 ± 0.02 mg/mL). FCG also exhibited the highest enumeration of LAB (11.33 ± 0.58 log CFU/mL) followed by PFCG and CG. The increase in antioxidant activities of FCG compared to the CG might be due to the biochemical changes affected by LAB fermentation, releasing the bound phenolic into free phenolic compounds. The fermentation showed a significant increment in the release of magnesium and oxalate content of *Cleome gynandra*. FCG showed the lowest LC50 value (17.79 ± 0.028) indicating the highest value of toxicity compared to CG sample and fermented and PFCG. Therefore, it can be concluded that fermentation may improve the nutritional properties of *Cleome gynandra*, however may cause toxicity at certain concentrations. Thus, studies on the biogenic amine and phenolic profiling are recommended to understand the toxicity of fermented *Cleome gynandra* further.

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Keywords: antioxidant, fermentation, lactic acid bacteria, oxalate, pasteurisation

Unveiling Fermencin B2: A Novel Antibacterial Agent for Targeted Inhibition of *Staphylococcus aureus*

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Staphylococcus aureus (*S. aureus*) is one of the most important pathogenic bacteria causing bacterial foodborne illness outbreaks. Identifying bacteriocins is promising as its characteristics of safety and with broad applications. In this study, we first screened the novel bacteriocin-producing lactic acid bacteria (LAB) from Chinese fermented vinegar Pei, followed by isolating, identifying, and characterising novel bacteriocins by using cation-exchange chromatography and LC-MS/MS. Then, the key gene for bacteriocin production was identified by third generations of whole-genome sequencing. The structure, minimum inhibitory concentration (MIC), and heat stability of Fermencin B2 were determined by fourier transform infrared (FTIR) spectroscopy and biochemical assays. The inhibitory activity and mechanisms of Fermencin B2 against *S. aureus* were analysed by scanning electron microscopy (SEM), nucleic acids and LDH leakage assays, flow cytometry, and molecular docking analysis. A bacteriocin-producing lactic acid bacterium was screened, and a bacteriocin (Fermencin B2) from it was identified with a MIC of 1.702 mM against *S. aureus*. The *dltA* was identified as a key gene for bacteriocin production. Meanwhile, Fermencin B2 is heat-insensitive, non-haemolytic, and is a cationic peptide with a β -fold and β -turn structure. Furthermore, Fermencin B2 increased the permeability of *S. aureus* cell membranes within a short period, permanently disrupting the cell membrane by inhibiting $\text{Ca}^{2+}/\text{Mg}^{2+}$ -ATPase activity, leading to the release of nucleic acids. Molecular docking revealed the potential for Fermencin B2 to inhibit key enzymes in *S. aureus*. Overall, Fermencin B2 could be a novel antibacterial agent for targeted inhibition of *S. aureus*.

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Keywords: bacteriocin, interaction mechanisms, identification

A Study on Antibioqram and Prevalence of *Staphylococcus aureus* Isolates from Meat Samples Collected in and around Tirupati

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Staphylococcus aureus is a commensal organism that colonises nasal mucosa in 25-30% of the healthy human population and is responsible for a wide range of human diseases including serious nosocomial infections. By studying AMR patterns, details related to antimicrobial-resistant strains involved, their early diagnosis and treatment, guiding empiric therapy, and monitoring of their resistance trends can be possible. Staphylococcal protein A (spa) is an important virulence factor that enables it to evade host immune responses. Spa typing is a genotyping method that is used to identify the presence of gene polymorphism in a variable number of 24 bp repeat sequences in the X-region. A gene variable repeat region (spa typing) provides a rapid and accurate method to discriminate *Staphylococcus aureus* outbreak isolates from those deemed epidemiologically unrelated. Hence, the present study was designed to know the prevalence of spa types and antimicrobial resistance among different meat samples in and around Tirupati. 250 meat samples (mutton-60, beef-30, pork-30, Chicken-100, Fish-30) were screened for identification of *S. aureus* by conventional method and the presumptive isolates were confirmed by PCR targeting the Nuc gene. Furthermore, the isolates were subjected to spa typing by PCR and the results revealed the four different patterns viz., P1-300(45/136,33%), P2-800,700,500,400(28/136,20.5%), P3- 300,400 (17/136,12.5%) and P4-Miscellaneous (33.8%) bp. Simultaneously, the confirmed *S. aureus* isolates were studied for antimicrobial resistance patterns against Ciprofloxacin, Ampicillin, Azithromycin, Tetracycline, Amoxycillin, Co-Trimoxazole, Vancomycin, Erythromycin, Ceftriaxone, and Cefoxitin antibiotics. In this study, varied zones of inhibition were found against different antibiotics viz., Ciprofloxacin (9-22mm), Ampicillin (0-17 mm), Azithromycin (0-21 mm), Tetracycline (0-18 mm), Amoxycillin (13-18mm), Co-Trimoxazole (0-23 mm), Vancomycin (0-19 mm), Erythromycin (10-18 mm), Ceftriaxone (0-8 mm) and Cefoxitin (0 mm) antibiotics. In conclusion, the presence of *S. aureus* in raw meat samples coupled with varied degrees of antimicrobial resistance from the study area suggests that there may be a possible transmission of AMR from food products to humans and there should be continuous monitoring of antimicrobial resistance regularly to ensure food safety and well-being of humans and animals respectively.

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keywords: spa typing, *Staphylococcus aureus*, meat samples, Tirupati, Andhra Pradesh, AMR

Assessment of *Fusarium* mycotoxins and Toxigenic *Fusarium* Species in Cereal Grains Marketed in Muscat, Oman

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Globally, cereal grains (Gramineae family) play an important role in dietary supply. It is a great source of energy for both humans and animals. It is rich of carbohydrates and fibres. In general cereal grains are susceptible to *Fusarium* infection which leads to production of their mycotoxins as secondary metabolites. *Fusarium* species is the major source of mycotoxins in food and feed. Mould growth and mycotoxin contamination can deteriorate cereal grains. *Fusarium* mycotoxins such as Fumonisin, deoxynivalenol and zearalenone can be frequently found in cereal grains. These mycotoxins are associated with specific health hazards in humans and domestic animals. A total of 90 cereal grains (wheat, corn, rice, barley) collected from local markets in Muscat, Oman Flour Mills Company and the Plant Quarantine Department, MAFWR, Oman were analysed in order to understand the magnitude of *Fusarium* mycotoxin (Fumonisin, deoxynivalenol and zearalenone) contamination. The detection and quantification of *Fusarium* toxins was performed using commercial ELISA kits. Furthermore, *Fusarium* spp. associated with the contaminated grain samples were isolated, and their mycotoxin producing potential was tested. None of the cereal grain samples tested exceeded the maximum tolerance level for mycotoxins fixed by the European Commission. A total of 19 *Fusarium* spp. associated with the contaminated grain samples were isolated and identified using molecular techniques. *F. verticillioides* was the most common, followed by *F. proliferatum*, *F. thapsinum* and *Fusarium chlamydosporum*. Two isolates each of *F. proliferatum* and *F. verticillioides* were found to produce fumonisin above 2000 µg/L. All tested *Fusarium* strains produced DON, with levels ranging from 26.5 to 212 µg/L. One isolate each of *F. proliferatum* and *F. verticillioides* was found to produce ZEN, however the levels were below 10 µg/L. Proper storage practices should be followed to avoid *Fusarium* growth and toxin production in the cereal grains.

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Keywords: mycotoxins, ELISA, cereal grains, *Fusarium* toxins

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Development of Appropriate QuEChERS Conditions for Efficient Determination of Multiple Mycotoxins in Processed Pork Products

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Mycotoxins, harmful secondary metabolites produced by certain fungi species, pose significant risks to both animals and humans, thus demanding insights crucial for the future of agriculture. Their stable properties lead to contamination during various stages of crop production, processing, and distribution, exerting adverse effects on food safety and global trade. This necessitates the development of advanced analytical methods to detect mycotoxins in agricultural products, particularly in heavily consumed commodities like pork. Employing innovative techniques such as Ultra-High Performance Liquid Chromatography coupled with Temperature Control Fluorescence Detector Light (UHPLC-TCFLD) provides invaluable insights for the future of agriculture. By simultaneously analysing multiple mycotoxins with fluorescent properties, this approach offers enhanced sensitivity and accuracy. Additionally, optimising extraction methods like Quick Easy Cheap Effective Rugged Safe (QuEChERS) ensures efficiency while minimising resource usage. Such advancements pave the way for rapid and reliable detection of mycotoxins in processed pork products, thus shaping the future of agricultural practices. These findings are pivotal for stakeholders in the agricultural sector, including policymakers, producers, and consumers, facilitating informed decisions to ensure food safety and sustainability. By addressing mycotoxin challenges, this research contributes to a future where agriculture thrives amidst evolving threats, ultimately safeguarding public health and enhancing the resilience of the food supply chain.

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Keywords: agricultural analysis, agriculture product safety, mycotoxin contamination, meat safety, food supply chain safety

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A Bibliometric Analysis of Utilising Infrared Spectroscopy Technology in Enhancing the Quality of Cocoa Through the Use of Vosviewer

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Infrared Spectroscopy is a non-destructive analytical tool, especially useful for assessing the chemical composition and physical quality characteristics of cocoa beans and cocoa products. It is fast, requires little or no sample preparation, has low operating costs, and is environmentally friendly. However, few studies have reported on the application of infrared spectroscopy in cocoa. The purpose of this research is to explore the research focus related to the application of Infrared Spectroscopy Technology in cocoa commodities. The methodology employed includes a literature review with a bibliometric analysis approach and systematic literature review, involving four stages: identification, screening, eligibility, and inclusion. The data were gathered from the Scopus database. The study results indicate an increase in publications related to the application of Infrared Spectroscopy Technology in cocoa commodities from 1988 to 2023. By delving into existing research, this study aims to provide better insight into the role and potential of infrared spectroscopy technology. Thus, through bibliographical analysis, this paper examines some studies on infrared spectroscopy technological interventions for cocoa published worldwide to describe the global output on the topic and define current research directions.

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Keywords: bibliometric, cocoa, infrared spectroscopy, quality, vosviewer

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Soybean is one of the staple food in Indonesia, where the primary soybean product is in the form of seeds. Soybean seed products are often mixed with other ingredients or undesirable adulterant, resulting from post-harvest activities, packaging and transportation. This causes a decrease in the quality and market value of soybeans. A non-destructive method using image processing with image segmentation is well known and quite good at displaying image data visually, especially with a user interface. This research aimed to conduct a study on the detection of soybean mixtures using image processing. The method used was image segmentation model based on direct HSV colour parameters and ANN with HSV parameters. The HSV colour samples of soybean and some adulterants (i.e. maize, mung bean and gravel) were used with levels of: 5%; 10%; 15%; 20% and 25% mixtures. HSV colour parameters were extracted from samples and used as input for HSV segmentation and ANN. The result showed that the direct HSV colour parameters segmentation produced a calibration equation of $y = 1.58 + 1.08$ with R^2 of 0.86. Its validation produced R^2 was 0.86 with RMSE of 3.9%. The ANN/HSV model produced a calibration equation of $y = 0.89 + 1.53$ with R^2 of 0.86. Its validation produced R^2 of 0.84 and RMSE of 1.5%. From the result it can be seen that both image segmentation using direct HSV colour parameters and the ANN/HSV were showing their good potential in further predicting adulteration in soybean sample.

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Keywords: soybean, image segmentation, HSV, artificial neural network

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Phytochemistry and Therapeutic Potential of *Moringa oleifera* Lam. against Some Food-borne Pathogens of Clinical ImportanceIdris S. Ibrahim^{1*}, Maryam H. Muhammad¹, Musa A. Abubakar², Umar Shittu³¹Department of Pharmaceutical Technology, Kano State Polytechnic, 3401 P.M.B Kano State, Nigeria²Department of Science Laboratory Technology, Kano State Polytechnic, 3401 P.M.B Kano State, Nigeria³Department of Biology, Isa Kaita College of Education Dutsin-ma, Katsina State, Nigeria

A significant number of plants have been utilised as dietary and phytomedicinal sources in enhancing human health. The present study was conducted to evaluate the antibacterial effects of ethanolic and aqueous leaf-extracts of *Moringa oleifera* against some food pathogens of medical importance. The present study was carried out at Kano State Polytechnic and Bayero University Kano, Nigeria. The leaves of the plant were extracted following standard methods (Soaking extraction and agar-well diffusion methods) to screen for potential antimicrobial substances. The crude extracts of the plant were also tested against standard reference strains including *Salmonella* Typhi ATCC 29212, *Escherichia coli* ATCC 11229, *Staphylococcus aureus* ATCC 6538 and *Pseudomonas aeruginosa* ATCC 15442 at different concentrations, with ciprofloxacin (30mg) being used as positive control. After the extraction techniques, the ethanolic extract was found to possess high contents of bioactive compounds compared to aqueous extract. The ethanolic extract exhibited the most remarkable antibacterial activity compared to aqueous extract. Hence, the most susceptible organisms for ethanolic extract were *E. coli* and *S. Typhi*, with diameter inhibition zone of 29 mm and 27 mm, followed by *S. aureus* (25 mm), respectively. The lowest was observed in *P. aeruginosa* with diameter of 22 mm. However, both extracts were found inactive against *P. aeruginosa* at 50 mg/mL. Both extracts also have shown to contain different amounts of bioactive components after phytochemical investigation. Thus, for this study, ethanol is indicated to be a better choice for bioactive components extraction compared to aqueous. The study confirmed the alternative source of medicine for food-borne and other enteric pathogens of clinical importance, and this may be attributed to the presence of phytochemical constituents of the tested plant.

Corresponding author: rahamagaida2022@gmail.com*Keywords: *Moringa oleifera*, pathogenic bacteria, antibacterial potential, phytochemical screening**

FB 3rd IFRC 2024 096-072

The Impact and Mechanism of Indigenous Microorganisms (IMO) Isolated from Fermented Banana Peel on the Growth and Bioactive Compounds of MushroomsNurul Solehah Mohd Zaini¹, Nurazlin Zainuddin¹, Nur Aisyah Syahirah Ahmad Fauzi¹, Khudair J. D. Abedelazeez¹, Bilal Agirman², Muhammad Hafiz Abd Rahim^{1*}¹Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, Malaysia²Department of Food Engineering, Faculty of Engineering, University of Cukurova, Turkey

Banana peels are promising biofertilisers due to their inherent post-fermentation bacteria. This research aimed to elucidate their bacterial profile and potential as biofertilisers through fermentation over 8 days at 30°C. Parameters such as pH, titrable acidity (TA), microbial counts, size, and species identification were assessed using selective agars and Polymerase Chain Reaction (PCR) techniques. In evaluating the biofertilising potential, the study examined each bacterial isolate and fermented banana in-vivo potential as biofertiliser via phosphate solubilising activity, Indole-3-acetic acid (IAA) acquisition, and antifungal activity against *Trichoderma* sp. The treatments were further applied to mushrooms for their in-vitro potential as plant growth promoters. Then, the harvested mushroom extracts were further analysed for their total phenolic content (TPC) and antioxidant properties. Fermentation induced a decline in pH and an increase in TA and colony counts. The PCR method identified *Liquorilactobacillus mali* (*L. mali*) as the predominant LAB on Day 4 and Day 8. For the biofertiliser potential, treatments with *L. mali*, *Lactiplantibacillus plantarum* (*L. plantarum*), 4 day and 8 day-fermented banana peels exhibited the highest phosphate solubilising effect with 2.10cm, 2.23cm, 2.37cm, and 2.40cm clear zone respectively on Day 8. For the IAA hormone acquisition, *L. mali* demonstrated the highest acquisition with 12.67ppm, followed by *Leuconostoc mesenteroides* (*L. mesenteroides*) (8.83ppm). *L. mali*, *L. mesenteroides*, and *L. plantarum* displayed significant antifungal properties, with maximal inhibitory activity (98.52%, 99.62%, and 97.99%) lasting until day 4. For the mushroom growth development, *L. mali*, *L. mesenteroides*, and *L. plantarum* exhibited predominant efficacy. Finally, treatment with *L. plantarum* increased the TPC of mushrooms, while treatment with *Priestia megaterium* (*P. megaterium*) demonstrated significant antioxidant properties in mushrooms. These findings suggest that fermented banana peels and their bacterial isolates, particularly *L. mali*, *L. plantarum*, *L. mesenteroides*, and *P. megaterium* have potential applications as biofertilisers, offering a sustainable approach to agricultural practices by utilising food waste.

Corresponding author: muhdhafiz@upm.edu.my*Keywords: banana peel, fermentation, biofertiliser, mushroom growth, sustainable agriculture**

FB 3rd IFRC 2024 130-106**Physicochemical Characteristics of Nata De Cassava with Variations in Fermentation and Concentration of Mung Bean Sprout Extract (*Vigna radiata*) as a Source of Protein**

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Nata is a food product rich in cellulose which has the potential to become a functional food. In general, the basic ingredient for nata comes from coconut water, but as an effort to innovate in developing nata products, other alternative ingredients can be used, namely cassava tubers. This research used a completely randomised design, with research variables namely variations in fermentation time and the addition of different mung bean sprout extracts. The fermentation process was carried out for 9 days, 11 days and 13 days, while the green bean Sprout extract added was 0.75%, 1% and 1.25%. Physicochemical analysis of nata samples includes water content, dietary fibre, pH, texture and colour. Research data were analysed using ANOVA and continued with the DMRT test. The research results showed that the water content of nata ranged from 75.28% - 93.49%. The amount of dietary fibre in nata ranges from 1.05% to 2.54%. The pH of nata ranges from 3.76 to 3.91. The hardness level of nata ranges from 81.93N to 132.25N. Nata brightness level (L^* value) ranges from 57.54 to 64.48; a^* value nata values ranged from -1.88 to 1.08; The b^* value of nata ranges from 0.58 to 3.02. Variations in fermentation time and the percentage of added green bean sprout extract can influence the characteristics of nata.

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Keywords: nata, cassava, sprouts, green beans, fermentation

FB 3rd IFRC 2024 150-140**The Antibacterial Effects of Surfactin-based Composite Antibacterial Agents on Dominant Spoilage Bacteria in Aquatic Products and Their Application in Preservation**

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Due to the limitation of cold chain logistics preservation technology, aquatic products are highly susceptible to contamination and degeneration by dominant spoilage bacteria during storage and transportation, especially *Pseudomonas fluorescens* and *Shewanella putrefaciens*, which cause large economic losses. In this investigation, surfactin (a type of lipopeptide), a natural active substance, was used as an antibacterial substance to prepare a variety of composite antibacterial agents. Due to its amphiphilicity, it can improve the destruction to phospholipid bilayer, and show great potential for development based on broad antibacterial spectrum, safety and non-toxicity. We prepared Arg-Surfactin by alkaline amino acid modification of surfactin, and Surfactin-AgNPs was prepared by coupling with nano-silver. On the basis, we used the MOF material zeolitic imidazolate framework-8 (ZIF-8) to prepare Surfactin/Ag@ZIF-8 by embedding surfactin, to prepare Surfactin@ZIF-8-NH₂ by covalent reaction with surfactin, and the antibacterial effect of them were researched. The results showed that the minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) of the modified surfactin against the dominant spoilage bacteria were greatly reduced. They were able to disrupt cell membrane integrity and alter the permeability of the cell bilayer membrane inducing cell lysis. At the same time, the sustained-release ability and stability of Surfactin/Ag@ZIF-8 and Surfactin@ZIF-8-NH₂ were enhanced, and the MIC and MBC were lower (0.125 mg/mL and 0.0625 mg/mL, respectively). In vitro cytotoxicity tests indicated that the composite antibacterial agents showed good safety. In addition, the cell membrane depolarisation induced by surfactin and the reactive oxygen species (ROS) aggregation induced by Zn²⁺ and Ag⁺ released from the nanocomposites exerted a synergistic inhibitory effect, which greatly improved the antibacterial capacity of surfactin and could effectively extend the shelf life of aquatic products. This study lays the foundation for proposing more effective preservation technology of aquatic products.

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Keywords: surfactin, Arg-Surfactin, antibacterial

The Application of Electromagnetic Field-assisted Low-temperature Storage Technology in Aquatic Products PreservationYutong Wu¹, Yongfa Cheng¹, Yongyong Li¹, Jinjie Zhang¹, Yongjiang Lou¹, Shiqian Fu^{1*}¹Key Laboratory of Animal Protein Food Deep Processing Technology of Zhejiang Province, Zhejiang-Malaysia Joint Research Laboratory for Agricultural Product Processing and Nutrition, College of Food Science and Engineering, Ningbo University, Ningbo, 315211, China

Due to the high activity of enzymes and abundant microorganisms, aquatic products often undergo spoilage before marketing, which affects the nutritional value. In this investigation, the shrimp were treated with different intensities of physical fields, containing high voltage electrostatic field, static magnetic field, and electron beam irradiation, assisted with low-temperature storage techniques. And physicochemical analysis was used to determine the ice crystal structure, physicochemical indexes, and enzyme activities of the shrimp to screen for the optimal intensity of the physical fields. The bacterial community and metabolites of shrimp were investigated using microbiomics and ultra performance liquid chromatography-mass spectrometry (UPLC-MS) untargeted metabolomics techniques so as to reveal the effect of electromagnetic field assisted low-temperature storage techniques on shrimp quality. The results showed that electromagnetic field-assisted low-temperature storage technologies significantly shortened the freezing time of the shrimp, reduced the ice crystal structure, improved muscle texture and decreased the content of isolated myofibrillar proteins. The combined preservation technologies significantly slowed down the growth of pH, total volatile base nitrogen (TVB-N) and total viable count (TVC) values and effectively inhibited the activity of polyphenol oxidase, and had an inhibitory effect on most bacteria, especially spoilage bacteria. Among them, the abundance of Proteobacteria and Firmicutes decreased significantly and *Vibrio* and *Pseudoalteromonas* were effectively inhibited. By comparing metabolites, we searched for potential biomarkers and analysed enrichment metabolic pathways to reveal preservation mechanisms. Phosphatidylcholine, inosine and L-valine were potential biomarkers associated with lipid, nucleotide, and organic acid metabolism, respectively. In essence, electromagnetic field-assisted low-temperature treatment adeptly restrained protein breakdown, lipid oxidation, glycogen depletion, ATP degradation and uric acid generation, maintaining the freshness and quality of shrimps. Electromagnetic field-assisted low-temperature storage technology has a significant impact on shrimp preservation and is an effective method to extend the shelf life of aquatic products.

Corresponding author: fushiqian@nbu.edu.cn*Keywords: aquatic products, electromagnetic field, low temperature storage, shrimp, preservation****Mechanism of Resistance to Freeze Drying Stress Regulated by Glycometabolism Pathway in *Lactobacillus acidophilus***

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The reduced survival rate of lactic acid bacteria during freeze-drying has become a key factor restricting the development of the fermentation agent industry. In our previous study, heat shock treatment was performed on *Lactobacillus acidophilus* before freeze-drying, which increased the freeze-drying survival rate of *Lactobacillus acidophilus* from 37.68% to 56.77% without freeze-drying protectants. Through proteomics technology and enzyme activity studies, it was found that the protein expression amount and enzyme activity of uridine diphosphate glucose pyrophosphorylase (UGPase) in glycometabolism pathway were significantly increased, suggesting that UGPase may be one of the key enzymes in the regulation of lactic acid bacteria against freeze-dry stress. The gene LBA0625 encoding UGPase of *Lactobacillus acidophilus* was selected as the research object, and strains of *Lactobacillus acidophilus* that knocked out, supplemented and overexpressed LBA0625 gene were constructed. The results showed that supplementation and overexpression of LBA0625 could promote the growth of bacteria and improve the survival rate of lyophilised bacteria. The knockout of LBA0625 inhibited the utilisation of lactose and galactose by *Lactobacillus acidophilus*, caused defects in cell wall and exopolysaccharide synthesis, led to irregular cell morphology, affected cell growth, and reduced lyophilised survival rate. This study aims to reveal the function of UGPase gene in *Lactobacillus acidophilus* and its metabolic regulation mechanism, and provide a research basis for further exploring the glucose metabolism pathway of *Lactobacillus*.

Corresponding author: 564149807@qq.com*Keywords: lactic acid bacteria, glycometabolism, anti-freeze drying, metabolic regulation mechanism**

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The food industry is responding to the increasing demand for plant-based alternatives, with coconut yoghurt emerging as a notable substitute for traditional cow milk-based yoghurts. This study focuses on the production of coconut yoghurt using three distinct coconut breeds of Malaysian varieties—Pandan, MATAG, and MAWA. The objectives are to examine the influence of coconut milk varieties on physicochemical, nutritional, and microbial properties, and sensory attributes of coconut yoghurts. For microbial, physicochemical, and nutritional properties, analyses such as including calcium, pH, titratable acidity (TA), whiteness index, gas chromatography, proximate analysis, and Lactic Acid Bacteria (LAB) count, were examined conducted on coconut milks or yoghurts. Finally, a sensory study is conducted on taste, aroma, and texture with 50 untrained panellists using a hedonic test. Results showed that MAWA coconut milk contained 18% fat, 2.5% protein, and 42.5 mg calcium, while MATAG exhibited 8.13% monounsaturated fatty acids and Pandan had 6.08%. All three yoghurt varieties surpassed a LAB count of 107, indicating successful fermentation, supported by low pH and titratable acidity levels. Sensory evaluation favoured MAWA coconut yoghurt with the highest scores. Whiteness index of coconut milks was not affected by fermentation process. This study provides valuable insights into the significance of coconut breed selection in influencing the functionality and quality of coconut yoghurts, catering to both the food industry and consumers.

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Keywords: coconut milk, coconut yoghurt, lactic acid bacteria, stabilisers, physicochemical properties

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Assessment of Calcium and Iron levels in Selected Fruits and Vegetables Consumed in Kano State, Nigeria

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Mineral elements are of vital importance to both plants and animals including humans which are required in large or small quantities for a variety of different functions. However, plant vegetables also contain both essential and toxic elements over a wide range of concentrations. Thus, the current was aimed to determine the dry matter level of calcium and some iron in fruits and vegetables that are consumed regularly by humans because, they serve as food source and adequate vitamins supplies. The present study was conducted to determine the moisture contents and concentration levels of Calcium (Ca^{2+}) and Iron (Fe^{2+}) in three different fruits and vegetables widely consumed in Nigeria (namely; Mango, Pine-apple, Watermelon, Cabbage, Tomato and Spinach) which were obtained from the Yan-kaba market of Kano City. In each case, Atomic Absorption Spectrophotometry was utilised for the experimental analysis. Also correlation between calcium and moisture contents was determined to reveal the relationship between them. Based on the results obtained, the moisture contents of the samples investigated showed that watermelon had the highest mean moisture content of 95.1% and spinach possessed the least moisture content of 63.7 %. The highest concentration of Calcium was recorded in Spinach (15.10 mg/L), and the least concentration was recorded in cabbage (4.20 mg/L). The highest concentration of Iron was recorded in pineapple (2.20 mg/L), and the least concentration was found in mango (0.17 mg/L). Also current findings revealed a significant positive but weak correlation between calcium (R^2 value = 0.128, $p=0.001$) with moisture contents. Thus, the lower the moisture content the higher the level of calcium in the studied foods. Therefore, comparing the mineral contents revealed in this research with the Recommended Dietary Allowance (RDAs) limits, the results showed that regular consumption of such fruits and vegetables is essential for bone and immune system development, respectively

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Keywords: calcium, iron, fruits, vegetables, moisture contents

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Effect of pH, Temperature and Milk to Protease Ratio on the Clotting Properties of *Moringa oleifera* Seed Kernel Protein as Milk CoagulantNur Atikah Muhammad¹, Chin Ping Tan¹, Nuzul Noorahya Jambari², Tai Boon Tan¹, Ismail Fitry Mohammad Rashedi¹, Masni Mat Yusoff^{1*}¹Department of Food Technology, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Protease from *Moringa oleifera* (MO) seed have shown promising properties as plant coagulant in milk. However, studies regarding the milk clotting ability towards different type of milk and parameters affecting the clotting properties are limited. This study aimed to determine the highest solubility of the MO protease over a wide range of pH (2.0 to 11.0) and the effect of milk clotting parameters towards milk clotting activity (MCA). The parameters for milk clotting were substrate pH value (5.0 to 7.0), temperature (50°C to 70°C), and the ratio of milk substrate to protease (1:2 to 1:4) on the milk clotting activity of the MO seed kernel. The milk substrates were sourced from cow and goat milk. The parameters of each milk contributed to the highest milk clotting activity (MCA) were statistically optimised by using response surface methodology (RSM) of Box-Behnken design. The optimisation shows that cow milk of pH 6.0 at 60°C and ratio 1:3 of milk substrate to protein resulted in the highest MCA value (236.30). For goat milk, pH 6.0 at 70 °C and milk substrate to protein ratio of 1:4 resulted in the highest MCA value (87.80). The optimisation model has significant effects towards the MCA ($p>0.05$) in both cow milk and goat milk. On the other hand, the highest solubility of protease from MO seed kernel, was discovered at pH 6 and pH 10 for MO seed kernel powder and MO protein extract, respectively. Overall, the conditions of different milk substrates specifically cow and goat milk which contributed to highest MCA of MO seed kernel protein were successfully determined. These findings are potentially useful in milk clotting domain such as processing of cheese, cream cheese and yogurt. Besides, the use of protease from MO seed kernel as plant-based coagulant can be expanded towards other types of milk substrates such as buffalo milk, soybean milk or almond milk.

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Keywords: *Moringa oleifera* (MO), optimisation, plant protein, coagulation

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Durian (*Durio zibethinus*) is a tropical fruit widely cultivated in Malaysia, primarily in the states of Perak, Pahang, and Johor. Pahang is known for producing high-quality durian. This study aims to investigate the physicochemical properties and consumer preferences of three popular durian varieties in Malaysia. In the present work, three different varieties of durian: "D197", "D24" and "D200" were purchased from durian orchards in Pahang and their physicochemical properties (L*, a*, b*, firmness) were measured using chromameter and texture analyser, respectively. Sugar and organic acid content were also determined using high-performance liquid chromatography (HPLC). To investigate consumer preference, Hedonic tests were carried out using untrained panellists. There was a significant difference ($p < 0.05$) found between all physicochemical properties studied. In terms of colour, "D24" had the highest L*, "D200" had the highest a*, and "D197" had the highest b* values. This corresponded to the colour of each durian pulp, where "D24", "D197" and "D200" had a light yellow, golden yellow and orange-yellow pulp, respectively. For firmness, "D200" obtained the highest value (0.4178 N). Sucrose was the major sugar in durian, followed by fructose and glucose. "D200" had the significantly highest sucrose, whereas "D197" had the significantly highest glucose and fructose content. Six organic acids (succinic, malic, lactic, citric, acetic, tartaric acid) were identified in durian. Lactic acid was present only in "D197" and "D24". Overall, results from the Hedonic tests showed that all varieties were preferred by consumers, with "D200" obtaining the highest liking scores, on average. "D200" was the variety that is most preferred by the consumers, which is likely due to its attractive appearance, sweeter taste accompanied with bitterness, and firmer texture among all varieties studied.

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Kenaf (*Hibiscus cannabinus* L.) seed, is recognised for its elevated protein and essential amino acid levels, emerges as a promising option for protein isolate production. The drying stage plays a crucial role in shaping the physicochemical, functional, thermal, and structural properties of the resulting powder. However, despite the acknowledged importance of drying methods in modifying protein functionality and structure, research specific to kenaf seed protein isolate remains limited. This study investigated the effects of freeze-dried (FD), spray-dried (SD) and oven dried (OD) on the physicochemical, functional, thermal and structural properties of kenaf (*Hibiscus cannabinus* L.) protein isolate powder. The protein curd produced during isoelectric precipitation were dried by using freeze-dryer, spray-dryer and convection oven. The physicochemical, functional, thermal and structural properties of dried kenaf seed protein isolate were analysed. SD has the highest L* values due to its small particle size, which allows for a larger surface area to reflect more light than FD and OD. Morphological research revealed that SD has a collapsed and wrinkled surface, whereas FD and OD have non-collapsed, non-porous, and crystalline structures, respectively. SD demonstrated exceptional protein solubility, emulsification activity and stability, and foaming activity and stability, while OD showed significantly higher water absorption capacity and FD represented significantly higher oil absorption capacity. All samples exhibit endothermic peak with high Td (84.25 – 96.00°C), indicating good thermal stability of KSPI. In comparison to OD and FD, SD demonstrated a much greater ΔH , indicating a lower degree of protein denaturation. Different drying methods do not result in the dissociation of protein subunits in KSPI based on SDS-PAGE result. Additionally, FD contain more β -sheet structures and low random coils structure compared to SD and OD. Overall, this study indicated that freeze-drying, spray-drying, and oven-drying procedures produced comparable colour, particle size distribution, crystal and surface morphology, protein solubility, with several desirable functional properties, and structural properties of KSPIs. These findings offer valuable insights into selecting a drying procedure that yields kenaf seed isolated protein powders with the desired functionality, aiding in optimising their applications in the food industry.

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Spices are primarily added in food products to develop the sensory profile. Antimicrobial compounds from spices are also renowned preservatives since years. Spices make the bacterial growth gradually slower and ultimately inhibited to protect microbial deterioration. The active ingredients in spices possess antibacterial, antifungal and antioxidant potentials and encourage the healing and control ailments in human beings. The present research was aimed to explore the antibacterial, antifungal and antioxidant activities of the extracts from traditional spices through in-vitro studies. Cinnamon (*Cinnamomum verum* L.), nutmeg / *jaiphal* (*Myristica fragrans* Houtt.), and black pepper (*Piper nigrum* L.) were selected and extracted through ethanol and methanol solutions. The alcoholic extracts were evaluated for possible activities. Methanolic extract of *Cinnamomum verum* showed the maximum (17.47 ± 0.31 mm) antibacterial activity against *Escherichia coli*. The substantial activities were noted against *Bacillus subtilis* and *Escherichia coli*. *Cinnamomum verum* exhibited strong antifungal activity against all the tested strains. The highest antifungal activity was shown by *Cinnamomum verum* (20.07 ± 0.43 mm against *Aspergillus niger* and 19.07 ± 0.07 mm against *Aspergillus flavus*) followed by *Myristica fragrans* (18.57 ± 0.59 mm against *Fusarium solani*). Antioxidant studies revealed the highest phenolic and flavonoid content in *Cinnamomum verum*. Total phenolic content was noticeably higher in *Cinnamomum verum* (316.75 ± 703 mg GAE/g extract) followed by *Piper nigrum* (299.16 ± 6.55 mg GAE/g extract). The total flavonoid content in ethanolic extracts of different spices ranged from 8.17 ± 2.02 to 132.10 ± 9.53 mg/g, and in methanolic extracts from 16.57 ± 1.98 to 211.13 ± 8.52 mg/g. The radical scavenging DPPH assay also exhibited the significant antioxidant potential of selected spices. *Myristica fragrans* was found to be the most effective ($69.23 \pm 3.26\%$). It was concluded that traditional spices possess the potent antibacterial, antifungal, and antioxidant potentials that can be effective against spoilage and pathogenic microorganisms.

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Keywords: antimicrobial, antioxidant, spice extracts, cinnamon, nutmeg, black pepper

FH 3rd IFRC 2024 030-017**Edible Landscape R(Evolution): Navigating Food Heritage and Embracing New Trends in Urban and Rural Planning for Sustainable Futures**

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Our research explores the dynamic intersection of food culture, landscape design, and contemporary planning strategies. Delving into the intricate balance between preserving food heritage and adapting to emerging trends, this session aims to bridge the gap between theory and practice. Focusing on both urban and rural landscapes, our investigation uncovers innovative approaches to seamlessly integrate edible elements into the fabric of communities. By examining the evolution of edible landscapes, we seek to decipher the complexities of preserving traditional food practices while meeting the demands of modern living. Key issues addressed include sustainable agriculture, community engagement, and the integration of new technologies to enhance food production. This presentation aspires to inspire specialists from various fields such as food engineers, planners, architects, policymakers, and society as a whole to envision a future where urban and rural spaces harmonise with the richness of food heritage, fostering resilient and sustainable environments.

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Keyword: food heritage, food culture, communities, traditional food, practices, sustainable

FH 3rd IFRC 2024 123-104**Integrating Local Culinary Heritage as part of Malaysia's Tourism Experiences: Content Analysis of Tourism Policies and Marketing Strategies**

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Today, many tourist destinations begin to recognise and define their local culinary heritage specialty and values. This includes uncovering the stories behind food preparation based on cooking methods, ingredient usage, presentation creativity, and historical context which reflect the local people and place. Scholars reported that several countries have included their culinary heritage into tourism promotion strategies, significantly enhancing the appeal of tourist destinations. However, there is uncertainty on specific promotional tools/activities have been utilised and how those marketing initiatives were planned and designed to foster the local culinary heritage uniqueness. This paper analyses relevant policies and marketing collaterals utilised by the Malaysian Government as well as food and tourism stakeholders to market the country through its culinary heritage specialties. The State of Penang, Malacca, Kelantan, and Sarawak were chosen as the central focus of this study due to rich culinary traditions and diverse food cultures. Furthermore, culinary heritage has been identified as one of local tourism niches/experiences. Content analysis was performed on selected marketing materials such as brochures, posters, travel guides, and online promotional videos obtained from official webpages and social media accounts of Malaysian Government as well as food and tourism stakeholders to extract relevant data on the portrayal of Malaysia's local culinary heritage. Results highlight relevant tourism and food policies have been established and used as guidance to various strategic marketing initiatives (either recurring or one-off promotional tools/activities including specific local food visual appeal based on the concept of locality/regional specialty) by the Malaysian Government as well as food and tourism stakeholders to promote and educate tourists about local culinary heritage. In conclusion, diverse range of strategic marketing initiatives employed, emphasising the visual appeal and regional specialty of local culinary heritage. This research sheds light on the internal role of culinary heritage in enhancing the appeal of tourist destinations and emphasises the importance of continued efforts in promoting and preserving this aspect of cultural identity.

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Keywords: culinary heritage, tourism promotion, marketing strategies, local food

FH 3rd IFRC 2024 264-251**Comparative Analysis of Sensory, Chemical, and Microbiological Characteristics of Heritage "Dadih" Food across Different Regions in West Sumatra, Indonesia**

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"Dadih" is a traditional fermented milk product indigenous to West Sumatra, Indonesia, with various regional processing methods. Assessing the quality of dadih from different regions is crucial for future quality enhancement efforts. This study aims to compare the sensory, chemical, and microbiological qualities of dadih from various regions within West Sumatra. The investigation included samples from Payakumbuh, Batusangkar, Bukittinggi, and Alahan Panjang. The evaluations comprised sensory assessments (taste, aroma, color, and texture), chemical analyses (pH and nutritional content), and microbiological assessments (Total Lactic Acid Bacteria [LAB] count). The sensory analysis indicated that dadih from Payakumbuh had the highest sensory score, averaging 3.40 ± 0.80 (indicating general liking). Payakumbuh dadih also exhibited superior chemical quality, with a pH value of 4.6 ± 0.32 and protein content of $8.91 \pm 0.22\%$. In terms of microbiological quality, Batusangkar dadih demonstrated the highest LAB count, measuring 9.3×10^8 colony/g. The study concludes that dadih from West Sumatra exhibits diverse characteristics. Payakumbuh dadih was found to have the highest sensory and nutritional quality, whereas Batusangkar dadih had the most robust LAB content. The quality of dadih is influenced by processing methods, hygiene practices, and the raw materials used..

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Keywords: dadih, sensory, chemical, microbiology, West Sumatra

FH 3rd IFRC 2024 296-273**Elucidating the Creative Integration of Local Herbs in Modern Malaysian Cuisine: A Culinary Exposé**

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Herbal trade has been identified as a new source of economic growth in Malaysia since 2011, coinciding with an increase in global demand for herbal products. However, despite being on a significant economic scale, minimal emphasis is paid to culinary practices, notably in the development of innovative culinary creations. However, the rising trend of modernist cuisine is seen as a platform to unravel this phenomenon, whereas it is deemed a higher level of chefs' creativity to interpret it. This study investigates the utilisation of Malaysian local herbs (MLH) in modern cuisine development and illuminates the role of chefs' creativity in contemplating the creation of modern Malaysian cuisine (MMC). In particular, this study analyses the creative process of (re)combining local produce into modern products through an inductive qualitative approach using a multiple-case study design. Eight fine-dining modern chefs in Kuala Lumpur were sampled, in which, semi-structured in-depth interviews and participatory observation were utilised to elucidate the repertoire of the creative culinary process. The data analysis was organised in two phases: the first captured the individual lens of each chef's creative thought process; and the second categorised and grouped each lens into themes that best encapsulate chefs' creativity in utilising MLH in the creation of MMC – (1) harmonising knowledge and experience, (2) recombinant of ingredients, flavours, and techniques, and (3) embodiment and personification of curiosity. Fundamentally, this study contributes to two facets. First, this study provides empirical evidence that creativity is intentional rather than coincidental, which implies that the creative culinary process can be schematised into a systematic view. Second, this study sheds new light on the dynamics that allow the equilibrium between familiarity and novelty in agricultural and creative industries where products suffer considerable inattention.

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Keywords: Malaysian local herbs, chef's creativity, creative culinary process, culinary innovation, modern cuisine development

FOMC 3rd IFRC 2024 048-044**Juice Packaging Label: A Visual Strategy Influencing Consumers' Buying Behaviour**Shabnam Sabandy Nuckcheddy¹, Leila Denmamode^{2*}¹Department of Media and Communication, Academy of Design and Innovation, Ebene, Mauritius²Department of Creative Arts, Film and Media Technologies, School of Innovative Technologies and Engineering, University of Technology Mauritius, La Tour Koenig, Mauritius

Juice packaging is available in multiple forms at retail stores, expanding consumers' choices while increasing competition. The present paper proposes to assist local juice brands in Mauritius in gaining market visibility and international brand recognition. The study analysed the visual influence of Tetra Pak juice label design on consumers' preferences and buying behaviour. It combined packaging and label design theory with the Hierarchy of Effects Model to shape its theoretical framework. Mixed methods comprising observations, interviews and surveys were used to collect data, and descriptive analysis was performed. Hypotheses were empirically tested using regression analysis. The results showed that four visual features: colour, image, typography and the types of information significantly impact consumers' behaviour at the different stages of the Hierarchy of Effects Model. Findings demonstrated that colour and image are primary features in establishing product awareness in retail stores. The combination of images, typography, and types of information reinforced knowledge about the product. All four features played strategic roles in stimulating liking and product preferences. They promoted quality perception, building trust and shaping consumers' buying intentions. The study discussed and proposed a framework to create an engaging visual strategy for Tetra Pak juice packaging label design for Mauritian companies, expanding marketing prospects on both local and international markets.

Corresponding author: ldenmamode@utm.ac.mu*Keywords: label design, packaging design, tetra pak, consumer buying behaviour, hierarchy of effects model****FOMC 3rd IFRC 2024 097-149****Defining the Critical Components of a Smarter Food Safety Management System: a Delphi Study**Azan Azuwan Baharuddin¹, Nuradibah Nor Azman¹, Tan Tai Boon¹, Noor Zafira Noor Hasnan², Sarina Abdul Halim-Lim^{1*}¹Faculty of Food Science and Technology, Universiti Putra Malaysia, 43000 UPM Serdang, Malaysia²Faculty of Engineering, Universiti Putra Malaysia, 43000 UPM Serdang, Malaysia

Food Safety Management System (FSMS) is a vital component for guaranteeing product safety and establishing a systematic, hazard-free process, but still, its effectiveness was challenged by the cases of hazardous contaminated food. Hence, digital technologies were proposed to strengthen conventional FSMS. This study proposes an integrated framework for a smart Food Safety Management System (FSMS) to enhance the adaptability of digital technologies within FSMS. The objectives are threefold: to identify, define, and rank the critical elements of a Smart FSMS, to explore the challenges of its implementation, and ultimately to develop an integrated smart FSMS framework. A two-round, qualitative Delphi study was undertaken with based on twenty-four global experts (practitioners, academics, decision-makers) and seven factors emerged: food safety culture, data-based decisions, technology-enabled traceability, effective emergency response, intelligent food safety tools and real-time monitoring, continuous improvement, and business model innovation through 52 indicators. Delphi questions with 75% agreement or less were altered and results with a mean of <3.5 and content validity ratio (CRV)<0.29 were rejected. In the final round, Pareto Analysis was applied with 80/20 rules to prioritise the elements and indications. The highest-ranked challenges were lack of cost and budgeting, fear of failure in implementing the smart system, and lack of knowledge and awareness on digitalisation. Using system theory, this study contributes to improved practices in the food industry by promoting the implementation of Smart FSMS and providing a theoretically sound framework for its development.

Corresponding author: sarinalim@upm.edu.my*Keywords: FSMS, digitalisation, qualitative method, traceability, challenges**

Consumers' Preferences for Local Food Attributes at Food Outlet Service: Evidence from a Discrete Choice Experiment in Sri Lanka

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It is becoming more popular in many nations to eat locally produced food. Governments have devised programs to boost production and promote the consumption of locally grown foods, which may help to strengthen the local economy. One of the initiatives entails the promotion of locally sourced goods through various food outlets, perhaps yielding positive impacts on the local economy. This study aims to determine the significant local food attributes in Hela Bojun food outlet, Sri Lanka. The outlets are administered by the Ministry of Agriculture following the United Nations initiative on biodiversity for food and nutrition. A discrete choice experiment (DCE) was conducted to evaluate the preferences and willingness to pay of consumers for five attributes: food safety, food certification, environmental friendliness, amenities, and service excellence. The data were estimated utilising the basic and interaction Multinomial Logit Model (MNL). The model results revealed that consumers were willing to pay the highest for superior food safety (SLR 128.33), followed by medium food safety (SLR 87.44), superior service quality (SLR 81.45), and having food certification (SLR 57.12). The willingness to pay (WTP) for food attributes was affected by a variety of factors, including household income, age, gender, and educational level. It is encouraged that improvements be made to the level of service provided by food outlets.

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Keywords: local food attributes, choice experiment, multinomial logit model, preferences, willingness to pay

Understanding Consumers' Purchase Intention for Buffalo Milk-Based Yogurt Enriched with Stabilised Rice Bran in Negros Island, Philippines: A Correlation Study

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The buffalo milk-based yogurt enriched with stabilised rice bran is a novel and innovative yogurt product developed by the Philippine Rice Research Institute (PhilRice) and Philippine Carabao Center (PCC). It is an unflavoured yogurt made from water buffalo's milk supplemented with stabilised rice bran. Commercialisation of this product requires understanding consumers' purchase intent to increase chance of market success. A total of 399 respondents in Negros Island were interviewed to gather primary data using a structured questionnaire. Data on socio-demographic characteristics, purchase and consumption of yogurt, and demand for the buffalo milk-based yogurt enriched with stabilised rice bran were analysed using descriptive statistics. On the other hand, correlation analysis was used to determine the associations between purchase intention and yogurt consumption, demographic variables, health consciousness, and product attributes. The respondents who have tasted the buffalo milk-based yogurt enriched with stabilised rice bran expressed willingness to buy the product if made available in the market (89.6%). They are willing to pay Php33.00 per 100-g cup of the product. The primary reason of their willingness to buy is the health benefits (41.6%) that they can get from consuming the product followed by curiosity (30.3%) and good taste (21.8%). Results further revealed that there is a moderate association between purchase intention for buffalo milk-based yogurt enriched with stabilised rice bran and consumption of existing yogurt brands (Phi and Cramer's V=0.109), civil status (Phi and Cramer's V=0.143), and educational attainment (Phi and Cramer's V=0.229). Moreover, a strong association was found between purchase intention for buffalo milk-based yogurt enriched with stabilised rice bran and health consciousness (Phi and Cramer's V=0.301), product taste (Phi and Cramer's V=0.372), flavour (Phi and Cramer's V=0.353), and appearance (Phi and Cramer's V=0.329). Commercialisation of the buffalo milk-based yogurt enriched with stabilised rice bran can be pursued because there is a high demand of the product in the market. Product developers should consider adding flavours to the product to meet consumer preference.

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Keywords: buffalo milk, correlation analysis, purchase intention, stabilised rice bran, yogurt

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The glycaemic index (GI) is a measure of how quickly food increases blood sugar level. Foods with low GI promote better health among consumers, specifically those controlling their blood sugar level. There were completed studies investigating the purchase behaviour of Filipino consumers toward GI foods, however, limited research were directed on the buying intention of millennial and Gen Z consumers. This study was conducted to 278 millennial and Gen Z consumers in the Philippines to determine the factors that influence their purchase intention toward low GI foods. Data collection was carried out through an online survey created using Google forms. Results showed that the Filipino millennial and Gen Z consumers are familiar about low glycaemic index but they lacked knowledge about different types of foods that have low GI. Their purchase intention toward low GI foods is moderately associated with awareness ($\chi^2 = 7.241$, $p\text{-value}=.027$, Phi and Cramer's $V=.161$) and perceived importance ($\chi^2 = 16.001$, $p\text{-value}=.003$, Phi and Cramer's $V=.240$). The findings further demonstrated strong associations between purchase intent and prediabetes diagnosis ($\chi^2 = 87.192a$, $p\text{-value}=.000$, Phi and Cramer's $V=.560$), taste ($\chi^2 = 229.796$, $p\text{-value}=.000$, Phi and Cramer's $V=.909$), nutritional and health value ($\chi^2 = 212.334$, $p\text{-value}=.000$, Phi and Cramer's $V=.874$) and satiety ($\chi^2 = 174.427$, $p\text{-value}=.000$, Phi and Cramer's $V=.792$). It can be inferred that there is a large potential for Filipino millennial and Gen Z consumers to purchase and consume low GI foods. However, continued efforts to educate them about the benefits of low GI foods consumption should be steered to attract them to utilise these types of foods.

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Keywords: Filipinos, gen Z, glycaemic index, millennials, purchase intention

FPE 3rd IFRC 2024 071-053**Effect of Washing Cycles and Sodium Bicarbonate Washing Solution Concentrations on Functional Properties of Surimi from Catfish (*Clarias gariepinus* × *Clarias macrocephalus*)**

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Overfishing and environmental changes have reduced seawater fish resources, impacting surimi production demand. In Malaysia, increasing freshwater fish production, especially catfish, offers a promising alternative to surimi production due to its quick growth, affordability, and tender meat. However, catfish's higher fat content poses challenges for fat removal during washing, which is crucial for achieving the desired surimi texture and quality. Sodium bicarbonate (NaHCO_3) assists in emulsification and fat removal, essential for low-fat surimi production, while its alkaline pH aids myofibrillar protein extraction, contributing to surimi's gel-forming properties. This work aims to evaluate the effects of different numbers of washing cycles (zero, one, two, and three cycles) and concentrations (w/v) of NaHCO_3 washing solution (0%, 0.25%, 0.50%, and 0.75%) on the physicochemical and functional properties of surimi from catfish. The yield of the surimi, whiteness parameter, pH, and gel strength increased with the number of washing cycles. Washing enhanced the surimi gel's water-holding capacity, making the gel's microstructure denser and reducing the fat content and water-soluble and salt-soluble proteins while increasing the moisture content of surimi. The surimi hardness increased as the concentration of NaHCO_3 solution increased to 0.25%, but it decreased at a higher NaHCO_3 solution concentration. Washing three times with 0.25% NaHCO_3 solution yielded the highest gel strength. It increased the water-holding capacity, pH, and whiteness parameters, with significantly ($p < 0.05$) higher ratings for the textural parameters of the surimi gel. Meanwhile, treatment with 0.75% NaHCO_3 solution generated the highest pH and whiteness values. However, it resulted in the lowest water-holding capacity and gel strength. This study suggested that washing three times with cold 0.25% NaHCO_3 solution improved the physicochemical and functional properties of surimi made from catfish.

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Keywords: freshwater fish surimi, catfish, washing cycles, alkaline washing solution, quality characteristics**FPE 3rd IFRC 2024 088-066****Synergism of Basil Seed Gum with Xanthan Gum and Locust Bean Gum on Physical Properties and Stability of Low-fat Mayonnaise**Nor Hayati Ibrahim^{1*}, Lee Zhixhuan¹, Suhana Muhamad Hanidun¹, Nor Afizah Mustapha², Faridah Yahya¹¹Faculty of Fisheries and Food Science, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia²Department of Food Technology, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Basil seed gum (BSG) has potential use in emulsion-based foods and is gaining popularity as an alternative hydrocolloid in the food industry. However, emulsions stabilised solely by BSG often demonstrate weak rheological properties and limited stability at low pH levels. Nevertheless, previous studies highlight BSG's capacity for synergistic interactions with other gums, presenting an opportunity to overcome these challenges and enhance the performance of emulsion systems. This study investigated the interaction effects between BSG and either xanthan gum (XG) or locust bean gum (LBG) on the droplet size, viscoelastic properties and stability (creaming and oxidative) of low-fat mayonnaise, aiming to mitigate the limitations of using BSG alone in the system. Blends of BSG:XG:LBG with ten different ratios were prepared according to a simplex centroid mixture design and incorporated at 0.5% in the mayonnaise formulation. The results demonstrated that binary BSG:LBG (1:1) and ternary BSG:XG:LBG (1:1:4) blends had significantly ($p < 0.05$) reduced the droplet size compared to BSG alone, thereby positively influencing the viscoelastic properties and stability of the resulting low-fat mayonnaises. A mixture regression modelling confirmed a significant synergistic effect ($p < 0.05$) on the viscoelastic properties when a relatively high proportion of LBG was utilised in the BSG:XG:LBG blend, leading to high creaming stability. This synergism is attributable to the formation of junction zones between the long "free chain" segment of LBG with the mannose backbone and bare portion of cellulose derivation of XG and BSG. Furthermore, a significant synergistic effect ($p < 0.05$) was observed on the oxidative stability due to a relatively high proportion of XG in the ternary blend. The study proposes that satisfactory physical properties and stability of the low-fat mayonnaise can be attained by incorporating up to 50% of BSG in the BSG:LBG blend and less than 20% of both BSG and XG in the BSG:XG:LBG blend, owing to synergistic interactions among the blend components.

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Keywords: basil seed gum, synergistic interaction, mixture design, physical properties, low-fat mayonnaise

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In recent years, we has screened some strains of functional lactic acid bacteria and developed key technologies for preparing fermented starter, mainly as follows: (1) More than 2,000 strains of lactic acid bacteria were isolated from Chinese local specialty fermented foods, breast milk, faeces of infants and elderly people; among them, more than 50 strains with good fermentation and functional characteristics were screened, mainly associated in nitrite degradation, broad-spectrum bacterial inhibition, production of bacteriocin, extracellular polysaccharides, and producing γ -aminobutyric acid, cholesterol, and hypertension-lowering. (2) The above lactic acid bacteria were used to develop specialty functional fermented dairy and meat products. Enzymatic properties, conformational relationships, and regulatory mechanisms of functional key proteins associated with the above lactic acid bacteria have been elucidated, which revealed the quality improvement and control mechanisms of fermented dairy and meat products. (3) Freeze-drying stress resistance, gastrointestinal tolerance, bioavailability, and transport efficiency of lactic acid bacteria improved by shock pretreatment and nano-embedded technology.

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Keywords: functional lactic acid bacteria, fermented starter, specialty fermented foods

Zero-Waste Biorefinery of *Litsea cubeba* (May Chang) as a New Woody Oil Plant Resources Based on The Green Extraction Concept and Techniques

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With the increasing global demand for edible oils and the restriction of arable land minimum in China, woody oil plants have gradually become the optimal solution to cover the shortage of current edible oil supply and to further improve the self-sufficiency rate. However, due to the lack of knowledge and technique, problems like "how to make full use of these plant resources?" and "how to guide consumers with reasonable data?" limit the development of woody oilseed industry towards a sustainable circular economy. In this work, *Litsea cubeba* as one of emerging woody oil plant was highlighted as a reference case based on its current research progress. Unlike other woody oil plants, essential oil rather than oil from *Litsea cubeba* has always been the main product through the years due to its interesting biological activities. Most importantly, its major component, citral, could be the base for other synthesised perfume compounds with added value. Moreover, the sustainable biorefinery of large amounts of waste residual after *Litsea cubeba* essential oil processing is now technically feasible based on the green extraction concept and techniques, which could inspire a total valorisation pathway for other woody oil plants to make more competitive plant-based products with both economic, social, and ecological benefits.

Corresponding author: yingli@jnu.edu.cn*Keywords: zero-waste biorefinery, *Litsea cubeba* (May Chang), green extraction, woody oil plants****Physicochemical Properties of Wet Noodles Made from Composite Flour Blend of Sorghum, Modified Cassava (Mocaf), and Wheat Flours**

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In regions like Indonesia, where wheat cultivation is limited, diversifying noodle production with local alternatives like sorghum and mocaf flour is crucial for sustainability and promoting local agriculture. This research employed a completely randomised design to assess the impact of various ratios of composite flour (sorghum flour:modified cassava [mocaf] flour:wheat flour) on noodle physicochemical properties. Three treatments were evaluated: Treatment A (40% sorghum flour, 30% mocaf flour, 30% wheat flour), Treatment B (30% sorghum flour, 35% mocaf flour, 35% wheat flour), and Treatment C (20% sorghum flour, 40% mocaf flour, 40% wheat flour). Protein content was determined using the Kjeldahl method, ash content by dry ashing, crude fibre content through enzymatic analysis, and noodle elasticity (elongation and tensile strength) via Universal Testing Machine. Results revealed that for treatments A, B, and C, the protein contents ranged from 10.01% to 10.77%, ash contents were 1.64% to 1.79%, and crude fibre contents were 2.86% to 3.60%. The noodles' elongation values were 7.26%, 10.74%, and 12.96%, while the tensile strength was 0.0350 MPa, 0.0375 MPa, and 0.0378 MPa for treatments A, B, and C, respectively. Notably, composite flour compositions did not significantly affect protein content, ash content, or tensile strength in noodles. However, they demonstrated significant effects on crude fibre content and elasticity value. These findings highlight the potential of sorghum and mocaf flour as viable substitutes for wheat flour in noodle production, contributing to food diversification and enhancing local agricultural sustainability.

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Flaxseed oil contains up to 50% *n*-3 fatty acids, which offer health benefits including anti-inflammatory, anti-tumour properties, cardiovascular protection, and diabetes treatment. Diacylglycerols (DAGs)-enriched oil (DEO) from flaxseed oil is rich in *n*-3 unsaturated fatty acids with considerable application potential. Considering the lack of long-term operational stability in free lipase and the difficulties associated with enzyme recovery and reuse, this study opts for the use of immobilised enzymes to catalyse glycerolysis for the preparation of DEO. Lecitase® Ultra (LU) was immobilised by adsorption on a macroporous resin and characterised. Meanwhile, the obtained immobilised lipase LXTE-1000-LU was applied in DEO preparation, and the glycerolysis catalytic stability was also investigated. At pH 7.0, enzyme loading of 0.4 g/g resin, and adsorption time of 2 h, an immobilisation efficiency (IE) of 89.98% could be achieved. The storage stability was promoted after immobilisation, in which the lipase maintained over 85% of its initial activity after 60 days at both 4 °C and 25 °C. Furthermore, DEO with DAGs content of 41.31 wt% was obtained after the glycerolysis reaction using LXTE-1000-LU as the catalyst. Under the consecutive reactions, the lipase protein content decreased from 17.91 mg/g to 6.99 mg/g, and significant changes in the secondary conformation of the protein were also observed, leading to the reduction of the catalytic activity. Flaxseed oil brings forth a myriad of health advantages with its high content of *n*-3 fatty acids. DEO with high content of *n*-3 unsaturated fatty acids from flaxseed oil have considerable application potential. In the present work, Lecitase® Ultra was immobilised by an adsorption method, and the immobilisation conditions were optimised by measuring the immobilisation efficiency, activity, and protein content of the lipase. The resulting LU immobilised on the macroporous resin LXTE-1000 was characterised by scanning electron microscopy (SEM), Fourier-transform infrared (FTIR) and thermogravimetric analysis (TGA) techniques. Meanwhile, the acylglycerols composition were analysed by gas chromatography (GC). Under the selected immobilisation conditions, 89.98% immobilisation efficiency and 263.66 U/g of immobilised lipase LXTE-1000-LU were obtained. The immobilisation method is stable, and LXTE-1000-LU showed high storage stability. The immobilised LXTE-1000-LU can be used to catalyse glycerolysis to produce DEO with a DAGs content of 41.31%. The immobilised lipase was still able to reach more than 80% of the initial lipase activity after 5 consecutive cycles. Lipase release and changes in the secondary and tertiary structures of the lipase protein were responsible for the decrease in catalytic efficiency. In this study, a convenient approach with lower cost immobilisation of lipase was developed, which was utilised in catalysing the glycerolysis reaction for the production of DEO from flaxseed oil.

*Corresponding author: twyong@jnu.edu.cn**Keywords:** lipase immobilisation, absorption, glycerolysis, diacylglycerol, catalytic stabilityElisa Julianti^{1,2,4*}, Zulkifli Lubis¹, Adrian Hilman^{1,2}, Mimi Nurminah^{1,2}, Titi Candra Sunarti³, Muhammad Siddiq Irawan¹¹Department of Food Technology Faculty of Agriculture, Universitas Sumatera Utara, Indonesia²Centre of Tuber and Root Crops Study, Universitas Sumatera Utara, Indonesia³Department of Agroindustrial Technology, Faculty of Agricultural Technology, IPB University, Indonesia

Maltooligosaccharides have the potential to become functional food ingredients, such as a source of prebiotics and probiotics that are good for the human digestive system. This study was conducted with the aim to determine the effect of α -amylase enzyme concentration, hydrolysis reaction temperature, and hydrolysis reaction time in the production of maltooligosaccharide from purple sweet potato paste of Ayamurasaki varieties on the response variables of total sugar, reducing sugar, degree of polymerisation, and anthocyanin content. This study was conducted using Box-Behnken Design of Response Surface Methods (RSM). The factors used in this study were the concentration of enzymes (1-2 U/g), hydrolysis reaction temperature (50-60 °C), and hydrolysis reaction time (30-60 minutes). Based on the research result that the parameters enzyme concentration, reaction temperature, and hydrolysis reaction time have a significant effect ($P < 0.05$) on the response variables of total sugar, reducing sugar and crude fibre either individually or by two factors. The results of the optimisation of the response variables formed a new formula with enzyme concentration factor of 2.00 U/g, reaction temperature of 60 °C and reaction time of 60 minutes. The new formulation obtained desirability value of 0.961 which indicated the higher the suitability of the optimal optimisation process with the desired response variable.

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Polysaccharides are usually high molecular weight, long, linear, or branched polymers of 10 or more monosaccharides linked by α - and β -glycosidic bonds and are widely found in plants (barley), animals (sea cucumbers), and microorganisms (lactic acid bacteria). Polysaccharides derived from lactic acid bacteria have received wide attention due to various excellent bioactivities (antioxidant, improvement of intestinal health) and their prominent role in resistance to low temperatures, desiccation, osmotic stress, or antibiotics. The structure of polysaccharides can be modified by physical (ultrasonic, microwave), chemical (sulphation, phosphorylation), and biological methods (enzyme, genetic engineering) to alter the structure and molecular weight of the polysaccharides to achieve changes in their physicochemical properties, enhanced biological activities, and even acquired new biological activities. Polysaccharides have shown great potential for application in the food industry, low-temperature protection, drug delivery, and environmental remediation. Especially in the food industry, polysaccharides can serve as stabilisers, thickeners, and emulsifiers, effectively improving the sensory and texture of food.

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Keywords: lactic acid bacteria, polysaccharides, bioactivities

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Postharvest application of 1-methylcyclopropene (1-MCP), lavender oil (LO) and geranium oil (GO) were investigated in alleviating chilling injury (CI) by regulating the cold tolerance of papaya cold stored at 4 °C for 16 days. The papaya was assessed on the attributes of CI, weight loss, firmness, color, respiration rate, total soluble solids (TSS), soluble sugar (SS), proline, and malondialdehyde content. The antagonistic effect of 1-MCP against ethylene proved highly effective in delaying fruit ripening and metabolic processes. Notably, a one-hour misting treatment with 600 mg/L 1-MCP (active ingredient, a.i.) solution significantly enhanced papaya's resistance to chilling conditions, reported a remarkable 2.08-fold reduction in CI damage compared to the control. Furthermore, 1-MCP-treated papayas exhibited the highest proline concentration (61.59 $\mu\text{g/g}$ FW) and the lowest malondialdehyde content (39.65 $\mu\text{mol/g}$ FW). Additionally, 1-MCP-treated papayas displayed a 1.1-fold reduction in oxygen consumption compared to the control. They also exhibited minimal changes in weight loss (3.6%), the least increase in TSS and SS compared to the control, and better retention of fruit color and firmness. Comparatively, GO known for its robust antioxidant and antimicrobial properties, played a pivotal role in enhancing papaya's cold tolerance and providing superior protection against chilling-induced damage when compared to the control.

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Keywords: cold storage, essential oil, proline, respiration rate, physicochemical properties

Effect of Drying Temperature on the Physicochemical and Functional Properties of Immature Melon Manis Terengganu (MMT)

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Melon Manis Terengganu (MMT) is one of the new varieties from rock melon. This fruit is widely known in Terengganu and also in other cities as the taste is sweet, crunchy, juicy and has a pleasant flavour. During the pruning process, only one immature fruit will be kept for each tree in order to ensure the quality of the MMT. These immature fruits that were removed were not utilised and became waste to agriculture crops but have the potential to be used as functional ingredients in food products, cosmetic or health products. Thus, to reduce the waste, this work will be done to investigate physicochemical and functional properties of the dried immature MMT, which can be converted into something beneficial. The immature MMT was washed and immersed in 0.2% sodium metabisulphite before drying at three different temperatures (50°C, 60°C and 70°C). All of the samples were ground, sieved and kept in air-tight containers. The analyses of the physicochemical properties of dried immature MMT included proximate analysis, colour determination and mineral content. While for the functional properties, including water holding capacity, oil holding capacity, swelling power and solubility, foaming capacity and stability, bulk, and tapped density. The sample at 70°C showed the lowest values in water holding capacity as the sample was exposed to high drying temperatures, which affecting the particle size. Different drying temperatures may cause some changes in the sample's physicochemical and functional properties.

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Keywords: drying, melon manis Terengganu, physicochemical properties, functional properties, dried product

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Chitosan-based Film Incorporated with Curry Leaf Essential Oil Foreseeing Repellency Potential against Housefly (*Musca domestica*)

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Housefly, *Musca domestica* is well-known as a mechanical vector that transmit variety of bacterial pathogens including *Escherichia coli*, *Salmonella* and others to food. The consumption of food that has been contaminated with these pathogens can cause intestinal infection and food poisoning. Thus, insect-repellent packaging film from natural sources has raised interest as safer alternatives to combat insect infestation and to control the housefly from spreading diseases by having direct contact with the food. This research investigated the effect of curry leaf essential oil (CLEO) on the properties of chitosan-based film and its potential as natural insect-repellent film. CLEO was added in chitosan solution at different concentrations with Tween 80 as a surfactant. The films were prepared by using solvent casting method. Films were dried and conditioned before further analysis. The results indicated that chitosan-CLEO matrix films successfully reduced ($p < 0.05$) the moisture content, film water solubility and water vapour permeability values. The incorporation of Tween 80 at greater concentration further improved ($p < 0.05$) the films moisture and water barrier. Films containing more CLEO showed continuous increment in the films DPPH scavenging activity and higher total phenolic compound. Chitosan-CLEO film forming emulsion (FFE) successfully inhibited the Gram-positive bacteria (*Staphylococcus aureus* and *Listeria monocytogenes*) and Gram-negative bacteria (*Escherichia coli* and *Salmonella* Typhimurium), indicating the potential of CLEO as antibacterial agent. Meanwhile, the films enriched with CLEO successfully repel *Musca domestica* in area preference test and the repellency potential were greater as the concentration of CLEO incorporated increased. The film produced in this study could potentially be used as a protective barrier against insects and prevent direct contact of houseflies with food hence reduce the transmission of various bacteria that cause contamination.

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Keywords: chitosan films, curry leaf essential oil, housefly, active packaging, tween 80

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Development of a pH-Sensitive Film Based on Fish Gelatine and Blackcurrant Pomace Extract for Real-Time Monitoring of Chicken and Shrimp Freshness

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Colorimetric pH-sensitive film is a type of smart packaging that changes color in response to pH. This study aimed to develop colorimetric pH-sensitive film using blackcurrant pomace extract (BPE) incorporated in fish gelatine (FG) films. However, FG films exhibit low mechanical and water barrier properties. Therefore, ultrasound was used to improve the properties of pH-sensitive film. FG was dispersed in heated distilled water for 30 min before glycerol and BPE were added. The film-forming solution was then ultrasonicated at 100, 200 and 300 W for 5 min. The solution was cast in a petri dish and dried at room temperature for 24 h. All films were conditioned in dry cabinet at 25 ± 2 °C and 50 ± 5 % relative humidity for 48 h before analysis. Ultrasound significantly lowered the moisture content of FG film incorporated with BPE by up to 26 % and decreased its water solubility by 5 %. Furthermore, mechanical performance was significantly improved, with tensile strength increasing by 44 % and elongation at break increasing by 45 %, demonstrating improved film strength and flexibility. FG films incorporated with BPE also showed distinct color changes in pH 1 to 13. In terms of pH-sensitivity, the films showed sensitivity toward headspace gas of ammonia and acetic acid. To explore practical application, the FG film incorporated with BPE was applied to monitor the spoilage of shrimp and chicken at a chilled condition and room temperature. The results showed an apparent color change from pink to green and yellow in response to shrimp and chicken spoilage. These findings demonstrate the effectiveness of ultrasound in enhancing the properties of pH-sensitive films and highlight the potential of FG films incorporated with BPE as smart food packaging for real-time monitoring of seafood and chicken freshness.

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Keywords: pH-sensitive film, smart packaging, ultrasound, blackcurrant pomace, fish gelatine film

Ultrasound-Assisted Extraction of Rambutan Peel Anthocyanins and the Potential as Chemosensor for Intelligent Food Packaging

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Food packaging has evolved to not only preserve food and prolong shelf life but also to monitor food quality in real-time storage. Anthocyanins can change color based on pH variations and could serve as a chemosensor for detecting food degradation. Chemosensor is a molecular sensor that interacts with certain substance to produce detectable response. The rambutan peel anthocyanins show a potential as a chemosensor for intelligent packaging but lack extensive research. This study aims to extract rambutan peel anthocyanins using ultrasonic-assisted extraction (UAE) and evaluate its potential as a chemosensor. Rambutan peel anthocyanins were extracted by UAE in aqueous ethanol (EtOH) at 25%, 50%, and 75% (v/v). The procedure was carried out under acidic conditions by additional of HCl 1% (pH 1) and citric acid 0.2% (pH 3). Anthocyanin extracts were evaluated for total anthocyanins, IC₅₀, total phenolic content, and chromatic color. The UAE of rambutan peel extracted in EtOH 75% at pH3 had the highest ($p < 0.05$) total anthocyanins (46.11 ± 0.46 mg/100g) and total phenolics (166.355 ± 9.369 mg GAE/100g). The IC₅₀ of rambutan peel anthocyanins in EtOH 75% at pH3 was higher (115.21 ± 0.39 ppm) than vitamin C at 11.90 ± 0.07 ppm. The chromatic color using a chromameter showed that anthocyanins changed with changes in pH. At low pH, the red (a*) color was high, but decreased as the pH increased to 7. Meanwhile, the blue (b*) color increased when the pH rose above 7. The color ranges from pH 1–11 showed the changes from red, pink, yellow to greenish-yellow. Rambutan peel contains high-level anthocyanins for an intelligent packaging chemosensor to monitor food degradation depending on changes in pH.

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Keywords: anthocyanins, rambutan peel, ultrasound-assisted extraction, intelligent packaging, chemosensor

Influence of Exogenous Melatonin Impregnation on Sugar Metabolic Regulation and Oxalate Content Reduction in Carambola

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Carambola, a tropical fruit prized for its distinctive flavour and nutritional richness, faces a challenge of rapid ripening and spoilage at room temperature. To address this issue, low-temperature storage is preferred. However, storing carambola at low temperatures leads to chilling injury symptoms, including browning, surface pitting, and hindered ripening, limiting its postharvest quality and shelf life, resulting in losses. Hence, there is a need to develop effective treatments to alleviate chilling injury and reduce postharvest losses. This study aims to investigate the effects of vacuum impregnation of exogenous melatonin in mitigating chilling injury and oxalate content in carambola. The carambola was vacuum impregnated with 100 µM melatonin at a vacuum pressure 150 mbar for a total 33-minute treatment time before being stored at 4 °C for 28 days, with sampling conducted every 7 days. Total soluble solid, titratable acidity, pH, soluble sugar content, sugar related enzymes activities and total oxalate content were analysed. The study results reveal that vacuum impregnation of exogenous melatonin successfully reduces chilling injury, enhancing the fruit's physical appearance while maintaining titratable acidity and total soluble solids. Sucrose content, crucial for osmotic regulation and membrane stabilisation, increased from 3.9286 g L⁻¹ to 11.3478 g L⁻¹ over the storage period, with D-glucose and D-fructose levels remain unchanged. The activities of acid invertase (AI) and neutral invertase (NI), responsible for converting sucrose into glucose and fructose, were upregulated on day 21 of storage. Additionally, a notable 23.86% reduction in oxalate content, an anti-nutritional compound in carambola, was observed. By regulating sugar metabolism, vacuum impregnation of exogenous melatonin successfully upregulates the levels of important sugars and reduces the presence of anti-nutritional components. These findings highlight the potential of postharvest melatonin applications in enhancing the quality and prolonging the shelf life of carambola.

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Keywords: chilling tolerance, non-thermal processing, postharvest quality, sugar content, and anti-nutritional factor

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Chitosan films enriched with an aqueous extract of sugar kelp *Saccharina latissima* (SLE) offer a promising avenue for the development of environmentally sustainable slice separators with antioxidant properties. The utilisation of chitosan, a by-product of the fishing industry, fortified with an extract from sugar kelp, a commonly found brown algae, addresses the need for biodegradable alternatives to synthetic materials in cheese packaging. In this study, chitosan films were formulated and characterised comprehensively, encompassing evaluations of equilibrium moisture, moisture content, water vapour permeability, mechanical properties, antioxidant potential, optical properties, surface morphology, and thermostability. The films were then tested as separators for sliced Havarti cheese, assessing their efficacy in mitigating lipid oxidation during refrigerated storage. The addition of SLE to chitosan films resulted in a decrease in mechanical properties, with reductions observed in tensile strength and Young's Modulus (compared to pure chitosan films). However, the chitosan-SLE films exhibited high free-radical scavenging activity against 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS^{•+}), indicating their potent antioxidant properties. Additionally, the presence of SLE significantly improved the UV-barrier properties of the films. When employed as separators for cheese, the chitosan-SLE films demonstrated a significant reduction in cheese lipid oxidation after 45 days of refrigerated storage compared to the control group using chitosan films. The findings of this study highlight the potential of chitosan-SLE films as environmentally sustainable alternatives to synthetic and non-biodegradable slice separators for cheese packaging. By harnessing chitosan and sugar kelp extract, this approach offers a viable solution for enhancing the shelf life of cheese products while minimising environmental impact.

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Keywords: active packaging, chitosan, biodegradable films, cheese

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In response to the demand for eco-friendly food packaging solutions, this study introduces an innovative approach to develop bioactive composite films suitable for food packaging applications. Traditional packaging materials often lack sufficient mechanical strength and antioxidant properties, thus demanding the exploration of novel materials for enhancing shelf life and preserving food quality. Composite films were fabricated by laminating bacterial cellulose (BC) and chitosan, enriched with grape bagasse extract (GE) for antioxidant capacity, and glycerol as a plasticiser. The formulations were systematically varied to evaluate their mechanical and thermal characteristics, crucial for packaging applications. The interaction between components was rigorously examined to assess the strength and resilience of the resulting films. Tensile and puncture tests were conducted to analyse the influence of GE and glycerol concentrations on mechanical properties. The study revealed a robust synergy between GE, glycerol, BC, and chitosan, leading to composite films with enhanced mechanical strength and puncture resistance. Tensile tests demonstrated significant impacts of GE and glycerol concentrations on tensile strength and elongation properties. Moreover, the incorporation of GE and glycerol proved pivotal in improving puncture resistance, crucial for protecting packaged food items. Predictive models were developed to gain deeper insights into the behaviour of these composite films, aiding in understanding their performance under various conditions. Subsequently, the efficacy of these films was evaluated through their application as separators for Havarti cheese, showcasing their ability to mitigate lipid oxidation and preserve antioxidant properties during storage. The findings underscore the potential of laminated BC-chitosan films enriched with GE and glycerol as sustainable packaging materials for extending the shelf life of food products. With their enhanced mechanical strength and antioxidant functionality, these bioactive composite films offer a promising solution to address the challenges associated with conventional packaging materials. This research signifies a significant step towards developing effective, eco-friendly packaging solutions to meet the evolving demands of the food industry while ensuring the preservation of food quality and safety.

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Keywords: active packaging, bacterial cellulose, biodegradable films, cheese, chitosan

FSH 3rd IFRC 2024 016-087**Perceived Benefits and Cost-Benefit Perspectives on Service Digitalisation: A Preliminary Study Among Fine Dining Restaurants in Bukit Jalil and Bukit Bintang, Kuala Lumpur**

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Internet has triggered the world to move online, accelerating a digital transformation to improve operational efficiency by transforming the traditional business model into digitalised model. As digitalisation continues to shape various industries, including the food and beverage sector, it is crucial for fine-dining establishments to understand and leverage its potential benefits. The process of transforming customer service into a digital experience that creates a paperless environment is known as service digitalisation. Previous studies on service digitalisation in Malaysia have concentrated on quick-service restaurants and online food delivery systems, with limited attention given to the unique context of fine dining restaurants. Moreover, the prior studies have mainly concentrated on customers' perspectives, giving limited attention to the standpoint of restaurateurs. Hence, this study aims to fill the significant gap in the literature by specifically investigating the perceived benefits and perceived costs of service digitalisation among fine dining restaurants, as well as identifying types of service digitalisation that should be prioritised among fine dining restaurants. This study has adopted a qualitative research approach in exploring the above-mentioned research objectives and one-to-one interview was held with eight restaurant owners or managers from fine dining restaurants located in Bukit Jalil and Bukit Bintang, Kuala Lumpur. The qualitative result was analysed based on the thematic analysis to identify the meaningful patterns in themes. The result indicated that usefulness, ease of use, operational efficiency, and enjoyment as the perceived benefits of service digitalisation among fine dining restaurants in Bukit Jalil and Bukit Bintang, Kuala Lumpur. Furthermore, the perceived costs highlighted in the study were price, dependence, technical risk, social disconnection, and adaptability. Subsequently, the study also proposed the types of service digitalisation that should be prioritised in fine-dining restaurants which include POS systems, online table reservation systems, and chatbots. In conclusion, this study contributes to the body of knowledge by providing a comprehensive understanding of the cost-benefit perceptions of restaurateurs toward service digitalisation in fine dining restaurants. The cost-benefit analyses contribute knowledge in assessing the benefits and drawbacks in a data-driven manner, allowing the restaurateurs and food service sector to make better-informed decisions and able to allocate resources effectively. Additionally, this study practically provides valuable insights into the financial implications of adopting digital technologies in the food service sector. It also contributes to a deeper understanding of the investments required, such as hardware and software, while also assessing the potential returns and long-term benefits.

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Keywords: service digitalisation, fine-dining restaurants, cost-benefit perspectives, perceived benefits

FSH 3rd IFRC 2024 077-081**Consumer's View, Perception and Acceptance of Plant-based Milk: Evidence from a Public University in Selangor.**

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Public universities face a complex set of considerations regarding the adoption and promotion of plant-based (PB) milk. Balancing nutritional needs, environmental sustainability, inclusivity, cost, and educational objectives is key. Effective communication and education about the benefits and limitations of PB milk, along with careful planning and resource management, are essential for addressing these issues comprehensively. However, there is a lack of research on the views, perceptions, and acceptance of PB milk attributes in Malaysia. Thus, this study aims (1) to identify the relationship between socio-demographic profiles of consumers and their views, perceptions, and acceptance of PB milk attributes; (2) to identify the relationship between views and perceptions towards the acceptance of PB milk attributes; and (3) to compare consumers' view, acceptance, and perception of PB milk. 380 students in a public university in Selangor were surveyed using purposive sampling. This allows researchers to gather data from a diverse, engaged, and influential group, providing valuable insights into the current and future trends in consumer behaviour regarding plant-based milk. An online questionnaire, created with Google Forms, was distributed via email and social media platforms such as WhatsApp, Telegram, and the Facebook Page. Data analysis using the SPSS employed various techniques including descriptive tests, one-way ANOVA, T-tests, correlation, and multiple regression analysis. The survey data indicated a positive correlation between individuals' views and perceptions of PB milk attributes and their level of acceptance. Strong correlations were observed between all the variables of views and perceptions, suggesting that higher levels of these factors correspond to increased acceptance of PB milk attributes. Consumer views, acceptance, and perceptions of plant-based milk attributes may vary based on socio-demographic profiles. This study is important for various stakeholders, as it provides insight into the plant-based milk consumption patterns in Malaysia. Findings suggest that the industry continues to improve PB milk attributes to increase its consumption, as well as its implications for health, sustainability, and the market dynamics in Malaysia.

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Keywords: acceptance, awareness, milk attributes, milk brands, plant-based milk

Sustainable Gastronomy Tourism: Examining the Nexus of Tourist Loyalty, Electronic Word of Mouth (eWOM), and Halal Food Image in Promoting Eco-friendly Culinary Experiences.Sara Abhari^{1*}, Rita Lo¹, Alexander Trupp¹, Alireza Jalali²¹School of Hospitality and Service Management, Sunway University, Selangor, Malaysia²Sultan Qaboos University, Masqat, Oman

This study explores the dynamics of tourist loyalty within the context of halal gastronomy tourism, emphasising the influential factors of Electronic Word of Mouth (eWOM) and sustainability practices. This study suggests an interest in understanding how halal awareness as a food image can contribute to the promotion of eco-friendly culinary experiences. This implies a focus on sustainable gastronomy practices that prioritise environmental conservation, cultural preservation, and community engagement, which are shared through social media as electronic word of mouth (eWOM). By examining the intricate relationship between the role of tourist intention to share feedback through social media and halal awareness in gastronomy tourism, the study seeks to provide practical insights for destination managers and businesses aiming to cultivate enduring relationships with halal-conscious travellers in an increasingly competitive tourism landscape, such as Malaysia. Moreover, this study aims to identify new avenues for promoting responsible travel while respecting cultural and religious dietary preferences. Through a multidisciplinary lens, the research seeks to contribute valuable insights into enhancing the overall tourism experience, fostering inclusivity, and supporting environmentally conscious practices in the hospitality industry. Therefore, as the landscape of global tourism changes, there is a rising interest in genuine, eco-friendly culinary adventures, prompting a closer look at the intricate relationships between these vital elements, such as halal awareness. The integration of sustainable practices not only contributes to positive destination perceptions but also aligns with the growing demand for responsible and memorable culinary experiences featuring halal food in eco-friendly destinations. The research employed a quantitative approach, utilising self-administered questionnaires for data collection and applying Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings of this study highlight the potential for enhancing the appeal of the gastronomic market in halal tourism, particularly in destinations characterised by a diverse multicultural environment and an eco-friendly context. The study showed that destinations perceived as offering authentic and high-quality halal food options were more likely to appeal to all travellers, regardless of their religious background, who were interested in sustainable gastronomy tourism. Furthermore, halal food awareness was found to positively influence tourist loyalty to eco-friendly destinations.

Corresponding author: saraa@sunway.edu.my*Keywords: gastronomy tourism, halal awareness, electronic word of mouth (eWOM), sustainable practices, eco-friendly culinary****Investigating the Food Waste in Vegetarian Menu and All Types Menu between 2019-2021 in School Lunches: A Study from Uppsala Municipality**Marina Hardiyanti^{1*}, Christopher Malefors², Mattias Eriksson², Niina Sundin²¹Department of Nutrition Health, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, 55281, Yogyakarta, Indonesia²Department of Energy and Technology; Division of Agricultural Engineering, Swedish University of Agricultural Sciences, Uppsala, Sweden

A school lunch program is an alternative to ensure students obtain optimal nutritious food during their day at school. However, school lunches also produce food waste that burdens the environment. This study aimed to investigate the amount of food waste produced from school lunches through three years of measurement in Uppsala Municipality, Sweden. Food waste from school lunches in Uppsala Municipality was collected between 2019-2021. In 2019, 33 primary schools participated, while in 2020 and 2021, there were 35 schools. The type of food waste quantified was divided into serving, plate, kitchen, and total waste; however, it was excluded because of the limited data in the kitchen waste category. To accommodate the analysis, the days were divided according to the menu of the measuring days. Statistical analysis was performed using the Microsoft Excel 2010 program using descriptive analysis and independent sample t-test. This study found that the mean weight of total food waste from school lunches in Uppsala Municipality in 2019 was 20.49 kg, while in 2020 decreased to 18.07 kg and increased in 2021 to 19.24 kg. Statistical analysis using a t-test showed a significant difference between the amount of total food waste in 2019 and 2020 ($p = 0.02$) and between 2020 and 2021 ($p = 0.04$). However, there is no significant difference between the year 2019 compared to 2021 ($p = 0.52$). As statistically analysed, there is no significant difference amount of serving waste ($p = 0.94$) and plate waste ($p = 0.93$) on the day with only the vegetarian menu and the day with all menu. A study from Uppsala Municipality showed that school lunches contribute to food waste production. Multisector approaches and efficient strategies must be implemented to reduce school food waste.

Corresponding author: marina.hardiyanti@ugm.ac.id*Keywords: food waste, plate waste, serving waste, vegetarian, school lunch**

Validating Psychometric Properties of Scale Development: Mindset Scale to Become a Food-Based Social Entrepreneur

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Entrepreneurship is a well-developed field. However, one of its subfields, social entrepreneurship, is exactly the opposite. Social entrepreneurs create change by adding value to the community to build a sustainable community. Creating an entrepreneurial mindset is paramount to the competitiveness of businesses and the socio-economic lifestyle of the population through value and job creation. Entrepreneurial mindset scales have been developed to predict entrepreneurial actions and intentions. This paper focuses on the validation of a social entrepreneurship mindset scale to become a food-based social entrepreneur among students in public universities in Malaysia. 274 usable questionnaires (n=274) were collected and analysed to confirm the validity and reliability of the instrument. The psychometric properties of the scale were analysed using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The EFA yielded a four-factor solution, namely adaptive competence, performance-oriented, compassion, and optimism that reflect the mindset. These factors were regressed on the intention to become a food-based social entrepreneur. The final model fit of the measurement model ($\chi^2/df=2.43$, CFI =.90, IFI=.90, TLI=.89, RMSEA=.07) was found to be acceptable, confirming convergent and discriminant validity. In terms of criterion-related validity, mindset was found to have a strong, significant and positive relationship ($r=.88$) with the intention to become a food-based social entrepreneur, indicating that the psychometric properties were validated. This study has produced a customised instrument to measure the mindset of food-based social entrepreneurs. The current study provides new insights into the context of social entrepreneurs and leads to a better nomological understanding of the relationship between mindset and intention to become a food-based social entrepreneur.

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Keywords: scale development, validation, psychometric properties, mindset, social entrepreneurship

Career Intention among Youth with Hearing Disabilities in Malaysia Hospitality Industry

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Malaysian government efforts have enabled students with hearing disabilities to access educational opportunities, including training in the hotel and foodservice industries, aligning with 2030 Agenda and SDGs. Despite the Ministry of Higher Education's efforts to help disabled youth become industrial players, high unemployment rates persist among the graduates. This situation has raised a question, and the underlying cause that led to this causation is unknown. Thus, this study examines the determinants influencing career intentions and the mediating effect of interest of students with hearing disabilities in the hospitality industry. Besides, this study examines the moderating effect of gender on the relationship between interest and career intention. Data were collected from 145 students with hearing disabilities who enrolled in Malaysia's Hospitality Certificates Program (n = 4). Questionnaires were distributed face-to-face with the help of a sign language translator. The proposed research model extends Social Cognitive Career Theory (SCCT) by incorporating four dimensions of perceived industry characteristics (i.e., nature of work, physical working conditions, pay/ benefits, and co-workers) and three dimensions of challenges (i.e., communication, barriers, and career anxiety). Analysis using SMART PLS-SEM (v4.0) revealed that perceived industry characteristics ($p < 0.000$) and self-efficacy ($p < 0.000$) significantly influence students' career intentions in the hospitality industry. Self-efficacy emerged as the most influential determinant. However, the relationship between challenges ($p < .120$), outcome expectation ($p < .258$), and career intention was not supported in this study. Interest mediates the relationship between perceived industry characteristics, self-efficacy, and career intention, but not for outcome expectations and challenges. Gender, however, does not act as a moderator between career intention and interest. The SCCT model, findings highlight invaluable information to enhance workforce participation among hospitality students with disabilities, utilise government funds to improve curriculum, and equip students with valuable skills for industry entry.

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Keywords: disability, self-efficacy, career intention, hospitality industry

FSS 3rd IFRC 2024 080-058**Developing a Roadmap for a Sustainable Urban Food System in Semarang, Indonesia**Budi Widianarko^{1*}, Inneke Hantoro¹, Meifita Handayani², Benny Danang Setianto³¹Department of Food Technology, Faculty of Agricultural Technology, Soegijapranata Catholic University, Semarang, Indonesia²Yayasan Bina Karta Lestari (BINTARI), Semarang, Indonesia³Department of Urban and Environmental Studies, Faculty of Environmental Science and Technology, Soegijapranata Catholic University, Semarang, Indonesia

As cities consume excessive resources and contribute to greenhouse gas emissions, there is an urgent need to transition toward sustainable food systems. This shift should prioritise healthy consumption, socio-economic sustainability, and environmental preservation. Semarang, Indonesia's fifth-largest city, was chosen as the locus of this study due to its substantial agricultural potential. Our study assesses Semarang's food system, identifies existing challenges and opportunities, and outlines a roadmap for its transformation toward sustainability. This study comprises four main stages: (1) Desk Study: Initial research was conducted to gather foundational data; (2) Survey on Food Consumption-Nutrition: A comprehensive survey was carried out to collect data on food consumption patterns and nutritional intake; (3) Focus Group Discussions (FGDs): Four FGDs were conducted covering topics such as consumption-nutrition, socio-economy, environment, and synthesis. Stakeholders actively participated in these discussions; and (4) Delphi Interviews: Two rounds of Delphi interviews were conducted with relevant experts to delve deeper into key findings and insights. The desk study provided essential data to guide the direction of subsequent activities. FGD4 focused on synthesising the findings from earlier discussions (FGD1, FGD2, and FGD3), which were further refined during the Delphi interviews. Finally, all collected data from the desk study, survey, FGDs, and Delphi interviews were analysed and synthesised to develop a comprehensive opportunity roadmap. Our investigation has revealed several challenges and opportunities. Challenges encompass the absence of a clear vision for food system development, limited prioritisation of food in urban planning, an aging farmer population, land conflicts, unattractive economic incentives, and unhealthy consumption patterns. However, there are promising indicators. The government demonstrates commitment to food and agriculture, ample agricultural lands are available, and initiatives in urban farming are emerging. Moreover, there is a positive trend towards healthier consumption habits among residents. To address these challenges and seize the opportunities, we propose strategies such as fostering multi-stakeholder collaboration, promoting research-driven innovation, implementing educational outreach programs, facilitating market development, and strengthening local supply chains.

Corresponding author: widianarko@unika.ac.id*Keywords: urban, food system, transformation, sustainability****FSS 3rd IFRC 2024 102-076****Unveiling the Challenges of Wastewater Reclamation in the Malaysian Food Industry: A Fuzzy Delphi Approach**Nabiliiah Mat Yusoff¹, Mohd Helmi Ali^{1,2*}, Asma-Qamaliah Abdul-Hamid¹¹UKM-Graduate School of Business, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia²Faculty of Economics and Management, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

Wastewater from the food industry is the contaminated water left over from food production, processing, and preparation activities. It contains organic matter, suspended solids, nutrients, fats, oils, grease, and potentially chemicals and pathogens. Nevertheless, it offers an opportunity to recover valuable by-products through recycling and appropriate treatment procedures. Reclamation wastewater is a vital option for the food industry, paving the path for sustainable resource management. This concept aligns with Sustainable Development Goals (SDGs) and circular economy (CE) principles, helping to tackle environmental issues and strengthen economic resilience in the food industry. However, despite its potential benefits, the initiatives for wastewater reclamation confront numerous challenges in their execution. Thus, current study aims to unveil the challenges hindering the implementation of wastewater reclamation initiatives. Forty-nine significant challenge criteria in wastewater reclamation adoption were collected and employed a fuzzy Delphi method to address the qualitative information and translate the linguistic preferences by gathering insights from 10 industry experts. Analysis reveals multifaceted barriers to wastewater reclamation, including political, regulatory, technological, economic, environmental, and social factors. These obstacles hinder the effective adoption of reclamation practices within the food industry, impacting sustainability goals and economic resilience. This study emphasises the intricate dynamics of wastewater management in the food industry and identifies key barriers to reclamation implementation. The findings offer valuable insights for industry stakeholders, policymakers, and researchers, informing strategic decision-making to overcome challenges and promote sustainable wastewater management practices. Addressing these challenges can help stakeholders unlock the full potential of wastewater reclamation, enhancing environmental stewardship, resource efficiency, and contributing to SDGs and CE objectives in the food sector. The limitations and future research directions are discussed.

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Plant-based meat analogues are high in demand globally as consumers seek protein sources which are healthier and more sustainable produced than traditional meat. While replicating the texture of real meat with plant proteins is crucial, the right lipid (fat/oil) ingredients are equally important for producing meat analogues with comparable juiciness and mouthfeel. This study examined the composition and physicochemical properties of 20 commercial vegetarian and vegan meat analogue made with various vegetable oils. Physicochemical properties were analysed, such as cooking loss and cooking yield, pH, water activity, moisture content, color analysis (raw and cooked), fatty acid composition and texture profile analysis. The physicochemical properties of palm oil contributed to higher cooking yields, improved moisture retention and enhanced texture, especially juiciness. Palm oil and its fractions both have liquid and solid forms at room temperature, which provide structure and bind plant protein components, preserving them during processing. The saturated and monounsaturated fats of palm oil give a neutral flavour to the meat analogues, unlike polyunsaturated oils, which can have off flavour notes. The results obtained in this study allowed identification of key quality attributes of commercial plant-based processed meat analogues and highlighted relationships between such attributes and vegetable oils' usage, which can be exploited in future product development of palm oil-based plant protein meat analogues. Palm oil improves juiciness, mouthfeel and structural integrity of the meat analogues. Emphasis should be placed on developing formulation strategies that utilise palm oil and its fractions to create plant-based meat analogue products. These should have desirable nutrition, texture, and taste to meet consumer needs in the areas of health, nutrition and sustainability.

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Keywords: palm oil, plant-based meat analogues, vegan, physicochemical properties, sustainable

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A growing global population in the world has imposed increasing pressure on the world's resources. In particular, the increased demand for high-quality protein is expected, which is expected to lead to higher greenhouse gas emissions and greater consumption of water and land resources. Addressing this issue will require more sustainable production of protein as well as alternative sources for direct human consumption. Protein serves as a crucial food component, contributing to the functionality, bioactivity and flavour in food systems. However, the functional, bioactive and flavour properties of sustainable proteins/peptides remain to be explored. This work will provide examples to help us understand and modify proteins and peptides derived from sustainable food sources, including plant-based, insect-based, and by-product proteins, with the aim of imparting them with desirable characteristics. We have elucidated their structure-function relationships and underlying molecular mechanisms. Conclusion: The obtained research findings contribute to the potential application of sustainable proteins and peptides as promising food ingredients.

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Keywords: sustainability, proteins, peptides, structure, function

NFF 3rd IFRC 2024 053-192**Disaccharides Lyoprotection Improved Physicochemical Stability and Bioactivities of Liposome Microparticles Loaded with Stone Fish-Derived Bifunctional Peptides**Shehu Muhammad Auwal^{1,2}, Muhammad Zarej^{1,3}, Nazamid Saari^{1*}¹Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Department of Biochemistry, Faculty of Basic Medical Sciences, Bayero University, Kano, Nigeria³Department of Food Science, University of Arkansas, Fayetteville, AR, 72704, USA

Food-derived peptides provides diverse health benefits to the body system. However, they are prone to degradation due to storage-related physicochemical changes. The use of liposomal microencapsulation and lyoprotection, helps to maintain the structural and functional integrity of the peptides during long-term storage. This enhances their potential as bioactive ingredients for various applications in functional foods and nutraceuticals. In the present study, the effect of lyoprotection was assessed on the physicochemical stability and bioactivities of liposome microparticles loaded with stone fish-derived antioxidant and ACE-inhibitory peptides fraction, following 8 weeks of their storage at 4°C and 25°C. Lipid film hydration method was used to prepare four liposome suspensions (F1 to F4) from lipoid S75. Two formulations, F3 and F4 were loaded with the peptides and lyoprotected using sucrose and trehalose, respectively. The F2 suspension was loaded with the peptides but not lyoprotected while F1 was prepared as control without peptide inclusion. Before storage, all freshly prepared F1, F2, F3 and F4 were characterised for physicochemical stability parameters including particle size and zeta potential whereas only F2, F3 and F4 were analysed for entrapment efficiency. Thereafter, both formulations were stored at 4°C and 25°C followed by evaluation for changes in their physicochemical stability parameters once weekly for two months. The F3 and F4 exhibited significantly lower ($p < 0.05$) particle size but higher zeta potential and entrapment efficiency compared to F2. They also showed significantly ($p < 0.05$) higher DPPH-radical scavenging, Fe^{2+} -ion chelating, and ACE-inhibitory activities both before and after storage, particularly at 4°C. Lyophilisation and subsequent analysis using FTIR, XRD, and SEM confirmed successful peptide inclusion in F2, F3, and F4, with minimal aggregation observed in F2. These findings identified lyoprotection and low temperature storage as suitable approaches to enhance the physicochemical stability and efficacy of stone fish-derived peptides for various foods and nutraceuticals applications.

Corresponding author: nazamid@upm.edu.my*Keywords: bioactivities, lyoprotection, liposomes, peptides, physicochemical stability****NFF 3rd IFRC 2024 125-148****Effects of GOS, LNB, LNT II and their Combination on the Gut Microbiota Composition, Intestinal Barrier, and Metabolites of Weaning Sprague-Dawley Rats**Jiayue Tang¹, Xinru Yang¹, Maolin Tu^{1*}, Ling-Zhi Cheong^{2*}¹Zhejiang-Malaysia Joint Research Laboratory for Agricultural Product Processing and Nutrition, Key Laboratory of Animal Protein Food Deep Processing Technology of Zhejiang Province, College of Food Science and Engineering, Ningbo University, Ningbo, 315211, China²School of Agriculture, Food and Ecosystem Sciences, Faculty of Science, University of Melbourne, 3010, Australia

Human milk oligosaccharides (HMOs) are the principal maternal milk nutrients that support the intestinal microbiota and promote the maturation of infant's gut. We aimed to determine whether gavage of individual HMOs alters growth and gut health in weanling rats. Healthy 21-day-old male Sprague Dawley rats were randomised to control, oligogalactose (GOS), Lacto-N-biose I (LNB), Lacto-N-triose II (LNT II) diets alone or in combination (GOS+LNB, GOS+LNT II, LNB+LNT II) at the same gavage dose (850 mg/kg BW) for 24 days. Body composition, plasma biochemical indices, faecal short-chain fatty acids, faecal microbiota composition, and messenger RNA (mRNA) expression in the intestinal tract were assessed. There were no significant differences between experimental and control rats in body weight, feed intake, spleen index, and kidney index, but LNT II significantly increased liver index. LNB+LNT II significantly increased the mRNA expression of colonic tight junction proteins such as ZO-1, ZO-2, Cdx1, Cdx2, and Muc2, while LNT II played a significant role in modulating short-chain fatty acid receptors and transporter genes (GPR43, GPR109a, and FABP4). All oligosaccharides-fortified diets altered gut microbiota composition and mRNA expression in the intestinal tract. Further long-term investigation of gut microbial profiles and supplementation with other HMOs during early development is warranted.

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NFF 3rd IFRC 2024 133-134**Identification, Screening and Taste Mechanisms Analysis of Two Novel Umami Pentapeptides Derived from Myosin Heavy Chain of Atlantic Cod (*Gadus morhua*)**

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Umami peptides are new ingredients for the condiment and seasoning industries, with healthy and nutrition characteristics, some of which were identified from the aquatic proteins. This study aims to further explore novel umami peptides from Atlantic cod (*Gadus morhua*) by combining the in silico, Nano-HPLC-MS/MS, sensory evaluation, and electronic tongue analysis. Then two novel peptides, Leu-Val-Asp-Lys-Leu (LVDKL) and Glu-Ser-Lys-Ile-Leu (ESKIL), from the myosin heavy chain of Atlantic cod (*Gadus morhua*), were screened and confirmed with strong umami tastes with the thresholds of 0.427 mM and 0.574 mM, respectively. The molecular docking was adopted to explore the interactions between the umami peptides and the umami taste receptor T1R1/T1R3, which showed that the umami peptides interacted with T1R1/T1R3 mainly by the electrostatic interaction, hydrogen bond interaction, and hydrophobic interaction. Furthermore, the physicochemical properties of the peptides were investigated by in silico methods and cell viability experiments. This study will provide a better understanding of the umami taste in Atlantic cod and will promote the development of the condiments and seasonings.

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Keywords: Atlantic cod (*Gadus morhua*), umami peptide, molecular docking, T1R1/T1R3, iUmami-SCM

NFF 3rd IFRC 2024 143-120**Investigating the Potential of Black Pepper as a Nutraceutical Agent for Diabetes Management**

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The antidiabetic and antioxidant benefits of black pepper have been extensively highlighted in numerous studies. Expanding upon the existing research findings, our aim is to utilise the bioactive constituents found in black pepper in order to develop a nutraceutical with the purpose of modulating blood glucose levels. In the midst of the worldwide diabetes epidemic, this approach can lead to development of new synergistic combinations for effective treatment of diabetes. The current findings demonstrate the inhibitory effects of the black pepper nutraceutical formulation on crucial enzymes implicated in carbohydrate metabolism, including β -amylase and β -glucosidase. The results of in vitro antidiabetic experiments demonstrate significant inhibitory effects, as seen by the high inhibition rate of 97.3% achieved by black pepper extracts against both enzymes. Moreover, the formulation demonstrates high antioxidant activity, as evidenced by the DPPH radical scavenging assay, wherein an apparent antioxidant percentage of 85.32% was observed. This highlights its capacity to reduce oxidative stress and protect cells from damage caused by free radicals. Additionally, our research results obtained from in vitro glucose uptake experiments performed on cell cultures reveal an increase in glucose uptake by muscle cells following exposure to the black pepper nutraceutical formulation. This improvement results in enhanced insulin sensitivity, making muscle cells more responsive to insulin and promoting higher glucose uptake. This is a considerable advantage in managing diabetes, highlighting the potential of black pepper as an antidiabetic agent.

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Keywords: black pepper, antidiabetic, nutraceutical, antioxidant, bioactive constituents

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Processed cheese spread is a multi-component mixture of water, cheese, fat, emulsifying salts, and other functional ingredients. Spices added to processed cheese creates a value-added product. The spices have antimicrobial properties, antioxidant effect and their own characteristic flavour. The purpose of this research was to develop a nutritious spicy cheese spread by incorporating selected spices. The main ingredients utilised for manufacture of spicy cheese spread were natural Cheddar cheese, emulsifying salt, black pepper and cumin seeds powder. The effect of three different levels of black pepper and cumin seeds powder (0.5, 1.0 and 1.5%) on the physico-chemical, phytochemical, microbiological and sensory qualities of cheese spread were examined during storage period of 60 days at refrigeration temperature ($5\pm1^{\circ}\text{C}$). The proximate analysis of spicy cheese spread indicated that the moisture, ash and fat content changed significantly during storage while protein showed non-significant impact. The pH and acidity of cheese spread during storage ranged from 5.28-5.03 and 0.70-0.79%, respectively. Total antioxidant capacity, total phenolic, total flavonoid content and DPPH free radical scavenging activity increased by adding spices while decreased during the storage period. The microbial analysis of cheese spread exposed that values of total plate count remained within the acceptable limits. Black pepper and cumin powder concentration considerably influenced the sensory attributes. When compared to other treatments, cheese spread having 1% black pepper and cumin seeds powder got the highest scores for taste, aroma, texture and overall acceptability. Results revealed that cheese spreads having spices have improved nutritional profile as compared to the control sample. Antioxidant potential was significantly higher in black pepper and cumin seeds incorporated cheese spread. Hence, it is concluded that the black pepper and cumin are appropriate for the production of healthy spicy cheese spread with acceptable quality and functionality and increase the shelf stability.

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Keywords: cheese spread, spices, black pepper, cumin seeds, antioxidant potential, nutrition profile

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The swiftlet nest industry in Malaysia supports the national economy. Swiftlet's habitats are limited to humid tropical habitats in Southeast Asia. Swiftlet nest from *Aerodramus fuciphagus* was claimed to aid in digestion problems among other nutritional benefits. A specific substrate for gut bacteria can contribute to consumers' health through the improvement of probiotics and beneficial gut bacterial growth. Referring to the nutritional properties, protein content in swiftlet nest can be 60–65%, whereas the glycan content is 10–30%, depending on the harvested place. In this study, the swiftlet nest and bioactive swiftlet nest were tested as a potential carbon substrate for the growth of probiotic bacteria. The glucose, molasses, swiftlet nest (glycoproteins), and bioactive swiftlet nest (glycopeptides) as carbon substrates were added into 'de Man Rogosa Sharpe' (MRS) broth media containing *L. acidophilus*, respectively. The broth media was incubated at 37°C for 24 h. The MRS broth without substrate was used as the control. The bacterial count was conducted on nutrient agar with a suitable level of dilution. The swiftlet nest could not be used by probiotic bacteria in intact form (glycoproteins). The swiftlet nest has the potential as a substrate for supporting probiotic growth in bioactive digested form (glycopeptides), such as in the swiftlet nest soup. This is due to the bioactive compounds usually being inactive in the parental intact compound. The glycopeptides from swiftlet nest have been reported to be soluble compounds, resistant to the digestive system, and may provide antioxidant benefits after being digested. The glycopeptides can also give benefit to beneficial gut bacteria. The benefits of bioactive swiftlet nest for probiotics as well as health improvements contribute to the sustainability of this industry.

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Keywords: swiftlet nest, glycopeptides, bacterial fermentation, digestion, probiotics

Trehalulose-Rich Stingless Bee (*Geniotrigona thoracica*) Honey Modulate Cytotoxicity and Glucose Uptake in HepG2, 3T3-L1 and SKMC Cells in Vitro

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Honey is widely used for nourishment, constituting a nutritious supplement with medicinal properties recognised in all over the world since ancient times. Many researchers tried to link the phenolic compounds in honey, which act as natural antioxidants for their potential role in improving human health, including inflammatory conditions like cardiovascular disease. The present study was aimed to determine some physico-chemical characteristics of Acacia and Kelulut honey and further investigate their effects on cardiovascular disease (CDV) risk modulation in high cholesterol level subjects. The present study showed that Acacia had lower content of moisture (19.2 vs 29.5%), acidity (68.9 vs 164.5 mEq/kg), diastase activity (6.7 vs 9.2 DN) and hydroxyl methyl furfural (54.0 vs 76.0 mg/kg) as compared to Kelulut ($p < 0.05$). Moreover, the reducing sugars (76.2 vs 48.4%), pH (4.2 vs 3.4) and the antioxidant parameters (total phenolic content, DPPH and FRAP values) were higher in Acacia honey ($p < 0.05$). For the intervention study, 83 high cholesterol subjects (TC > 5.4 mmol/L) were recruited and randomly assigned into four groups as control ($n=14$; no honey supplementation), three low dosage of honey were used, namely, 10 ($n=25$), 20 ($n=19$) and 30 ($n=25$) g/day. In the first phase, Acacia honey was supplemented for one month and after a wash-out period of two months, Kelulut honey was then supplemented accordingly. Results revealed that 10 g/day of Acacia honey supplementation significantly decrease body fat, total cholesterol (TC), LDL-c and triglyceride (TG) by 1.8%, 6.0%, 5.0%, and 16.7%, respectively. Haemoglobin was increased significantly by 2.3% and more apparent increases in HDL-c by 13% following 30 g Acacia honey supplementation. On the other hand, 10 g Kelulut honey supplementation decrease TC, LDL-c and TG by 3.3%, 4.9% and 16.7%, respectively. The effect on HDL-c is contradicted with Acacia honey, whereby at 10 dosage, the increases was by 12%. Blood glucose was decreased in the range from 0.5-0.9% for Acacia honey, compared to Kelulut honey supplementation which resulted in increases by 2.5 to 9.8%. Interestingly, in general at 20 g dosage for both Acacia and Kelulut honey, the beneficial effects seem diminished. Therefore, it can be concluded that Acacia honey supplementation exhibits better CVD risk modulation, involving the body fat percentage, haemoglobin, glucose concentration apart from lipid profile. In conclusion, the present study suggests that low dose of Acacia honey (10 g = 1 spoon) may be proposed as a dietary supplementation for aiding CVD risk modulation.

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Keywords: acacia honey, kelulut honey, physico-chemical, antioxidant, cardiovascular disease risk

Development and Quality Evaluation of Probiotic Beverage from Aromatic Brown Rice

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The increasing consumer demand for innovative plant-based alternatives to traditional dairy products reflects a shifting preference towards healthier and sustainable food choices. This trend is evidenced by the growing popularity of plant-based foods as consumers actively seek healthier options. This study focuses on developing a plant-based product-a fruit-flavoured probiotic rice milk beverage from aromatic brown rice. The paddy rice undergoes parboiling for nutritional and physical enhancements. The probiotic rice milk beverage, with 10% pineapple (T1) and 10% mango (T2) flavours, underwent viability tests, shelf-life assessments, and sensory evaluations. The results clearly demonstrate that Mango (T2) exhibited significantly higher acceptability compared to Pineapple. Viability tests from the first to fourth week showed mango's initial advantage over pineapple, with both increasing viability initially and decreasing later. Shelf-life analysis from day 0 to day 14 revealed mango's decreasing pH over time, while both samples' Total Soluble Solids (TSS) remained stable until day 9. Sensory evaluations favoured mango throughout the 14 days, whereas pineapple became unacceptable from day 12. Consistent results were found in sensory evaluations and consumer tests for color, aroma, sweetness, sourness, flavour, and viscosity, with mango scoring higher. Mango-flavoured probiotic rice milk beverage underwent nutritional analysis, revealing 5.12% ash, 84.40% moisture, 0.81% protein, 0.01% fat, 2.58% dietary fibre, 6.57% total sugar, and the rest as total carbohydrate. Acid composition analysis showed 0.01% for various acids. Nutrition facts per 200 mL serving include 84

calories, 0 fat, 0 cholesterol, 56mg sodium, 19g total carbohydrates, 5g fibre, 13g sugar, and 2g protein. Mango-flavoured probiotic rice milk beverages exhibit higher acceptability, stability, and nutritional content compared to pineapple variants. These results suggest potential applications in the food industry.

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Keywords: aromatic brown rice, probiotic, plant-based, viability

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Development of Noodles Incorporated with Malaysian Green Seaweed *Caulerpa lentillifera*

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Caulerpa lentillifera, commonly known as sea grapes or latok in Malaysia, is a type of edible green seaweed widely consumed as sea vegetables. This seaweed has gained popularity worldwide in recent years due to its unique texture, flavour, and numerous health benefits. The objective of this study was to develop and investigate the effects of incorporating noodles with different concentrations of *C. lentillifera* powder (2.5%, 5.0%, 7.5%, and 9.0%). Several analyses were conducted including color, pH, water activity, texture analysis, cooking properties, sensory acceptance, and nutrient content. Furthermore, a human intervention study was conducted to evaluate the hypoglycaemic properties of the seaweed noodles. The results suggested that the addition of an increasing amount of seaweed powder had an impact on the noodles. The optimum cooking time and cooking loss increased as the concentration of the seaweed powder increased. The texture profile analysis indicated an increasing trend, which could be attributed to the negative effects of the seaweed powder on gluten development. The noodles with 2.5% seaweed powder was selected as the best formulation based on the highest scores for all six sensory attributes such as colour, aroma, taste, aftertaste, texture and overall acceptance. The addition of seaweed has increased the dietary fibre and the macro- and micro-minerals content of the noodles including calcium, potassium, sodium, magnesium, manganese, iron, copper, selenium, zinc, and iodine as compared to noodles without seaweed. The human study has shown that seaweed noodles have a low glycaemic index (GI) score of 51. In conclusion, *C. lentillifera* powder can be incorporated to improve the nutritional value of the noodles, and the sensory attributes were found to be acceptable.

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Keywords: noodles, green seaweed, *Caulerpa lentillifera*, sea grapes, hypoglycaemic

NFF 3rd IFRC 2024 262-246

Therapeutic Impact of Bitter Gourd Seed-Fortified Crackers on Alloxan-Induced Diabetic Rats

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Developing functional foods by utilising food waste products is an emerging trend in the sustainable food industry. These days, researchers and industrialists are more focused on developing such food recipes that could have the potential to control or limit the widely spreading health complications. Diabetes mellitus (DM) is a metabolic condition marked by a decreased body's capacity to produce or react to endocrine hormones to keep blood glucose levels within normal ranges. DM is categorised into type 1 DM (T1DM), type 2 DM (T2DM), and gestational diabetes. T2DM accounts for 90% of DM cases and is largely associated with diet. In this research, BG seeds (BGS) were incorporated at 10% into crackers to make BGS-fortified crackers (BGS-C), to investigate their therapeutic impact on DM. A 35-day therapeutic trial on 15 male Wister rats was performed. Rats were divided into five groups where G0 (non-diabetic: control diet), G1 (diabetic: Metformin), G2 (diabetic: Metformin + 25% BGS-C), G3 (diabetic: Metformin + 50% BGS-C), and G4 (diabetic: Metformin + 75% BGS-C). The results of this study revealed that the inclusion of BGS-C into the diet of diabetic rats brought much faster, highly significant, and health-promising outcomes. The results of G4 and G3 were quite close to the normal values for almost all biomarkers including body weight, diabetic biomarkers, lipid profile, liver and renal function tests. These outcomes have strengthened the nutraceutical significance of BGS against DM. Moreover, the treatment of DM only relying on the medicine may prolong the disease but the use of BGS along with the use of medicine may help in speeding up the recovery process from DM. Hence, the regular dietary intake of BG or BGS is highly recommended to lower the negative health outcomes of DM and its associated metabolic disorders.

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Keywords: bitter gourd seeds, functional foods, nutraceuticals, diabetes mellitus, food sustainability

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Metabolomics, with its potential to differentiate different stages of diabetes, offers a promising avenue for early detection of the risk of developing diabetes. This early detection is not just crucial, but it also holds the key to early prevention, potentially transforming the landscape of diabetes management. In this study, we employed an untargeted ¹H metabolomics approach using 600 MHz Nuclear Magnetic Resonance (NMR) spectroscopy. This highly precise and effective method allowed us to acquire spectral data of plasma samples from a diverse range of individuals, including healthy controls, non-diabetes, prediabetes, and diabetes patients screened for bariatric surgery in Klang Valley, Malaysia. We further enhanced the reliability of our findings by using multivariate data analysis techniques (principal component analysis (PCA), orthogonal projection latent square-discriminant analysis (OPLS-DA) to differentiate between different groups of patients. The results showed that multiple binning regions differentiated between healthy human controls, non-diabetes, prediabetes and diabetes patients. Metabolites, namely but not limited to alanine, isoleucine, valine, lactate were some of the metabolites responsible for differentiating between the groups. The findings of this study suggest that the ¹H metabolomics approach, when used in conjunction with conventional diabetes screening tools, could significantly enhance patient stratification, potentially leading to more effective diabetes management.

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Keywords: metabolomics, diabetes, biomarkers, NMR

NGT 3rd IFRC 2024 049-032**Development of Microwave Heating Technology for Drying of Agricultural Products at Walailak University**M. Nisoa^{1,2*}, S. Kaewpawong², W. Kongsawat^{2,3}, R. Taleh², K. Wongyai², K. Wattanasit², J. Suttiphan⁴, D. Srinoum²¹School of Science, division of physics, Walailak University, Thailand²Plasmas and electromagnetic wave research laboratory, Walailak University, Thailand³Center for scientific and technological equipment, Walailak University, Thailand⁴Walailak University Science and Technology Park, Walailak University, Thailand

The conventional method for drying agricultural products, such as fish, chili, coffee, fruits, and herbs, in Southeast Asia countries is by hot air circulation. Normally, it will take long time and high energy consumption for finishing products. An alternative drying method by using microwave energy has been developed at Walailak University since 2004. Because of strong interaction between dielectric dipoles of water molecules and microwave field, the drying time of the agricultural products can be reduced drastically. We have developed a novel microwave heating system for the efficient drying of the products. The system utilises switching power supply so that the magnetron can generate a microwave field continuously, and its output power can be adjusted for each magnetron, making it very different to household microwave oven. The waveguide is designed for effective transmission of microwave fields into the multi-mode heating cavity. Door chokes have been carefully investigated by simulation and experiment for safety of microwave leakage. The experimental results reveal that heat produced by the microwave system causes evaporation of moisture from the products at low temperature, making it possible to produce high quality dried foods and herbs. The prototypes of various microwave drying systems for different agricultural products, such as fishes, chili, fish's skin, have been developed and used by local industries and communities. These prototypes have high-potential for foods and herbs business in the future.

Corresponding author: mnisoa@gmail.com*Keywords: agricultural products, microwave heating, dielectric dipole, industrial prototype, door choke****NGT 3rd IFRC 2024 065-049****Exploring The Potential of Natural Deep Eutectic Solvent (NADES) For Simultaneous Extraction of Phenolics and Carotenoids**Qi Qi Koh¹, Yin Leng Kuaa,^{2*}¹School of Energy and Chemical Engineering, Xiamen University Malaysia, 43900 Sepang, Malaysia²College of Chemistry and Chemical Engineering, Xiamen University, 361005 Xiamen, China

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The oil palm plantation sector in Malaysia is a significant contributor to biomass production, with its output poised to increase alongside the growing demand for palm oil. Yet, a mere 10-15% of the entire palm tree is put to use, while each hectare of palm plantation produces approximately 10 tonnes of oil palm leaf (OPL) waste, comprising over 50% of the total oil palm biomass. If the biomass is not utilised, it is typically disposed of or incinerated. This study aimed to investigate simultaneous extraction of polar phenolic compounds and non-polar carotenoids from nutrient-dense fresh oil palm leaves (OPL) using Natural Deep Eutectic Solvents (NADES). The extraction process involved homogenisation, followed by heating and stirring at a solid-to-liquid ratio of 40 ml/g, 10 wt% water content, 2-minute homogenisation, 40-minute extraction duration and an extraction temperature of 40°C. The total phenolic compounds (TPC) and total carotenoid compounds (TCC) were quantified through standard gallic acid calibration graph and standard β -carotene calibration graph, respectively. Among the tested NADESs, ChCl:Xyl (1:1) emerged as the optimal NADES for phenolic compounds extraction, displaying the highest TPC at 20.24 mg/g OPL. On the other hand, ChCl:Xyli (1:1) exhibiting the highest TCC at 325.94 μ g/g OPL primarily due to its lower viscosity and polarity, while ChCl:Glu (1:1) with elevated viscosity hindered mass transfer, resulting in the lowest TCC at 197.93 μ g/g OPL. NADES demonstrated the ability to simultaneously extract polar phenolic compounds and non-polar carotenoids from fresh OPL, overcoming the challenge of high moisture content in OPL that act as a barrier between the targeted bioactive compounds and the extraction solvent.

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As the world's population grows, so will the need for animal protein. Additionally, as the economies of developing countries expand, their populations' diets will become more protein-based, driving up demand even further. Yet, the heavy reliance on animal agriculture as the primary source of protein has already contributed to many global environmental, social, and ethical issues. Therefore, scholars and professionals are exploring cellular agriculture as a more sustainable alternative, such as cultured meat, to complement traditional methods. Although the products are still in the development phase in many countries, consumer approval is critical to their market success. This study seeks to explore Malaysian consumers' collective effervescence experiences during group food consumption, identifying gaps and investigating their connection to their intention to consume cultured meat. Several issues related to the complexity of the existing studies, such as the exclusion of essential dimensions and a lack of focus on diverse emotional aspects, have strengthened the need for the study. Following these initial discoveries, a qualitative study was conducted, specifically employing transcendental phenomenological exploration through focus group discussions (FGD) with purposefully chosen Malaysian consumers. The groups were carefully selected based on certain criteria to achieve maximum variation, thus ensuring heterogeneity in sampling. Subsequently, the rich data were transcribed verbatim and analysed using the descriptive phenomenological psychological method. Through the FGD, four main themes and five subthemes emerged regarding collective effervescence from group dining experiences and perceptions of cultured meat. Themes include i) discussions about new food; ii) collective dining experiences; iii) group identity; and vi) values and beliefs. The themes identified are crucial in contributing to the development of a more comprehensive conceptual model that will further enhance the body of knowledge regarding the factors influencing consumer behaviour towards novel food acceptance in Malaysia.

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Keywords: cultured meat, collective effervescence, emotion, group identity, intention to consume

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Allergen-free baked goods lack functional proteins obtained from wheat, eggs, milk and soy, which results in an underdeveloped 3D network during the baking process, leading to inferior product texture. Therefore, seeking for alternative proteins and technologies that can enhance its texture and quality is in need. Methods: This study examined the quality characteristics of allergen-free muffins prepared with three different chickpea protein isolate (commercial CPI, laboratory-extracted CPI, and cold plasma jet-treated laboratory-extracted CPI) at varying addition levels (5%, 10%, and 15%). The effect of adding CPI was determined by evaluating the rheological behaviour of the muffin batter and the quality characteristics of the allergen-free muffins, including volume, height, weight loss, colour parameters, and texture. The results showed that the addition of CPI significantly improved the rheological behaviour of the batter and the quality characteristics of the muffins, with a higher protein content leading to more pronounced effects. Commercial CPI resulted in a muffin batter with higher rheological behaviour but the muffins were harder and less elastic. The muffin batter prepared with cold plasma-treated CPI also exhibited higher rheological behaviour, and the muffins had a larger volume, lower hardness, higher elasticity, and displayed a well-developed porous microstructure. Adding 15% cold plasma-treated CPI to the allergen-free muffin batter resulted in higher rheological behaviour, and the muffins displayed superior quality characteristics, including larger volume, greater elasticity, lower hardness, and better color. This study will promote the development of the hypoallergenic food industry and be beneficial to people suffer from allergies.

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Keywords: allergen-free muffin, cold plasma, chickpea protein, quality characteristics

The Study on Preparation, Modification, and Adsorption Characteristics of Algal Biochar for Efficient Removal of Phenanthrene from Aqueous Solutions

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Eucheuma (EBC), a type of algae, shows significant nutritional value and promising potential in food processing. However, due to its rapid growth rate, there has been an oversupply issue, leading to wastage of food resources and exacerbating ecological pressures. To actualise higher value application, due to its abundance of dietary fibre, we developed it into biochar to efficiently adsorb PAHs, particularly Phenanthrene (Phe) in water, for protecting the quality of drinking water. In order to obtain the most effective biochar under the same adsorption condition, biomass, pyrolysis temperature and modification method were selected to perform single-factor experiment. It turned out that biochar obtained by calcining *Eucheuma* at 500°C for 2 h and modified with KOH (EBC-K) and HCl (EBC-H) performed a best efficiency on removing Phe from aqueous solutions. Then the adsorption ability and mechanism of them were researched. At the same time, their application potential was also studied. The results showed that EBC-H and EBC-K had high specific surface area, well-developed pore structure, low aromaticity, macro polarity and significant adsorption efficiency of Phe in aqueous solution, with the removal efficiency was 99.46% and 99.6%, respectively. The kinetic fitting indicated the adsorption of EBC-H and EBC-K was caused by a combination of physical, chemical, and intra-particle diffusion. The Langmuir model was found to be a good fit for EBC-K and EBC-H, with the fitted maximum adsorption capacity of 224.70 mg/g and 231.41 mg/g, respectively, which was 2.4 times higher than that of the original biochar. Batch experiments indicated that 0.3 g/L biochar had the highest adsorption efficiency, and an acidic environment was more conducive to adsorption. The EBC-H-regenerated biochar still exhibited a high removal rate of 84.15%. The oversupply of EBC can be used to effectively remove PAHs from aqueous solutions and shows high practical application.

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Keywords: *Eucheuma*, biochar modification, structural characterisation, Phe, adsorption**The Application of Cold Argon Plasma on Reducing Casein Antigenicity**Ruiyi Cai^{1,2}, Daodong Pan^{1,2}, Lihui Du^{1,2*}¹State Key Laboratory for Managing Biotic and Chemical Threats to the Quality and Safety of Agro-products, Ningbo 315211, China²Key Laboratory of Animal Protein Food Processing Technology of Zhejiang Province, College of Food Science and Engineering, Ningbo University, Ningbo 315800, China

Cow's milk allergy is a global public health concern. Casein, the most abundant allergen in milk, is challenging to avoid in modern processed foods. Strategies for destroying or modifying epitopes of casein have been sought by researchers. Heat treatment and enzymatic hydrolysis are primary techniques employed to decrease casein allergenicity. However, challenges such as limited reduction rates, potential epitope exposure, and undesirable flavours persist. Therefore, alternative approaches are needed for reducing casein allergenicity. This study was to investigate the effect of dielectric-barrier-discharge (DBD) cold argon plasma treatment at different treatment time (0-12min) on the structural changes and antigenicity reduction of casein. The result showed that cold argon plasma mainly produced reactive oxygen species (ROS), especially high content of hydroxyl radicals (OH·). After plasma treatment time of 12 min, the antigenicity of casein was reduced by 80.46%. The reduction of antigenicity was related to the aggregation of casein, which were verified by transmission electron microscopy, electrophoresis. Furthermore, the reduced particle size, elevated free amino acids, and increased carbonyl content indicated that ROS produced by DBD plasma affected the peptide chain, leading to casein oxidation and fragmentation. The free sulfhydryl content significantly increased from 22.05 μM/g to 68.24 μM/g, and the results of multi-spectroscopic analysis illustrated the protein structure was altered through exposure of hydrophobic group and breakage of the disulphide bonds. The comparison of LC-MS/MS data with the epitope database showed that cold plasma treatment effectively destroyed the sequential epitopes of casein. This investigation demonstrated cold argon plasma can change the structures of the epitopes in casein, making it impossible to be recognised by the specific antibody, which could be beneficial in the processing of hypoallergenic foods.

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Keywords: cold Argon, plasma, casein, antigenicity

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Pea protein isolate (PPI) is highly favoured due to its low allergenicity, high protein content, and sustainable plant source. However, similar to many commercial plant protein isolates, PPI presents relatively poor functionality that limit its application. Cold plasma (CP) generates reactive oxygen and nitrogen species, which induce protein structural modifications and therefore achieve functionality enhancement. In this study, argon gas was used as the carrier gas, and CP was used to treat a 15wt% PPI solution for different durations (0, 2, 4, 6, 8 min). The aim was to investigate the effects of CP on the oxidation of PPI, functional and structural properties, as well as its application in 3D printing of plant-based food. The results reveal that the hydroxyl radicals and high-energy excited state argon atoms are the main active substances. A decrease in free sulfhydryl content and an increase in carbonyl content were observed in treated PPI, indicating the oxidative modification occurred. Compared to the control group, the gel strength of PPI increased by 62.5% and the storage modulus significantly improved after 6 minutes of treatment, forming a more ordered and highly cross-linked 3D gel network. Additionally, CP significantly improved the water-holding capacity, oil-holding capacity, emulsifying activity, and emulsion stability of PPI. The α -helix and random coil content in PPI decreased, while the β -sheet content increased, resulting in a more ordered secondary structure after CP treatment. Compared to untreated PPI, the consistency coefficient (k) increased from 35.995 to 47.678 Pa·sⁿ. the modified PPI exhibited higher apparent viscosity and storage modulus and demonstrated better 3D printing performance and self-supporting ability. This study demonstrates that CP can significantly enhance the functional properties of PPI, providing great potential and prospects for improving the printability of 3D printing materials and developing low-allergenicity plant protein foods.

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Keywords: cold plasma, pea protein isolate, functional properties, 3D food printing

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The chilli (*Capsicum annuum* L.) farming industry is a significant contributor to Malaysia's economic growth; however, it grapples with substantial losses caused by pest infestations, often resulting in excessive pesticide use, thereby raising additional health concerns. To address this issue, recent advancements in post-harvest pesticide removal, such as ozone treatment, have demonstrated their potential as a solution. In this study, the effects of water electrolysis ozone treatments, including water flow rate (0, 3, 5 L/min), treatment duration (10, 15, 30 minutes), and ozone concentration (2, 3, 4 ppm), on the degradation of pesticide (cypermethrin) and post-harvest qualities (soluble solids concentration, titratable acidity, and firmness) of chillies were investigated. Untreated chillies were used as the control for comparison in this study. Results indicated that a flow rate of 3 L/min caused significant ($p < 0.05$) degradation of pesticide content while maintaining the highest soluble solid content (Brix) in chillies. No significant difference ($p > 0.05$) was observed in the titratable acidity and firmness of chillies between the treated and untreated samples. The 30-minute water electrolysis ozone treatment significantly ($p < 0.05$) decreased the titratable acidity and increased the °Brix value. However, the 15-minute treatment duration was the most effective in reducing pesticide content, with a 70% reduction compared to the untreated sample. An ozone concentration of 3 ppm resulted in the highest pesticide degradation (71% reduction), while no significant ($p > 0.05$) effects were observed on the other post-harvest qualities of the chillies. Findings from this study revealed that water electrolysis ozone treatment could be an effective method for removing pesticide residues while maintaining chilli quality during post-harvest processing.

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Keywords: ozone treatment, water electrolysis, chillies, pesticide, post-harvest processing

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Salmonella outbreaks pose major public health concerns, especially with the growing global poultry demand. Cold plasma technology, a novel non-thermal decontamination technology, applies electricity to a gas at room temperature and pressure, generating reactive gas containing ions, radicals, electrons, and excited molecules. High-voltage atmospheric cold plasma (HVACP) generates reactive oxygen and nitrogen species quickly with minimal energy. Generation conditions can be adjusted to achieve microbial destruction without compromising food quality. Recent advancements have introduced plasma-activated water (PAW) demonstrating bactericidal properties that remain stable for extended periods. In this study, PAW was generated using an HVACP system at 185 ± 2 W for 30 minutes using 80% humid air to decontaminate boneless, skinless chicken breast inoculated with a cocktail of *Salmonella* Typhimurium, *Salmonella* Enteritidis, and *Salmonella* Newport. Optical emission spectra revealed the presence of excited nitrogen species, atomic oxygen, and hydroxyl molecules in the generated gas. Optical absorption spectroscopy recorded ozone, NO_2 , NO_3 , and H_2O_2 , all causing bactericidal effects. PAW exhibited a pH of 1.77 ± 0.02 , ORP of 572 ± 13 mV, and electrical conductivity of 5.13 ± 0.08 mS, with peroxide, nitrate, and ozone concentrations at 1168 ± 10 ppm, 2083 ± 250 ppm, and 2330 ± 580 ppb, respectively. Chicken samples immersed in 25 mL PAW for 5 and 10 minutes showed 1.45 ± 0.01 and 2.59 ± 0.03 log CFU/cm² reduction of *Salmonella* respectively. The treated samples showed visible changes in lightness ($\Delta L^* > 3$), while Δa^* and Δb^* values displayed slight perceptible changes (0 – 3). However, the wide range of L^* values (35.41 to 43.57) of the control suggests that these variations don't impact consumer acceptance of treated chicken. These findings highlight the potential of HVACP-generated PAW as a promising novel and sustainable decontamination method for raw chicken to enhance food safety.

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Keywords: cold plasma, reactive species, plasma-activated water, raw chicken breast, *Salmonella*

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In recent years, the development of sustainable and biocompatible materials for food packaging has garnered significant attention due to growing environmental concerns and the need for safer packaging solutions. Carbon quantum dots (CQDs) have emerged as promising candidates for such applications owing to their unique properties, including biocompatibility, excellent fluorescence properties, strong antioxidant activity, and potential antimicrobial activity. In this study, we present a facile and sustainable green synthesis approach for the production of functionalised biocompatible carbon quantum dots using *Ginkgo biloba* residue leaves (GBL) as a precursor. The synthesis process involves a simple one-step hydrothermal method, utilising water as the solvent and GBL powder as the carbon source. This green synthesis route offers several advantages, including low cost, scalability, and environmental friendliness, making it highly suitable for large-scale production. The obtained carbon quantum dots were thoroughly characterised using various analytical techniques, including transmission electron microscopy (TEM), Fourier-transform infrared spectroscopy (FTIR), X-ray Diffraction (XRD), UV-Vis spectroscopy, and fluorescence spectroscopy. The results confirmed the successful synthesis of uniform, spherical carbon quantum dots with excellent biocompatibility and fluorescence properties. Accordingly, the synthesised CQDs exhibited an absorption peak at 292 nm, validating the presence of the π - π^* transition within the carbon core state. Additionally, the CQD particles were observed to be spherical, measuring less than 10 nm in diameter. Moreover, XRD analysis unveiled a combination of both amorphous and polycrystalline characteristics inherent in the CQDs. In essence, the sustainable synthesis of biocompatible carbon quantum dots from GBL offers a green solution to developing advanced materials suitable for various functions in food packaging, thereby facilitating the promotion of environmentally friendly practices and the cultivation of healthier ecosystems.

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Keywords: carbon quantum dots, ginkgo leaves, biocompatibility, food packaging, sustainability

POSTER PRESENTATION SESSIONS

FASQ 3rd IFRC 2024 012-038**Detection of Antibiotic Residue in Raw Buffalo Milk in Malaysia**

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Buffalo milk, renowned for its creamy texture and nutritional benefits, is widely consumed as a popular dairy product. However, concerns over the presence of antibiotic residues (AR) in milk have raised significant food safety issues. Antibiotics like oxytetracycline (OTC) and amoxicillin (AMO) are commonly used for mastitis treatment in buffalo farms. Consequently, residues of these antibiotics may persist in milk for several days following treatment. This study aims to investigate the occurrence of AR in raw buffalo milk samples collected from nine selected farms. Enzyme-linked immunosorbent assay (ELISA) kits were employed to test milk samples for AMO and OTC residues. The results revealed that all milk samples tested positive for AMO residues, ranging from 0.03-0.36 µg/kg. Additionally, eight buffalo milk samples tested positive for OTC residues, with levels ranging from 2.09-9.12 µg/kg. Importantly, the detected levels of both AR were found to be within the limits of Food Regulations 1985. These findings underscore the necessity of monitoring and controlling AR in buffalo milk to ensure consumer safety and compliance with food safety regulations. Further research and intervention strategies are imperative to reduce AR in buffalo milk and other dairy products, safeguarding public health and fostering regulatory compliance.

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Keywords: buffalo milk, amoxicillin, oxytetracycline, enzyme-linked immunosorbent assay (ELISA)

FASQ 3rd IFRC 2024 029-016**The Effects of Quality Changes in Vegetable Oils on the Formation and Absorption of Monochloropropanediol Esters (MCPDE) and Glycidyl Esters (GE) during Deep-frying of Potato Chips**

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Monochloropropanediol esters (MCPDE) and glycidyl esters (GE) are probably carcinogenic compounds found in refined vegetable oils and deep-fried foods. However, there was a lack of studies on the absorption of MCPDE and GE by food system fried with different types of oils. In this study, four major types of vegetable oils, i.e. palm olein (PO), canola (CNL), soybean (SBO), and sunflower oils (SFO) were used to fry potato chips for 40 cycles. The potatoes were pre-soaked in 5% NaCl before frying. The 3-MCPDE contents in soft oils (CNL, SBO, SFO) were found to increase across the frying cycles owing to the release of unsaturated FFA (lower pKa value) which was likely to dissociate and increase the acidity of the oil. In contrast, the 3-MCPDE content in PO decreased with frying cycles since saturated FFA (higher pKa value) has a less tendency to dissociate. After 40 frying cycles, the 3-MCPDE content in potato chips fried with PO (0.14 µg/g of chips) was found to be lower than CNL (0.25 µg/g of chips) and SBO (0.17 µg/g of chips), but slightly higher than SFO (0.12 µg/g of chips). On the other hand, the initial GE content in PO was found to be significantly higher (3.49 µg/g of oil) than the soft oils (≤0.1 µg/g). The GE content in potato chips did not change significantly across the frying cycles regardless of the vegetable oil used. In conclusion, the physicochemical properties of vegetable oil have been found to influence the 3-MCPDE level in fried food and it is critical to produce frying oil with low initial levels of contaminants (especially GE) to improve food safety.

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Keywords: frying, contaminants, palm olein, soft oil, physicochemical properties

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The reconstitution behaviours of nutritional products could impact user experience. Reconstitution issues such as lump formation and white flecks sticking to bottles surfaces could be very unappealing for the consumers in milk preparation. The controlling steps in dissolving instant milk powders include wetting, swelling, sinking, dispersing, and dissolution as in the literature. Each stage happens simultaneously with the others during milk preparation, and it is challenging to isolate and measure each step individually. This study characterised three adult nutritional products for different properties including particle size, density, dispersibility, stickiness, and capillary wetting to understand the relationship between powder physical properties and their reconstitution behaviours. From the results, the formation of clumps can be caused by different factors limiting the critical steps of powder reconstitution. It can be caused by small particle size distribution, light particle density limiting powder wetting, or the rapid swelling and dissolving of particle surface materials to impede water penetration in the capillary channels formed by powder agglomerates. For the grain or white flecks formation in milk preparation, it was believed to be controlled by dissolution speed of the particles after dispersion into water. By understanding those relationship between fundamental powder structure and their user experience in reconstitution, this information provides us new and multiple perspectives on how to improve the powder characteristics in the commercial manufacturing.

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Keywords: reconstitution behaviour, powder reconstitution, dissolution behaviour

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Food practitioners play an important role in maintaining food safety and blocking food borne illness. In Malaysia, food safety management system is important to sustaining the food safety from hazard such as microbiological, chemical and physical contamination. Therefore, the purpose of this systematic review is to identify the competency of food practitioners towards Food Safety Management System performance in Small and Medium Enterprises (SMEs) in Malaysia. This study's search strategy was used two different internet databases Science Direct and Scopus. Information related to either competency of employees or practices and the FSMS of the industry were extracted. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was followed as a reporting guideline. From 522 initial titles, 12 studies were selected based on included requirement considered, which collected studies related to food safety management system in food manufacturing. The number of articles which have been reviewed has been expended on competency of employees on safety field especially on food industry. The review of the competency of employees suggest knowledge, skills, attitude, job commitment, motivation as a basic competencies that have being focused. The review process suggest foe future research on to have specific and standard systematic review method for guide search synthesis in context of competency in other sectors to adapt in the food safety.

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Keywords: competency, food safety, small medium enterprises, leadership, Malaysia

FASQ 3rd IFRC 2024 098-070**Investigating Potential Sources of Sore Throat: Physico-Chemical Attributes and Microbial Contamination in Rambutan from Fresh Harvests and Retail Stores**

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Rambutan (*Nephelium lappaceum*) is a native fruit to Southeast Asia that is rich in vitamins and minerals. However, consuming rambutan nevertheless poses the possibility of sore throat. This study aims to identify the factors of rambutan that could cause sore throats by analysing the physicochemical characteristics and microbiological study. For this experiment, two samples of fruit which are rambutan sold in stores (RS) and rambutan freshly harvested from the tree (RT) were collected and analysed on their external peel, internal peel, and flesh parts ($n = 2$). The physicochemical assessment includes weight of visible fine dirt, pH value, oil content and surface morphology. Meanwhile, total coliform analysis was carried out for the microbial study. From the results, the weight of visible fine dirt of RT external peel and pH value on its external and flesh was significantly higher and more acidic respectively ($p < 0.05$) than RS. However, the observed pH value of 4-5 is within the acceptable limit for tropical fruits. Besides, there were insignificant differences ($p > 0.05$) of oil content between both rambutan's external peel to indicate small chances of getting plant oil intoxication. Next, surface morphology proves that RT contains greater foreign particles on its external peel than its internal peel and flesh compared to RS. In terms of the microbial aspect, there is a significant difference ($p < 0.05$) in the total coliform unit between RT and RS external peel and flesh. These differences might be affected by the contamination with dust from the environment and improper handling processes which potentially cause sore throat.

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Keywords: rambutan, physicochemical, sore throat, morphology, microbial contamination

FASQ 3rd IFRC 2024 155-130**Method Validation of Inorganic Arsenic using HPLC-ICPMS and Assessing its Contamination in Rice Sold in Malaysia Market**

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Rice constitutes half of the world's staple food, including Malaysia. As a result, rice plantation on a large scale has become a national necessity. Pesticides were applied to meet demand and prevent production loss. The pesticide residue, particularly arsenic pesticides, has the potential to leach into the ground, leading to soil contamination and the presence of inorganic arsenic (iAs) in paddy plants. However, reports on iAs contamination in rice sold in Malaysia remain limited. Therefore, this study was performed (1) to develop and validate a reliable analysis for iAs (As (III), As (V)) in rice using HPLC-ICP-MS and, (2) to determine the iAs levels in locally sold rice using the established and validated method. The sample was grinded, sieved, and grinded again until completely transformed to fine powder before the extraction and analysed for arsenic contamination. The coefficient of determination (R^2) calculation for the analytes was above 0.99. Also, the analytes exhibited a limit of detection at $0.0015 \text{ mg kg}^{-1}$, including the limit of quantification of 0.005 mg kg^{-1} . Calibration standards were established in solution at $1.0 \text{ } \mu\text{g kg}^{-1}$ and $10.0 \text{ } \mu\text{g kg}^{-1}$. Recovery studies showed 99% to 119% for As(III) and 109% to 131% for As(V). The method was validated on the Food Analysis Performance Assessment Scheme (FAPAS) Proficiency Test sample with a z-score of 1.09. Subsequently, 23 rice varieties were sampled for iAs content using the convenience sampling method. The result was between 0.01 mg kg^{-1} and 0.102 mg kg^{-1} , where brown and coloured rice displayed higher iAs than white rice. None of the samples violated the Codex Alimentarius Commission (CAC) permissible level (0.2 mg kg^{-1} to 0.35 mg kg^{-1}) or the maximum permitted limit of European union (0.1 mg kg^{-1} to 0.3 mg kg^{-1}). The level of iAs in rice sold in the Malaysian market is generally low.

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Keywords: inorganic arsenic, rice, method validation, HPLC-ICPMS

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In culinary-rich regions like Perak, Malaysia, ensuring food safety is paramount due to the threat of foodborne pathogens. This study aimed to assess the prevalence, distribution, and sources of *Salmonella* and *Listeria* spp. contamination in Kam'ar's food scene. A total of 327 samples were collected from hypermarkets, wet markets, coffee shops, fruit stalls and poultry farms over a 25-month period (April 2021 to May 2023). These samples included vegetables (n=155), fruits (n=50), chicken eggs (n=42), chicken meats (n=50) and chicken feeds as well as water (n=10). The samples were tested for *Salmonella* spp., including *S. enteritidis* and *S. typhimurium*, using Xylose Lysine Deoxycholate (XLD) agar, and *Listeria* spp., particularly *L. monocytogenes*, were identified using PALCAM and Tryptic Soy agar (TSA). The positive samples were verified using multiplex polymerase chain reaction (mPCR). Raw chicken meat sourced from hypermarkets exhibited a high incidence of *Salmonella* spp. at 76.0% (38/50), with *S. enteritidis* presented at 14.0% (7/50). Additionally, the pathogen was detected in chicken feed and water samples at 80.0% (4/5) and 40.0% (2/5), respectively. Similarly, papaya and mung bean sprouts obtained from retail stalls showed contamination by *Salmonella* spp. at 26.0% (13/50) and 30.0% (3/10), respectively, with *S. enteritidis* detected in 6.0% (3/50) and 10.0% (1/10), respectively; and *S. typhimurium* in 10.0% (5/50) and 10.0% (1/10) of cases, respectively. On the other hand, *Listeria* spp. was detected in 4.0% of cucumber (1/25), 28.0% of parsley (7/25), 10.0% of beetroots (1/10), 10.0% of radish (1/10), and 10.0% of sweet potatoes (1/10). *Listeria monocytogenes* contamination was observed in sengkang, baby carrots and cherry tomatoes at 10.0% (1/10), 26.7% (4/15) and 6.7% (1/15), respectively. This study underscores the urgency for enhanced food safety measures, including proper handling and hygiene practices, to mitigate the risks of *Salmonella* and *Listeria* contamination in food items and retail settings.

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Keywords: *Salmonella*, *Listeria* spp., food safety, microbiological surveillance, foodborne pathogen

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Gingers (*Zingiber officinale*) are perennial herbs belonging to the family Zingiberaceae. They produce subterranean rhizomes, and each rhizome produces erect leafy shoots. Both rhizomes and leaves are widely used in cooking as a food flavouring and have properties as traditional medicine. Gingers are usually harvested at the young and old maturity stage according to the use after harvest. In this study, the antimicrobial activity and total phenolic content of ginger leaves were determined at different maturity stages. Gingers were planted in polybags in green houses and were harvested at 4 and 9 months. The leaves were cleaned, washed and dried in an oven at 60°C before being powdered and extracted in 70% methanol, acetone and pentane (1:10 w:v). The extracts were then subjected to valuation of total phenolic content, antimicrobial analysis against six selected pathogens and determination of minimum inhibition concentration (MIC). The analysis results found that the total phenolic content of ginger leaves was higher when harvested at 9 months, compared to 4 months in all three extractions. The total phenolic content was the highest in the 70% methanol extract (57.92, 260.58 mg GAE/g) followed by the acetone (28.74, 122.84 mg GAE/g) and lowest in pentane extracts (3.98, 19.73 mg GAE/g), for both the 4-month and 9-month maturity stages, respectively. Antimicrobial activity against some tested pathogens was found to be higher in 9-month extracts (9.12 – 19.68 mm) than in 4-month leaf extracts (7.87 – 13.68 mm) based on the diameter of the pathogen growth inhibition zone. There was no significant difference in antimicrobial activity between the types of solvents in the 4-month-old ginger leaf extract, but in the 9-month-old leaf extract, it was found that the 70% methanol extract showed the highest activity against 4 pathogens out of 6 pathogens tested. The 9-month-old leaf extract showed the lowest MIC value (6.25 mg/mL) in 70% methanol extract, compared to other extracts (12.50 – 25.00 mg/mL). The stage of maturity and type of extraction solvent affect the antimicrobial activity and total phenolic content in ginger leaves. Leaves harvested at 9 months old have higher total phenolic content and antimicrobial activity than 4-month-old leaves. Ginger leaves have good antimicrobial activity and can be developed as a potential antimicrobial agent with more precise studies.

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Keywords: antimicrobial, ginger, leaf, maturity, solvent extraction

FASQ 3rd IFRC 2024 247-248

Determination of Total Iodine in Iodised Table Salt using High-Performance Liquid Chromatography with Diode Array Detector

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In iodised table salt, iodate and iodide form are typically used for iodine fortification although iodate form is more common due to its stability. The fortification of iodine in table salt is the simplest and low-cost intervention which has been proven to be effective against iodine deficiency disorder (IDD). The current method for iodine determination is using inductively-coupled plasma – mass spectrometry (ICP-MS), which is costly and high maintenance due to the nature of salt samples that is easily crystallised at high temperature. Reducing agent of 2M sodium bisulphite is added to the iodised table salt (0.5 g) before the sample homogenised to a total volume of 10 mL with deionised water. Later, 50 µL of injection volume of the sample solution was introduced to the reverse-phase setup of high-performance liquid chromatography (HPLC) system with a diode array detector. Isocratic mobile phase of 1:1 (v/v) ratio between methanol and 120 mM phosphate buffer mixed with tetrasodium pyrophosphate (pH 3.0) was employed at the flow rate of 0.20 mL/min, for 15 minutes, in which iodide was to be eluted at 10.11 minutes ($\lambda=223$ nm), after passing through a weak anion-exchange column (2.1 mm × 150 mm, 5 µm particle size, Thermo Scientific™ Acclaimed™ Mixed Mode WAX-1). This method was able to determined total iodine in iodised table salt in the form of iodide ranging from 10 mg/kg to 60 mg/kg of total iodine with the detection limit and quantification limit of 1.2 mg/kg and 3.7 mg/kg, respectively. Six (6) samples were tested and spiked with individual iodate and iodide standards. It was found that the samples (n=3) were recovered greatly from 87.2% - 106.9%. The method was able to determine the total iodine in iodised table salt by reducing its iodate form to iodide form using 2M sodium bisulphite.

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Keywords: iodine deficiency disorder, universal salt iodisation, weak anion-exchange, total iodine, iodised table salt

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Evaluation of *Moringa oleifera* Seed Protein with Antibacterial Activity

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In emphasising the consumption of plant-based protein, *Moringa oleifera* (*M. oleifera*) seeds have gained popularity among food industrial players due to several nutritional and antimicrobial claims. Thus, this study was focusing on the determination of protein content of *M. oleifera* and evaluating the potential antibacterial activity of its protein hydrolysate. Different types of extraction methods were used in this study. The amount of crude protein of fresh and dried *M. oleifera* seeds was determined using Kjeldahl method. In order to assess the antibacterial activity, the well diffusion method was employed. The protein content of the dried *M. oleifera* seeds was determined to be 21.29%, while the protein content in the fresh seeds were slightly lower at 17.60%. The results revealed that the *M. oleifera* seed extract exhibited inhibition zone against *Staphylococcus aureus*, with the peptide isolates showing inhibition zone of 29.3 mm. Meanwhile, the average inhibition zone for the dry seed extraction was decreased to 25.0 mm. These findings suggest that the peptide isolate obtained may posed antibacterial activity in synergy with other bioactive compounds. Meanwhile, the drying process was shown to affect the protein content and the antibacterial activity of *M. oleifera* seeds.

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Keywords: plant-based protein, kelor, antibacterial, drying, seed extract

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Assessment of Antioxidant Traits in Coconut-Milk-based Kefir Beverage Using an *in-vivo* Animal Model

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Kefir is a fermented drink produced mainly by inoculating cow milk with kefir grains. The treatment of farm animals raised for food and feed creates significant ethical concerns around the globe. Hence, there is an increased interest and worldwide demand towards plant-based dairy substitutes. The current research work carried out to evaluate the bacterial count and biological traits of coconut milk-based Kefir drink using an *in-vivo* model. The growth of lactic acid bacteria (LAB) in cecum of rats administered with modified drink was counted. Antioxidant activities such as total superoxide dismutase (T-SOD) and catalase (CAT) were measured. Moreover, serum biochemical analysis, haematology and histopathological studies were also executed using an *in-vivo* rat model. The *in-vivo* evaluation revealed that the administration of coconut-based kefir beverages to rats increased the lactic acid bacteria (LAB) count in the cecum of the animals and decreased the pathogenic bacterial count in the digest, thus improving the overall health of animals. Animals treated with coconut milk kefir (G2) showed a significant increase ($p \leq 0.05$) in T-SOD activity as compared to the control group (G0) and regular coconut milk administered group (G1). Regarding CAT activity, G2 showed a significant increase relative to the control group (G0). The same group (G2) also exhibited lower Alkaline Phosphatase (ALP) and Aspartate Transferase (AST) and higher High-Density Lipoprotein (HDL) blood levels. Haematology results also revealed non-significant difference between three groups. The histopathology examination of all organs generally showed that all sampled organs had none to mild lesions. In G2, the livers were generally normal or with minimal congestion, while the spleens appeared to be very mild hypocellular. The findings of this study thus demonstrate a high potential for fermented coconut milk using kefir grains as a healthy and safe drink.

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Keywords: kefir, coconut milk, LAB count, *in-vivo* studies, haematology, histopathology

FASQ 3rd IFRC 2024 264-257

Quality and Food Safety Evaluation of Bada Fish Flour as Local Food for Stunting Management

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Zinc and iron deficiency conditions are often found in stunted children under five. The utilisation of local foods high in both substances is considered potential to be developed. One of them is bada fish flour, which is commonly found in West Sumatra, Indonesia. The study aimed to evaluate the quality and safety of bada fishmeal. Tests were conducted by observing the sensory, chemical and microbiological profiles of the product. Sensory testing through hedonic test, then chemical profile is seen through water content, and proximate analysis to see the content of macronutrients (carbohydrates, protein and minerals), as well as the content of vitamins and minerals. Heavy metal testing was carried out using spectrophotometry. Furthermore, total microbiology was tested by looking at total plate numbers, and yeast and mould. Results : The results showed that the product had a level of liking in taste 2.31 ± 0.02 (Disliked), aroma 2.89 ± 0.13 (Disliked), texture 4.32 ± 0.043 (Liked), and colour 4.03 ± 0.22 (Liked). The average moisture content of bada fish flour is 2.5%, then the results of proximate analysis per 100 g of product obtained total Energy 331 kcal, protein 68.7 g, fat 4.2 g, carbohydrate 0 g, calcium 238 mg, zinc 13.6 mg, iron 23.4 mg, vitamin A 62 RE, phosphorus 1500 mg. The test results showed that heavy metals Pb, Cd, Hg and As were not detected. Microbiological test results obtained <10 colonies/g on ALT, and mould and yeast. Conclusion : The conclusion of the study was that the quality of the product was considered good from the attributes of colour, texture, and nutritional content, especially protein, zinc and iron. Product safety is considered to have met food safety standards from heavy metal content and microbiological profile.

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Keywords: bada fish, stunting, quality and food safety

FASQ 3rd IFRC 2024 279-263**Exploring Rice Allergens - How Varieties and Conventional Cooking Method Affect Their Ige-Binding Profiles**

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Rice is primarily cultivated in Asian countries, including Malaysia, where it serves as a staple food. However, a notable number of allergic patients have been reported to be sensitive to rice allergens. Therefore, it is important to evaluate IgE reactivity to rice proteins in order to identify potential allergens that can cause allergic reactions and to assess allergen risks. This study aims to investigate genetic variation at the proteomic level between rice populations and its impact on IgE binding protein profiles among rice-allergic individuals. We also aim to determine the effect of the conventional rice cooking method, such as simmering, on rice IgE-binding protein profiles. To achieve this objective, proteomic tools including SDS-PAGE and 2-D gel electrophoresis, followed by IgE-immunoblotting where serum IgE reactivity from five rice-allergic individuals were tested against protein extracts of three different rice varieties, MR219, MR269, and PadiU Putra. Our findings demonstrate that different varieties of rice have distinct proteomes, leading to varying IgE binding protein profiles when tested against sera from rice-allergic individuals. The raw rice varieties, particularly MR269 and PadiU Putra, exhibited higher numbers of IgE-binding protein spots, totalling 36 spots, than MR219. Notably, when comparing the percentage decrease of IgE-binding proteins in cooked rice, MR269 demonstrated the most significant reduction at 67%, compared to MR219 (45%) and PadiU Putra (46%). Among these IgE-binding protein spots, six of 17 rice proteins were identified by MALDI-TOF/TOF MS as putative allergens that are related to seed storage proteins and important for the production of amylose in the endosperm. Our finding demonstrated that genetic variation of different rice varieties affected their allergenic protein profiles and simmering further reduced the IgE binding protein contents.

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Keywords: rice varietal proteomics, IgE-binding protein profile, cooking-mediated allergen reduction

FASQ 3rd IFRC 2024 289-269**Sustaining Food Security Using Biotechnology and Innovative Modern Food Technologies in Kuwait**

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The issue of food security is very important to preserve the functioning of human life and eliminate famine and poverty around the world. In this research, we will talk about the importance of sustaining this security through the use of innovative modern technologies and the use of bio-food methods to better preserve the environment and agriculture in societies. In Kuwait, the state has striven to Maintaining environmental and food security by supporting and preserving agricultural products by providing the necessary agricultural land to achieve this goal and by promoting and encouraging agriculture within residential areas and thus using all modern and advanced methods to preserve and develop natural agricultural wealth.

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Keywords: functioning, agricultural products, maintaining environmental

FB 3rd IFRC 2024 252-242

The Development of Chicken Patty by Utilising Biomass Flour of Ganoderma-Liquid Cultivated Biomass and *Pleurotus djamor*

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Urban mushroom cultivation requires a short period of ten days or less, however, medicinal mushroom production utilising rural cultivation necessitates a longer timeframe of six months. After a preliminary investigation, the fruiting bodies of culinary and medicinal mushrooms were ground and made into flour to make mushroom-chicken patties. When culinary mushrooms (*Flammulina velutipes*) are added to chicken patties (10%, 20%, and 30%), consumer acceptance is much higher ($p > 0.05$) than when medicinal mushrooms (*Ganoderma*) are added to chicken patties (10% and 20%). Urban cultivation (submerged liquid fermentation) was used as a sustainable method of producing therapeutic mushroom biomass based on the findings of a preliminary investigation. Chicken patties with culinary mushrooms (*Pleurotus djamor*) (3%, 6%, and 9%) showed less significant consumer acceptance than mushroom-chicken patties made with biomass flour of *Ganoderma*-liquid grown biomass, which showed 3% ($p > 0.05$) of the total. Taken together, these elucidate the role that mushroom biomass plays in food security as a result of the synergy between rural and urban mushroom cultivation.

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Keywords: *Ganoderma*, mushroom biomass, chicken patties, urban cultivation, submerged-liquid fermentation

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Impact of Alkaline Solubilisation on Microalgae Protein Extract's Functional Properties

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Microalgae proteins are emerging as highly promising and sustainable ingredients for future food production. However, the impact of using alkaline solubilisation, a common protein extraction method, on the functional properties of microalgal protein extracts remains understudied. Hence, this study has investigated the effect of NaOH solubilisation on both the extraction process and functional properties of *Chlorella vulgaris* protein extract (CVPE) obtained via isoelectric precipitation. *C. vulgaris* protein was extracted from dry-milled biomass and solubilised using different NaOH concentrations (0.1-0.7 M). The protein solubilisation yield and functional properties-solubility, water absorption capacity (WAC), oil absorption capacity (OAC), foaming capacity (FC) and stability (FS), emulsifying activity (EAI) and stability (ESI)-were determined for each protein extract obtained with different NaOH concentrations. The protein extraction efficiency significantly increased from 6.22% with water to 56.23% with 0.7 M NaOH. Furthermore, the alkaline solubilisation process enhanced the solubility, WAC, FC, FS as well as EAI and ESI of CVPE. The protein extract obtained through solubilisation with 0.7 M NaOH showed the highest WAC and ESI, while 0.5 M NaOH was optimal for maximising FC, FS, EAI, and solubility. Notably, the maximum solubility, OAC, FC, and EAI of CVPE were 2.3-, 1.8-, 2-, and 1.3-fold higher, respectively, than those of commercial soy protein isolate. The present study highlighted the effectiveness of alkaline solubilisation in modifying *C. vulgaris* protein and emphasised the potential of CVPE as food additives for moisture modification, texture enhancement, foaming, and emulsification.

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Keywords: *Chlorella vulgaris*, microalgae protein, protein extract, alkaline solubilisation, functional properties

FCB 3rd IFRC 2024 129-105

Chemical Composition and Characteristics of Organic Solvent Extracts from the Omani Seaweeds *Gelidium omanense* and *Melanothamnus somalensis*Abdullah Al-Nassri¹, Ahmed Al-Alawi^{1,2*}¹Department of Food Sciences and Nutrition, College of Agricultural and Marine Sciences, Sultan Qaboos University, P.O. Box 34, Al-Khoud 123, Muscat, Sultanate of Oman²Centre of Excellence in Marine Biotechnology, Sultan Qaboos University, P.O. Box 50, Al-Khoud 123, Muscat, Sultanate of Oman

Seaweeds are divided into three categories: green, brown, and red. Each group of seaweeds consists of several families that have differences in composition. Even at the genus level, there are differences in some ingredients, although in general composition, they are the same. Environmental conditions, availability of nutrients, and maturity stage are the main reasons for composition differences. In this study, two Rhodophyta (red) seaweed species, *Gelidium omanense* and *Melanothamnus somalensis*, were gathered in September 2021 from Sadh (Dhofar governorate, Oman). Five organic solvents were used sequentially to achieve extraction. The solvents were applied in the subsequent arrangement: hexane, dichloromethane, ethyl acetate, acetone, and methanol. The chemical composition was measured; also, total phenols, flavonoids, and tannins were investigated. The structure of the extracts was analysed by FTIR. There are consequence variances detected in the chemical composition, total phenolic content, total flavonoid content, and total tannin content of seaweeds. *Gelidium omanense* showed high moisture content, lipid content and carbohydrates (9.8 ± 0.15 %, 2.29 ± 0.09 % and 70.15 ± 0.42 %, respectively) compared to *Melanothamnus somalensis* (6.85 ± 0.01 %, 2.05 ± 0.12 % and 52.7 ± 0.36 % respectively). However, *Melanothamnus somalensis* showed high ash and protein content (27.68 ± 0.40 % and 52.7 ± 0.36 % respectively) compared to *Gelidium omanense* (8.07 ± 0.39 % and 9.70 ± 0.22 % respectively). *Melanothamnus somalensis* showed higher minerals' content, especially sodium and potassium. This is attributed to the jelly-like structure of *Melanothamnus somalensis* which allows storage of more solutes compared to the leafy-like structure of *Gelidium omanense*. Furthermore, *Melanothamnus somalensis* had higher TPC in all fractions except the hexane fraction than *Gelidium omanense*. Except with hexane, TFC in the other solvents' extracts were significantly different between *Gelidium omanense* and *Melanothamnus somalensis*. In all fractions, except dichloromethane and ethyl acetate fractions, there were no significant differences in TTC. FTIR spectra showed variation between fractions which is an indication of different functional groups extracted by different solvents.

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Keywords: chemical composition; organic extract; Omani seaweeds; biological activity; FTIR.

FCB 3rd IFRC 2024 173-170

Caffeine, Chlorogenic Acid and Antioxidant Properties in Different Clones of Green and Roasted Liberica Coffee Bean ExtractsMirfat Ahmad Hasan Salahuddin^{1*}, Rosalizan Md Saleh¹, Norma Hussin¹, Noor Syahira Nasarudin², Muhammad Faris Mohd Radzi, Zulkefli Abdul Rahman, Zaulia Othman, Yaseer Suhaimi Mohd¹Industrial Crops Research Centre, Malaysian Agricultural Research and Development Institute, MARDI Headquarters, Persiaran MARDI-UPM, 43400 Serdang, Selangor, Malaysia²Industrial Crops Research Centre, Malaysian Agricultural Research and Development Institute, MARDI Kluang, 86000 Kluang, Johor, Malaysia

Coffee is one of the most important food commodities in the worldwide economy. Liberica (*Coffea liberica*) coffee is a minor coffee species, commonly grown and consumed in most Southeast Asia countries, especially in Malaysia. However, information on caffeine, chlorogenic acid and antioxidant properties in different clones of Liberica coffee is still scarce. Hence, the present study aimed to screen different Liberica clones as the initial step for identifying the best planting materials with high quality and potentials. Three different clones of Liberica coffee (MKL8, MKL9 and MKL10) were obtained from coffee germplasm in MARDI research station in Kluang, Johor. The green coffee beans were dried under a hot air oven at 60°C and medium-roasted prior to extraction with 70% ethanol using sonication-assisted extraction method. Both green (unroasted) and medium roasted bean extracts were analysed for phytochemical and antioxidant properties using spectroscopic and non-enzymatic antioxidant methods. Green bean extracts contained significantly ($P < 0.05$) greater amount of total phenolic and flavonoid content. High performance liquid chromatography (HPLC) analysis revealed that chlorogenic acid was significantly ($P < 0.05$) higher in the extracts which ranged from 3.345 to 7.172 mg/g. Caffeine content was significantly ($P < 0.05$) higher in medium-roasted bean extracts which ranged from 11.712 to 13.691 mg/g. MKL10 of green bean extracts showed significantly ($P < 0.05$) the highest phytochemicals and antioxidant activities as measured by DPPH radical scavenging and ferric reducing antioxidant power (FRAP) assays. The antioxidant activities of all the extracts were significantly ($P < 0.05$) reduced after roasting. MKL10 was a potential source of Liberica coffee with high phytochemical and antioxidant properties, which provide new possibilities to exploring it for other potential bioactivities in the future. The selected clone can also be promoted as the best source of planting material for the production of Liberica coffee for nutraceutical and functional food industries.

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Keywords: alkaloid, phenolic, HPLC, oven-drying, medium-roasted

Comparative Assessment of Enzymatic and Chemical Routes for Preparing Sesaminol Concentrate from Sesame MealHsin-Ya Tsai¹, Wei-Ju Lee², Yi-Ting Chen¹, Wei-Ching Hung¹, Nan-Wei Su^{1,3*}¹Department of Agricultural Chemistry, National Taiwan University, Taipei 10617, Taiwan²School of Food Safety, Taipei Medical University, Taipei 11031, Taiwan³Department of Biochemical Science and Technology, National Taiwan University, Taipei 10617, Taiwan

Sesaminol, a bioactive lignan with potential benefits of retarding neurodegenerative diseases, remains inaccessible due to its low abundance in sesame seeds, primarily existing as sesaminol triglucosides (STG). Systematic investigation into preparation methods for sesaminol, especially the identification of suitable biocatalysts for STG hydrolysis, is lacking. This study evaluated various chemical and enzymatic methods for the efficient conversion of major sesame lignans, particularly sesaminol and STG, into sesaminol. Two potential routes were explored: the hydrolysis and rearrangement of sesaminol, and the hydrolysis of STG. Acid-catalysed conversion of sesaminol was conducted under different acidic solvent systems. Hydrolysis of STG in sesame meal was performed through chemical and enzymatic methods using industrial enzymes and a glucosidase from *Kluyveromyces marxianus* (Kmbgl1). The reaction products were analysed by HPLC-DAD and identified by LC-ESI-MS/MS. Acidic conversion of sesaminol yielded samin and sesamol, while chemical hydrolysis of STG led to its degradation with minimal sesaminol formation. Industrial enzymes, including Viscozyme L and Pectinex Ultra SP-L, showed limited conversion efficiency, with the obtained sesaminol concentrate using Viscozyme L at 45°C for 48 h containing the highest sesaminol content of 30.1 mg/g. Among the tested enzymes, Kmbgl1 demonstrated superior performance, converting STG into sesaminol with a conversion rate of 80.0% at 40°C for 16 h. The obtained sesaminol concentrate contained 424 mg/g of sesaminol. This enzymatic approach presents a promising process for producing sesaminol from sesame by-products, highlighting the potential of novel enzymes for STG hydrolysis and warranting further investigation into their catalytic mechanisms.

***Corresponding author:** snw@ntu.edu.tw**Keywords:** sesaminol, sesaminol glucoside, sesame lignans, glucosidase**Effect of Different Types of Emulsifiers on the Physical Characteristics and Fat Bloom Stability of Dark Chocolate with Cocoa Butter Alternatives**Wan Zunairah Wan Ibadullah^{1*}, Tan Zi Han¹, Chung Ying Xuan¹, Nur Fatin Natasya Ahmad¹, Izzreen Ishak³, Johari Khaironi, Nor Afizah Mustapha², Mohammad Rashedi Ismail-Fitry², Rashidah Sukor¹, Nur Hanani Zainal Abedin², Nor-Khaizura Mahmud Ab Rashid¹¹Department of Food Science, Faculty of Food Science and Technology, 43400 UPM Serdang, Selangor, Malaysia²Department of Food Technology, Faculty of Food Science and Technology, 43400 UPM Serdang, Selangor, Malaysia³Cocoa Downstream Technology Division, Cocoa Innovative and Technology Centre Malaysian Cocoa Board, Kawasan Perindustrian Nilai, 71800 Nilai, Negeri Sembilan, Malaysia

An emulsifier is incorporated to delay the fat bloom formation and improve the overall quality of dark chocolate. This study aims to investigate the effects of different emulsifiers on the physical properties and stability of fat bloom in dark chocolate with cocoa butter alternatives (CBAs). Dark chocolate formulations were prepared containing different emulsifiers like lecithin, glycerol monostearate and a combination of both with CBAs like cocoa butter substitute (CBS) and cocoa butter replacer (CBR). Physical property analyses included hardness, snap texture, melting behaviour, Ph and water activity. The whiteness index was used to measure fat maturity. The results showed that the addition of lecithin, CBs and CBR decreased the hardness value. Meanwhile, samples CB+GMS and CB+2E increased the hardness and snap texture. Besides, CBR increased the peak temperature and emulsifiers increased the peak temperature in samples with CB and CBR while decreasing the melting enthalpy. Furthermore, the addition of CBA and emulsifiers improved the stability of the fat bloom. Therefore, mixed emulsifiers, which have favourable physical properties and higher fat bloom stability, are ideal for use in chocolate production. CBAs have the potential for practical application in chocolate production to improve fat bloom stability.

***Corresponding author:** wanzunairah@upm.edu.my**Keywords:** cocoa butter, cocoa butter alternatives, emulsifiers, fat bloom, physical properties

Comparison of Soluble Polyphenol Oxidase and Membrane Bound Polyphenol Oxidase Activities Extracted from Hass Avocado (*Persea americana* Mill. Cv. Hass)Dericia Qi Yi Wong¹, Zhi Zhou Siew², Chen Wai Wong^{1*}¹Department of Biotechnology, Faculty of Applied Sciences, UCSI University, Kuala Lumpur, Malaysia²Department of Food Science with Nutrition, Faculty of Applied Sciences, UCSI University, Kuala Lumpur, Malaysia

Enzymatic browning, catalysed by polyphenol oxidase (PPO) is a reaction characterised by the production of brown or dark pigment. This process causes undesirable darkening of the fresh cut produce and alters its appearance, flavour and texture. Consequently, enzymatic browning diminishes consumer satisfaction and poses a significant challenge in the fresh cut produce industry. Characterisation of crude soluble polyphenol oxidase (Sppo) and membrane-bound polyphenol oxidase extracted from Hass avocado (*Persea americana* Mill. Cv. Hass) were done through their biochemical properties. The analysis include enzymatic activity, substrate specificity, PPO kinetics, optimum pH and optimum temperature. It was found that Sppo (22195.56 ± 439.97 U) exhibited significant ($p < 0.05$) higher activity compared to Mppo (11035.56 ± 484.71 U) with pyrocatechol as substrate. This indicated that Sppo is the dominant enzyme form that is involved in the enzymatic browning of Hass avocado. Sppo demonstrated similar substrate specificities towards 4-methylcatechol and pyrocatechol whereby the activities were 23533.32 ± 39.25 U and 22195.56 ± 439.97 U respectively. Sppo had K_m of 33333.33 U and V_{max} of 67 Mm for 4-methylcatechol. Meanwhile, its K_m and V_{max} values were 10 Mm and 25000 U, respectively, using pyrocatechol as substrate. Sppo showed a higher affinity for pyrocatechol and higher maximum reaction rate with 4-methylcatechol. Sppo exhibited optimal activity at Ph 6.0, 40°C and Ph 7.0, 50°C when catechol and 4-methylcatechol were used as substrate, respectively. These findings suggested that high temperature, acidic, and alkaline conditions could effectively inhibit the activity of Sppo. The outcomes obtained from this study can provide a comprehensive understanding of the enzymatic behaviour and catalytic activity of Hass avocado PPOs. It also offers potential solutions for improving the shelf life and quality of fresh cut produce in the food industry.

Corresponding author: wongcw@ucsiuniversity.edu.my*Keywords: polyphenol oxidase, soluble, membrane bound, enzymatic browning, hass avocado**

FH 3rd IFRC 2024 076-065**Adopting Digital Storytelling to Safeguard the Hawker Culture of Taman Selera in Petaling Jaya Old Town, Malaysia**Rachel Yuen May Yong¹, Bee-Lia Chua^{1*}, Sridar Ramachandran², Wan Melissa Wan Hassan¹¹Department of Food Service and Management, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²School of Business and Economics, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Hawker culture, integral to gastronomy tourism, embodies diverse ethnic legacies and fosters community interaction. Taman Selera, a historic hawker centre since the 1960s, embodies this tradition as a hub of multicultural Malaysian dining. Amidst globalisation and modernity, Taman Selera grapples with declining vibrancy, impacting its distinct gastronomic identity. To address this challenge, innovative safeguarding endeavours such as digital storytelling are important to foster heightened engagement and support through the development of a unified cultural story. Despite its potent capacity in other cultural landscapes, the effectiveness of this novel practice within the realm of hawker culture remains largely uncharted in scholarly research. Bridging this gap, the primary focus of this study is to explore the adoption of digital storytelling to safeguard the local hawker culture. The multi-method design of this qualitative study involves data collection through participant observation (both at physical sites and in the digital realm, including social media platforms as non-human actors), document analysis, alongside in-depth interviews and focus groups with pertinent stakeholders. These methods complement each other, providing a comprehensive enrichment of the gathered field data. Subsequently, data analysis occurs using NVivo software through a thematic analysis process. This study is anticipated to uncover the complex dynamics between social practices and actor-networks within the unique cultural context of Taman Selera. Expected outcomes include elucidating the role of digital storytelling, as well as exploring its adoption aspects in driving the safeguarding efforts of local hawker culture. The research underscores the potential to broaden academic horizons by augmenting the theoretical understanding of the interplay between social practices and actor-networks, notably within the domain of cultural safeguarding. These findings are poised to offer pragmatic insights for practitioners and policymakers in harnessing the digital realm's capabilities while upholding this living heritage's sanctity.

Corresponding author: chuabeelia@upm.edu.my*Keywords: gastronomic identity, hawker culture, digital storytelling, social practice theory, actor-network theory****FH 3rd IFRC 2024 166-158****Durian in Malaysia: A Brief Review of Cultivation, Culinary Delights, and Economic Significance**

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Durian is a tropical fruit native to Southeast Asia, known for its distinctive odour, thorn-covered husk, and creamy, custard-like flesh. This review paper provides a comprehensive overview of the multifaceted aspects surrounding the cultivation, culinary delights, and economic significance of durian in Malaysia. As an iconic fruit deeply ingrained in Malaysian culture, durian holds a revered status, earning the title of the "King of Fruits" for its distinctive flavour, aroma, and nutritional value. The paper begins by exploring the rich history and cultivation practices of durian in Malaysia, highlighting the diverse varieties cultivated across different regions of the country and the environmental factors influencing their growth. Results: The cultivation of durian in Malaysia has a storied history, deeply embedded in the tropical terrain that provides the ideal conditions for durian trees to flourish. As the demand for this distinctive fruit surges both domestically and internationally, understanding the intricacies of its cultivation becomes imperative. Additionally, it delves into the cultural significance of durian in Malaysian cuisine, showcasing its versatility in various dishes, desserts, and beverages, ranging from traditional delicacies like durian kampung to modern innovations such as durian-flavoured ice cream and pastries. Furthermore, the review examines the economic impact of the durian industry on Malaysia's agricultural sector, trade dynamics, and tourism, emphasising its role as a lucrative export commodity and a major driver of rural livelihoods and economic development. The durian in Malaysia is more than just a fruit—it is a cultural heritage, a gastronomic adventure, and an economic powerhouse. By providing insights into the cultivation practices, culinary traditions, and economic contributions associated with durian in Malaysia, this review aims to deepen our understanding of the cultural, culinary, and economic significance of this iconic fruit in the nation's heritage and identity.

Corresponding author: suzihauque@uitm.edu.my*Keywords: fruit, durian, food, cultivation, culinary**

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Influence of Different Drying Methods on Anthocyanins Composition and Antioxidant Activities of Mangosteen (*Garcinia mangostana* L.) Pericarps and LC-MS Analysis of the Active Extract

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Mangosteen pericarps (MP) often end up as agricultural waste despite being rich in powerful natural antioxidants such as anthocyanins and xanthenes. This study compared the effect of different drying processes and times on phenolic compounds and antioxidant activities of MP. Fresh MP were subjected to 36 and 48 h of freeze-drying ($-44 \pm 1^\circ\text{C}$) and oven drying ($45 \pm 1^\circ\text{C}$), and 30 and 40 h of sun-drying ($31 \pm 3^\circ\text{C}$). The samples were analysed for anthocyanins composition, total phenolic content (TPC), total flavonoid content (TFC), antioxidant activities, and colour characteristics. Analysis of liquid chromatography-mass spectrometry (LC-MS) with electrospray ionisation identified two anthocyanins in MP: cyanidin-3-O-sophoroside and cyanidin-3-O-glucoside. Overall, the drying process, time, and their interactions significantly ($p < 0.05$) influenced the phenolic compounds, antioxidant activities, and colour in MP extracts. Both freeze-drying after 36 h (FD36) and 48 h (FD48) possessed significantly ($p < 0.05$) higher total anthocyanins (2.10–2.20 mg/g) than other samples. However, FD36 was associated with significantly ($p < 0.05$) higher TPC (~ 94.05 mg GAE/g), TFC (~ 621.00 mg CE/g), and reducing power (~ 1154.50 $\mu\text{mol TE/g}$) compared to FD48. Moreover, FD36 is more efficient for industrial applications due to less time and energy consumption. Subsequently, obtained dried MP extracts could be further utilised as an alternative to synthetic food colourants.

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Keywords: mangosteen pericarps, freeze-drying, oven-drying, sun-drying, anthocyanins

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Effects of Hot Water and Steam Blanching on Polyphenol Oxidase and Peroxidase Activity, Antioxidant Attributes, and Phenolics Profile in Mangosteen Pericarp

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Anthocyanin pigments in mangosteen pericarps (MP) can serve as natural colourants; however, their stability is compromised by enzymatic browning caused by polyphenol oxidase (PPO) and peroxidase (POD). Thus, this study aimed to investigate how hot water and steam blanching affect the PPO and POD activities, phenolic profile, and antioxidant properties of MP. Fresh MP was blanched for 0, 30, 60, 90, and 120 s at 100°C in hot water and steam, and the residual PPO and POD activities, total phenolics content (TPC), total anthocyanins, antioxidant activities, browning index, and colour characteristics were evaluated. Phenolic compounds were identified using liquid chromatography-mass spectrometry (LC-MS). Following zero-order reaction kinetics ($R^2 > 0.800$), a significant reduction ($p < 0.05$) in residual PPO activity was observed in both the blanched MP. As expected, PPO was inactivated more rapidly in hot water ($t_{1/2} \sim 59.1$ s) than in steam-blanching ($t_{1/2} \sim 121.1$ s). Meanwhile, the residual POD activity in hot water and steam followed the first ($R^2 > 0.90$) and zero ($R^2 > 0.93$) orders, respectively. A shorter half-life of POD was observed in hot water ($t_{1/2} \sim 33.6$ s) than in steam ($t_{1/2} \sim 61.8$ s). The statistical analysis and principal component analysis (PCA) revealed that steam blanching for 90 s was the most efficient method, preserving the highest levels of antioxidant capacity (~ 9135.60 $\mu\text{mol TE/g}$), ferric-reducing power (~ 9729.00 $\mu\text{mol TE/g}$), total anthocyanins (~ 3.03 mg/g), and TPC (~ 1056.66 mg GAE/g). Overall, steam blanching for 90 s was the most efficient method because of its ability to preserve the phenolic compounds. It is also a cost-effective method compared with hot water, which needs to be replaced after a few uses. This is the first study to report the effects of blanching on anthocyanins predominantly present in MP, specifically cyanidin-3-O-sophoroside (C3S) and cyanidin-3-O-glucoside (C3G), by using high-performance liquid chromatography (HPLC) and LC-MS. This study makes an important scientific contribution to the food industry by providing suitable blanching techniques to maintain the quality of bioactive compounds, specifically anthocyanins in MP, which can potentially be used as natural colourants.

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Keywords: waste valorisation, anthocyanins, browning enzyme, enzyme residual activity, cyanidin-3-o-sophoroside

Impact of Different Extraction Techniques on Ginger Oleoresin Yield and Antioxidant Activity from Selected Countries

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Ginger (*Zingiber officinale* Roscoe) oleoresin, a pungent and aromatic nutraceutical, is a high-value ingredient for functional foods. In the present work, the effects of Soxhlet extraction (SE), ultrasound-assisted extraction (UAE), and enzyme pre-treated extraction (EAE) performed on the ginger cultivated in China, Malaysia (Bentong), and Thailand were investigated. The extraction efficiencies of the ginger oleoresins of these different extraction techniques were compared. Furthermore, physical properties analyses of the moisture content, water activity, colour measurement, and morphology analysis of the ginger powders were conducted. The total phenolic compound, total flavonoid content and scavenging activity namely 2,2-diphenyl-1-picrylhydrazyl (DPPH), ferric reducing ability power (FRAP), 2,2-azino-bis-3-ethylbenothiazoline-6-sulphonic acid (ABTS) of the extracted oleoresins were examined. Oleoresin yields were significantly different ($p < 0.05$) among selected countries. In addition, the extraction efficiency also varied among different extraction techniques. Notably, the China's ginger samples yielded the highest amount of oleoresin ($32.02 \pm 0.23\%$) using the enzyme pre-treated technique followed by extraction methods ultrasound-assisted extraction ($27.73 \pm 0.41\%$) and Soxhlet extraction ($19.79 \pm 0.99\%$). Moreover, the oleoresin extracted from the China ginger using enzyme pre-treated technique had the highest antioxidant activity among all the samples. Images obtained from the scanning electron microscopy further revealed fractural changes found on the surface of the ginger powder. The enzyme pre-treated extraction technique is recommended to be carried out for the extraction of China ginger sample to maximise the extraction yield and preserve valuable bioactive compounds for functional food applications.

*Corresponding author: ngsp@tarc.edu.my**Keywords:** ginger oleoresin, enzyme pre-treated extraction, selected countries, extraction, bioactive characteristics**Functional, Thermal, and Rheological Properties of Barley-Bambara Groundnut Flour Blends**Saheed Adewale Omoniyi¹, Rabiha Sulaiman^{1*}, Nor Afizah Mustapha¹, Radhiah Shukri¹, Nurul Shazini Ramli²¹Department of Food Technology, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Barley is important cereal grain which mostly utilised for malting and animal feeding globally whereas Bambara groundnut is underutilised legume crop, rich in protein and essential to human nutrition. Barley flour was blended with Bambara groundnut flour at different ratio (90%:10%, 80%:20%, 70%:30%, 60%:40% and 50%:50%) while 100% barley flour served as a control sample, the functional, thermal, and rheological properties of flour samples was analysed using standard methods. The result showed that functional properties of barley flour and barley-bambara groundnut flour was significantly difference ($p < 0.05$) and ranged from 0.57 - 0.78 g/cm³, 70.53 - 79.67%, 2.16 - 2.79 g/g, 6.67 - 18.00%, 0.71 - 0.95 g/g, 2.31 - 2.98 g/g and 0.77 - 0.97 for bulk density, dispersibility, water absorption index, water solubility index, oil absorption index, swelling power and swelling capacity respectively. The inclusion of Bambara groundnut flour led to increase in bulk density, water absorption index, water solubility index and swelling power of barley-bambara groundnut flour blends with decrease in dispersibility and oil absorption index. Also, there was increase in the values of I^* and b^* with decrease in the values of a^* for flour blends as percentage of the Bambara groundnut flour increased. The pasting properties of flour samples ranged from 2112.00 - 2992.33 cP, 1229.00 - 1671.67 cP, 815.00 - 1455.00 cP, 3002.67 - 3495.00 cP, 1673.33 - 2059.00 cP, 5.53 - 5.99 min and 72.30 - 83.07 °C for peak viscosity, trough viscosity, breakdown viscosity, final viscosity, setback viscosity, peak time and pasting temperature respectively. The study showed that the inclusion of Bambara groundnut flour influenced the functional thermal, and rheological properties of barley-bambara groundnut flour blends. The flour blends could be utilised in production of complementary foods, pasta and baked products.

*Corresponding author: rabiha@upm.edu.my**Keywords:** underutilise, pasting, viscoelastic, plant protein, legume

Effect of Gamma Irradiation and Salt on the Physical Properties and Microbiological Quality of Turmeric Paste (*Curcuma longa*)

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Turmeric paste is valued for its colour, aroma and antioxidant properties and is an important ingredient in both cooking and traditional medicine. However, the high water content of the paste poses a problem for storage stability, so safe preservation methods without chemical additives are required. The addition of salt, a traditional preservative, raises concerns about excessive sodium intake. Irradiation of spices is a recognised preservation technique that reduces losses, extends shelf life and ensures microbiological safety. The aim of this study is to evaluate the storage stability of turmeric paste treated with irradiation (4, 6 and 8 kGy) and salt (10, 20 and 30%) at different temperatures (4-6°C and 25-27°C) for 30 days. The results show minimal differences in water content, pH, colour and curcumin content between the irradiated and salt-treated paste. The salt-treated paste has better microbiological quality, indicating that it has better storage stability compared to the irradiated paste. However, given the health concerns associated with high salt intake, a combination of 20% salt and 8 kGy irradiation, stored at refrigeration temperature, is recommended for optimal storage quality.

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Keywords: turmeric paste, irradiation, salt, shelf-life, preservation

Pulsed Electric Field (PEF) Preservation of Bovine Colostrum and Influence on Its Quality

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Bovine colostrum preservation methods (pasteurisation or drying) can affect immunoglobulin levels. The aim of this study was to evaluate the effect of Pulsed Electric Field (PEF) preservation on the quality of bovine colostrum. The test material was bovine raw colostrum subjected to the PEF process. The tests were carried out in two scenarios: 1 - pulse width 50µs, pulses number 10, pulse repetition time range 10000 - 10ms, duration 10min; 2 - pulse width 99µs, pulses number 10, pulse repetition time 1000ms, duration 10, 20, 30min. analyses included: composition (MilkoscanTM FT3, Foss), total microbial count (CASO, Merck), identification of bacteria (MALDI-TOF), immunoglobulin levels (Bovine IgG ELISA Kit, Bethyl Laboratories). The PEF-treated colostrum showed a lower level of solids-non-fat (SNF), which was probably due to the deposition of charged particles on one of the electrodes under the influence of an applied electric field or the heat released from the generated thermal energy of the device itself. The PEF treatment parameters used had no effect on immunoglobulin levels in colostrum. The study showed that the lower the pulse processing time (analysed range 1-100ms) and thus the higher the frequency (analysed range 1-1000Hz), the lower the residual bacterial count. PEF method did not significantly affect the chemical composition of the colostrum tested, which positively demonstrates its effect on the product. The level of immunoglobulins, in raw colostrum as well as after PEF treatment, did not change. Using too high frequency values (above 1000HZ), however, may increase the temperature, thus affecting the secondary structure of the proteins. Further research is needed to select the operating parameters of the PEF device to optimise the bovine colostrum preservation process.

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Keywords: PEF, bovine colostrum, preservation, immunoglobulins

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Chia mucilage, a promising food additive material is rarely used in the food industry due to its attachment to the seed with remarkable tenacity causing less mucilage yield and longer extraction time. This study optimises the extraction of mucilage using alkaline pH and sonication conditions (time and temperature) to obtain high extraction yield, hue angle, and viscosity. Chia seeds were hydrated in distilled water at a seed-to-water ratio of 1:40, adjusted to various pH values (7-9) and treated in an ultrasound bath at varying temperature (50-70°C) and duration (30-60 min). At the optimum extraction condition of 67 °C, 33 min and pH 9 determined by using Response Surface Methodology (RSM), the yield, hue angle and apparent viscosity was obtained at 79.616%, 74.791° and 0.8182 Pa.s, respectively. The yield was significantly ($p < 0.05$) affected by sonication time, hue angle by both of the sonication conditions and the apparent viscosity by pH and sonication temperature. The optimised chia mucilage was validated, and no significant differences ($p > 0.05$) were obtained between the predicted and experimental values. Furthermore, the hue angle and yield of the optimised solution was significantly ($p < 0.05$) higher compared to the conventionally extracted, due to the cavitation effect of the ultrasonic waves that elevates the yield and diffusion of natural pigments from the chia seed. Hence, this study may enhance the extraction of chia mucilage as a plant-based hydrocolloid using ultrasonication without the need for drying and reconstitution of the mucilage.

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Keywords: chia mucilage, hydrocolloids, sonication extraction, apparent viscosity

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The growing interest in vegetarian and vegan diets, coupled with increased interest in lifestyle changes and increased awareness of sustainable food production, especially proteins, is a driving force for the development of vegan dairy substitutes. The aim of this study was to compare the quality characteristics of commercial rennet ripened cheeses such as Cheddar, Mozzarella and Feta cheese and their plant-based alternatives in terms of quality features. The cheese were analysed for texture profile analysis – TPA (hardness, fracturability, adhesiveness, springiness, cohesiveness, gumminess, chewiness, elasticity), colour, chemical composition, and in case of Mozzarella cheese: meltability, free fat release and browning. Most plant-based cheese alternatives were characterised by greater hardness, springiness, cohesion, gumminess, chewiness and elasticity. The plant-based alternatives did not show similar fracturability as Cheddar and Feta cheese. The plant-based products were characterised by a darker colour, were more yellow, and had higher negative values of a-parameter (green). The dairy products also had a purer and deeper colour than their vegan counterparts. The cheeses had higher protein content than their alternatives. The functional properties, such as meltability, free-oil release and browning, were significantly lower for plant-based Mozzarella (PBM) than cow-milk Mozzarella (CMM). After heat treatment, CMM showed a darker colour, a lower negative value of the a-parameter, and a less homogeneous colour (due to darker spots spread over the entire surface) than the comparison samples. There were significant differences among all studied parameters between cheeses and their plant-based alternatives. The technological process affects the functional properties of Mozzarella by affecting the proper processing of the cheese mass. Protein of animal origin gives products unique sensory characteristics and functional properties that are difficult to mimic in plant origin products.

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Keywords: cheese, plant-based dairy alternatives, cheese melting, cheese browning

Molecular Encapsulation of Aroma Compounds in V-type Starch: Ordered Structure, Release Properties, and ApplicationQing Gao¹, Bin Zhang^{1,2}, Xiong Fu^{1,2}, Qiang Huang^{1,2*}¹School of Food Science and Engineering, South China University of Technology, Guangzhou 510640, China²Overseas Expertise Introduction Center for Discipline Innovation of Food Nutrition and Human Health (111 Center), Guangzhou 510640, China

As a homologue of cyclodextrin, the pre-formed V-type starch is a low-cost, multifunctional carrier that can be used to encapsulate a variety of hydrophobic small molecules and has great application prospects in the fields of food, medicine and agriculture. In this work, V-type starch carriers were prepared through facile and efficient water-ethanol and alkali-ethanol methods. Various aroma compounds such as thymol, cinnamaldehyde and menthone were chosen for guest models to test the load capacity of the V-type starch carrier, the thermal protection ability and the controlled release effect of the aroma compounds. The crystallinity of V-type starch carriers ranged from 25% to 40%, and the loading capacity of V-type starch was positively correlated with its V-type crystal content. Among them, the V-type starch carrier could load up to 74, 62 and 51 mg/g of thymol, cinnamaldehyde and menthone respectively. Increasing the complexing temperature of solid-phase encapsulation helped increase the crystallisation perfection of the V-type starch-aroma molecule inclusion complexes and improved their thermal stabilities. After being encapsulated by V-type starch, the aroma compounds could be sustainably released for more than 4 weeks at 25 °C and 57% relative humidity. In addition, the V-type starch-aroma molecule inclusion complexes extended the shelf life of strawberries to 7 d under daily storage conditions. Increasing the V-type crystal content of the carrier and complexing temperature was the key to increasing the loading capacity and stability of aroma compounds. V-type starch is a promising aroma carrier in delaying aroma release and preserving fruit freshness.

Corresponding author: qiangh@scut.edu.cn*Keywords: V-type starch, aroma compounds, ordered structure, release kinetics****Physico-chemical and Rheological Characterisation of Broken Rice Flour and Starch Modified via Heat-moisture Treatment**

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The milling process of rice generates a significant amount of broken rice. The broken kernels showed poorer functionalities than the head rice due to the differences in composition and structure of starch components. Hydrothermal modification has been associated with the improvement of functionality of rice due to alteration of the molecular structure of starch. The majority of work on hydrothermal modification has been done using starches. The impact of flour components other than starch on the degree of alteration caused by the hydrothermal modification process is not well understood. Therefore, this study attempts to explore the impact of the duration of heat- moisture treatment on the properties of broken rice flour and starch. Broken rice flour (RF) and starch (RS) were altered by heat-moisture treatment at 110° C for varying times: 0, 1, 3, 5, and 16 hours. Amylose content, swelling capacity, pasting profile and rheological properties were analysed. The amylose concentration and swelling capacity of RS were substantially higher than those of RF. Amylose in RF slightly increased with HMT duration, while no discernible trend was seen in RS. As the HMT time increased, swelling decreased. The RVA profile revealed that RS exhibits greater viscosities and degree of retrogradation. As the HMT time increases, a different pattern is observed in RF compared to RS. RS treated for 5 and 16 hours had a lower final viscosity. Dynamic oscillatory analysis of 6% (w/w) stored broken rice flour and starch pastes revealed that the G' , G'' and $\tan \delta$ values increased with frequency, but the η^* values decreased. All samples exhibited predominantly elastic behaviour. The G' of heat-moisture treated RF is higher than Control, whereas only HMT-5 and HMT-16 are higher than Control in the starch counterparts. Both broken rice flour and starch showed distinct trends as the length of HMT increased. Aside from modifying the starch components and granules, the treatment may also affect the other flour macrocomponents.

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Ginger (*Zingiber officinale*) is one of the agricultural crops planted in Malaysia, and is widely used in ginger-based foods, drinks and medicines. In 2022, Malaysia has produced 10,623 metric tons (MT) of ginger with 951 ha planted area. Young ginger and old ginger are harvested at approximately six and eight months after planting, respectively. In this research, ginger postharvest and process mechanisation system was designed, developed and assessed its performance. The postharvest mechanisation system comprises three primary sections: pre-cleaner, drum washer and fan dryer for fresh ginger cleaning and treatment. On the other hand, the process mechanisation system consists ginger puree and dried ginger productions; targeted Small and Medium Enterprises (SME). Washer, peeler, bowl chopper, filler, sealer, freezer, and retort machine are machineries involved in ginger puree production. Washer, slicer, dryer, pulveriser, and sealer are machineries involved in dried ginger production. The fresh ginger postharvest system has a capacity of 500 kg/batch. Ginger was cleaned using water in the pre-cleaner and drum washer prior surface water removal using fan dryer. On the other hand, the ginger puree processing system has a capacity of 100 kg/batch, and produced frozen or retorted ginger puree. The dried ginger processing system produced dried ginger slices, or ginger powder. Microwave dryer with a capacity of 10 kg/hr was implemented in the drying process. The ginger postharvest and process mechanisation system developed showed beneficial potential to the fresh ginger and ginger-based product producers for market enhancement.

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Keywords: postharvest mechanisation, process mechanisation, fresh ginger, ginger puree, dried ginger

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Milling is essential for obtaining rice flour for various rice-based products. Dry and wet milling techniques are common but can adversely affect grain integrity, diminishing final product quality. This study compares the effects of dry, wet, and semi-dry milling techniques on the physicochemical properties of brown rice flour (BRF) and the physicochemical properties, cooking characteristics, and sensory acceptance of brown rice noodles (BRN) in an attempt to determine the most suitable rice milling technique. Different milling conditions, including dry milling (control), wet milling, and semi-dry milling, were employed. Brown rice was soaked in water for specific durations to achieve varying moisture contents for wet milling and semi-dry milling of BRF preparation. Subsequently, the BRF was used to prepare BRN using an extruder. Semi-dry milling reduced starch damage and maintained a favourable pH in BRF compared to wet milling. This technique also enhanced the whiteness parameter of BRF and exhibited similar water hydration properties to wet milling. Furthermore, BRN produced through semi-dry milling demonstrated comparable textural attributes and cooking qualities to wet milling. BRN made from semi-dry milled flour was the most preferred by panellists, indicating its potential for producing brown rice noodles with acceptable sensory attributes. Semi-dry milling effectively produces high-quality brown rice flour and noodles by preserving rice integrity, mitigating starch damage, and yielding superior results compared to dry milling. It retains water hydration properties similar to wet milling and enhances whiteness, texture, and cooking qualities of rice noodles. Brown rice noodles from semi-dry milling exhibit superior characteristics and are preferred based on sensory evaluation. Hence, the adoption of semi-dry rice milling techniques is recommended for improved production of high-quality brown rice noodles.

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Keywords: milling techniques, brown rice flour (BRF), brown rice noodles (BRN), semi-dry milling, quality characteristics

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Brown rice noodles have emerged as a gluten-free option, catering especially to individuals with celiac disease, while also being recognised for their health benefits over white rice noodles due to their retained fibre content and lower glycaemic index. However, the absence of gluten often poses textural challenges. This study aims to explore the effects of different types and concentrations of hydrocolloids on the physicochemical properties and sensory acceptance of extruded brown rice noodles. Extruded brown rice noodles were produced using brown rice flour, water, and three types of hydrocolloids: xanthan gum (XG), guar gum (GG), and konjac glucomannan (KG), at concentrations of 0.0%, 0.4%, and 0.6% (w/w), utilising a single-screw extruder. Parameters such as cooking quality, colour, pH, textural property, and sensory acceptance were analysed. Incorporation of hydrocolloids into the brown rice noodle formulation notably enhanced overall cooking properties. However, there were no significant differences among the extruded samples in terms of the colour parameters and pH value. The findings indicated that noodles with 0.6% XG exhibited the most substantial improvement in textural properties and as reflected by the highest sensory acceptance score. The improvement in the acceptability of brown rice noodles was observed across various quality parameters studied. Hydrocolloid supplementation, including XG, GG, and KG, significantly augmented the physicochemical properties and sensory acceptance of extruded brown rice noodles. This enhancement can be attributed to the hydrocolloids' ability to enhance water retention, stabilise structure, and impart desirable texture, thereby addressing the textural challenges often associated with gluten-free products.

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Keywords: brown rice noodle, gluten free, hydrocolloids, physicochemical properties, preference

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This study investigated the viability of utilising Red Nile tilapia (*Oreochromis spp.*) flesh as a sustainable alternative for pork in tocino production. It addresses the pressing need for sustainable and nutritious meat substitutes, prompting the adaptation of traditional tocino-making practices to incorporate tilapia. This research demonstrated the feasibility and efficacy of fish-based tocino as a viable substitute in traditional pork-based tocino production. Through ingredient selection and processing steps, including brining, marination, and flavour enhancement, fish-based tocino was developed to mimic the flavour of traditional pork tocino, blending sweetness, savoury elements, and a touch of tanginess. Through a comprehensive sensory evaluation using both the 9 point Hedonic Scale and the Rate-All-That-Apply (RATA) method, various attributes including colour, appearance, aroma, taste, mouthfeel, and aftertaste of the fish-based tocino were assessed. The study involved the preparation of tilapia flesh through a marination process with a blend of seasonings, followed by freezing for flavour enhancement. A total of 105 respondents participated in the sensory evaluation, providing mean ratings for each attribute. Results revealed a favourable perception of the appearance (7.8) of fish-based tocino, aroma (7.0) and aftertaste (6.7). The RATA method further revealed mixed perceptions across all attributes, suggesting potential areas for improvement in aroma, mouthfeel, and aftertaste. Based on these findings, while the fish-based tocino showed promise in terms of visual appeal and taste attributes, there are opportunities for refinement in aroma, mouthfeel, and aftertaste to better align with consumer preferences. This research contributes to the exploration of sustainable food innovations and offers insights into consumer acceptance of alternative meat products.

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Keywords: fish, RATA, sensory evaluation, sustainability

Optimisation of Light Alkalisiation of Cocoa Bean Shell Powder

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Cocoa bean shell (CBS) is a major by-product in chocolate processing that is collected after the roasting of the cocoa beans. This study aimed to utilise and valorise this waste material through light alkalisiation treatment to enhance its flavour, develop a darker colour, and enhance its solubility. Pertinent factors affecting the light alkalisiation treatment of CBS were identified and optimised using Box Behnken Design (BBD). Variable screening evaluated the impact of alkali concentration, CBS in solution, reaction temperature, reaction time, drying temperature, and drying time. The pH of light alkalisied CBS powder was used as the response variable. Results of the experiment showed alkali concentration, CBS concentration in solution, and reaction time elicited significant effects and accounted for 63.75%, 24.19% and 2.97% contribution on the pH response, respectively. The model equation generated in the optimisation experiment recorded an R² of 0.9615, adjusted R² of 0.9231, and predicted R² of 0.8663. The model equation developed through BBD showed that the pH of the light alkalisied CBS powder is relative to the concentration of the alkali, percent CBS in solution and reaction time. A verification experiment was done for confirmation of the predictability capacity of the model equation generated. Predicted and actual pH values were recorded to be equal establishing the efficiency of the model equation.

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Keywords: cocoa bean shell, light alkalisiation, Plackett-Burman Design, Box-Behnken Design

Evaluation of Shelf Life of Ready-To-Eat Retort Processed Grilled Beef

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Retort processing is considered as one of the most effective methods of preserving food. Grilled beef was marinated and prepared according to the standardised recipe. It was packed in retort pouches and processed at temperature 121°C, F₀ = 12 in a horizontal water immersion clutch retort. The shelf life study was conducted over a span of 24 months with evaluations made at 1 month intervals for microbiological, sensory and physical characteristics. During storage, all the processed sample were microbiologically safe up to 24 month. Sensory evaluation, ranked on a 7-point scale, was found to be greater than 5 ("like moderately") when processed by panellist during storage. Firmness, as assessed by shear force values, exhibited a slightly decline during storage period. Colour and pH value also showed a decreasing trend. Overall, the shelf life study indicated product acceptability for up to 2 years based on assessments of physicochemical, microbiological, and sensory attributes. Conclusion: The present study suggests that retort processing is suitable for long term storage of grilled beef at ambient temperature with acceptable quality and safety for 24 months. Retort processing of grilled beef will thus, help to increase the market demand due to convenience and ready to eat features.

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Keywords: grilled beef, retort processing, ready-to-eat, shelf life

Production of Hybrid Enoki Mushroom (*Flammulina filiformis*) Patties Incorporated with Meat from Different Animal Species

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Enoki mushrooms (*Flammulina filiformis*) can be used as an ingredient in plant-based meat alternative products due to their distinctive texture, flavour, nutritional value, and Halal status. However, patties made with only Enoki mushrooms face issues such as texture, binding and sensory, thus hybrid plant-based meat products could be the solution. This study investigates the effect of Enoki mushroom patties incorporated with meat from different animal species; chicken (MCP), mutton (MMP), beef (MBP), and buffalo (MBOP) at a 1:1 ratio. The control patties consisted of 100% of enoki mushrooms (CMP). The patties were evaluated for their physicochemical, microstructural and sensorial properties. The CMP failed to bind together resulting in no data for the cooking yield, shrinkage, texture, microstructure and sensory. Nevertheless, CMP had the highest moisture (71.04%) and fibre (1.10%). MCP showed the highest percentage in protein, cooking yield, lightness and yellowness, while MMP had the highest carbohydrate content. No significant differences ($P > 0.05$) in hardness, chewiness, and shear force were observed among the formulations. Microstructural analysis showed that MBOP had the largest pores, while others had more homogenous structures. The MCP was highly acceptable by panellists in terms of colour, texture, aroma, aftertaste, and overall acceptance. This study suggests that Enoki mushroom-chicken patty is the most potential hybrid plant-based meat product.

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Keywords: burger, meat products, meat replacer, mushroom, plant-based substitute

FPS 3rd IFRC 2024 107-216**Improving the Properties of Gelatine/Graphene Oxide/Cinnamon Bark Oil Food Packaging Films: Effect of Ferulic Acid Concentration**Nur Hanani Zainal Abedin^{1,2*}, Maryam Adilah Zainal Ariffin¹, Han Lyn Foong¹, Nabilah Ibrahim¹, Jamilah Bakar^{1,2}¹Department of Food Technology, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Halal Products Research Institute, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Fish gelatine (FG) is extensively used as a raw material in the production of biodegradable packaging. Despite its prevalence, the mechanical strength and water vapour barrier properties of FG-based packaging fall short when compared to synthetic polymers. This study investigated the effect of incorporating a crosslinking agent, ferulic acid (FA), on the physicochemical and functional properties of gelatine-graphene oxide-cinnamon bark oil (gel-GO-CBO) composite films, as active food packaging. Graphene oxide (GO) was synthesised via the oxidation of graphite, following the Hummers' method with slight modifications. The gel-GO-CBO films consisted of FG (2% w/v), GO (2% w/w based on FG), CBO (5% w/w based on FG), and various concentrations of FA (0.5%, 1.0%, 2.0%, 3.0%, and 4.0% w/w based on FG). A gel-GO-CBO film without ferulic acid served as the control. The incorporation of FA increased film tortuosity, significantly ($p < 0.05$) lowering the water vapour permeability of the films. Antioxidant activities of the films exhibited significant ($p < 0.05$) improvements with increasing FA concentration, reaching peak values for DPPH (2,2-diphenyl-1-picrylhydrazyl) scavenging activity, ABTS (2,2-azino-bis-3-ethylbenzothiazoline-6-sulphonic acid) scavenging activity, and total phenolic content at 97.41%, 98.67%, and 79.50 mg GAE/g, respectively. An FA concentration of 1% demonstrated optimum results, yielding the highest ($p < 0.05$) Young's modulus and tensile strength, along with significant ($p < 0.05$) improvements in ultraviolet (UV) light barrier properties (wavelength= 200, 280, and 400 nm). Crosslinking gel-GO-CBO films with FA presents a promising strategy to improve mechanical strength, water vapour and light barrier properties, and functional attributes, thereby expanding their potential applications in food packaging.

Corresponding author: hanani@upm.edu.my*Keywords: active food packaging, gelatine films, antioxidants, crosslinking, physicochemical properties****FPS 3rd IFRC 2024 152-189****Supercritical Solvent Impregnation of Pomegranate Peel Extract Into Polyethylene Films: Effect of Pressure**Han Lyn Foong¹, Nor Adilah Abdullah¹, Gun Hean Chong¹, Nur Hanani Zainal Abedin^{1,2*}¹Department of Food Technology, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Halal Products Research Institute, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Supercritical carbon dioxide (scCO₂) has emerged as a safe solvent for incorporating active compounds into polymers. The efficiency of this process, known as supercritical solvent impregnation (SSI), is influenced by pressure and temperature, which affect diffusivity and solvating capacity. This study investigated the effect of varied pressure conditions on impregnation efficiency and properties of low-density polyethylene (LDPE) films impregnated with pomegranate peel extract (PPE), aiming to improve the functional properties of active food packaging. Pomegranate peels were locally sourced, cleaned, dried (30 °C, 24 h), and pulverised. Ethanolic PPE was prepared using a 1:5 (w/v) ratio and shaken in darkness for 24 h, followed by solvent removal using a vacuum rotary evaporator at 40 °C. LDPE film impregnation was performed in batch mode at pressure levels of 10, 20, 30, and 40 MPa, with plain LDPE film as the control. PPE exhibited high phenolic compound and flavonoid content, demonstrated by total phenolic content (59.00 mg GAE/g DW), DPPH radical scavenging activity (74.43%), and total flavonoid content (50.81 mg QE/g DW) assays. The impregnation of PPE into LDPE film improved ultraviolet (UV) light barrier (transmittance at $\lambda_{280 \text{ nm}} \approx 45\%$) and antioxidant properties (DPPH RSA = 96%). Significantly higher ($p < 0.05$) DPPH RSA and impregnation efficiency were achieved at 30 and 40 MPa, indicating higher PPE loading in LDPE films. This study highlights the potential of SSI in producing LDPE/PPE films as active food packaging with enhanced UV barrier and antioxidant properties. Optimising pressure conditions during impregnation can lead to improved impregnation efficiency and functionality of the packaging material, offering opportunities for developing greener food packaging solutions.

Corresponding author: hanani@upm.edu.my*Keywords: supercritical solvent impregnation, pomegranate peel extract, antioxidant properties, active food packaging**

Effect of Sterility Values and Retort Temperature on the Changes of Physico-chemical and Sensory Properties of *Kawah*-style Meat Curry

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Kawah-style meat curry is a fragrant and flavourful dish that showcases the popular culinary heritage in the Eastern Coastal region of Peninsular Malaysia, such as Kelantan and Terengganu, with its unique blend of spices and aromatic ingredients. The traditional dish is often prepared with lamb or goat meat, although variations with chicken or beef can also be found. A total of 180g of product (60g of half-cooked meat and 120g of curry gravy) was manually filled into different types of retort pouches, which were RcPP/Nylon/Al/PET (Al) and Nylon/RcPP (Transparent), before subsequently being processed in a retort at 121°C with the corresponding F_0 values of 8, 10, and 12. All samples were analysed for physico-chemical, microbiological, and sensory evaluation tests. The parameter retort of sample with the highest overall acceptability score together with microbiologically safe characteristics, was selected to continue with the storage study. During storage study, the samples were kept in a climatic chamber for 16 weeks and analysed for various quality characteristics. The total soluble solid (TSS) and pH of the curry gravy decreased as the F_0 values increased for both Al and Transparent pouches. Meanwhile, an increasing trend was observed for colour (L^* , a^* , b^*) values of curry gravy packed with Al compared to Transparent pouches. The absence of aerobic and anaerobic bacteria, as well as yeast and mould, coliform/*E.coli*, and *Salmonella* spp., indicated that the retorted samples were safe to be consumed. Overall, the sensory evaluation results indicated that the retorted *Kawah*-style meat curry at different F_0 values with different types of pouches are generally acceptable in terms of colour, odour, taste, texture, viscosity, and overall acceptability (sensory scores >5.52). However, further improvements can be made in terms of odour, taste, texture (meat) and specific pouch types for certain F_0 values. The overall acceptability of the retorted *Kawah*-style meat curry at 121°C with F_0 8 was the most preferred, with sensory scores of 5.95 (Al) and 5.89 (Transparent) respectively ($p>0.05$), thus it was chosen as a thermal parameter for storage study of retorted *Kawah*-style meat curry.

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Keywords: *kawah*-style meat curry, retort pouches, quality evaluation, sensory acceptance

Effect of Storage on Physicochemical, Microbiological and Sensory Evaluation of Sponge Cake with Butter and Coconut Milk

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The study aimed to examine the effect of storage on sponge cake with butter and coconut milk. Two types of coconut milk namely coconut milk (containing 74% coconut extract) and trim coconut milk (containing 48% coconut extract) were used in the sponge cake formulation, where coconut milk replaced butter in a 75:25 ratio and sponge cake with 100% butter served as control. The sponge cake was prepared by beating eggs, sugar, and emulsifiers until dissolved. Then, wheat flour, corn flour, skim milk, and leavening agent were added and beaten until fluffy. Flavouring, colouring, preservative, and melted butter/coconut milk were added and mixed until homogeneous. The batter was weighed, poured into baking moulds, and baked in an oven at 170°C for 25 minutes. The baked cakes were stored in Ny/PE plastic bags with an oxygen absorber for 3 months at room temperature ($29 \pm 2^\circ\text{C}$) and were withdrawn monthly for physicochemical analysis (moisture content and water activity), microbiological analysis and sensory evaluation. Moisture content and water activity (A_w) decreased in the coconut milk sponge cake samples during 3 months of storage. The microbiological count (total plate count) is considered satisfactory (below 5 log CFU/g) throughout 3 months of storage as the counts are within allowable limits (acceptable limit is 5×10^5) for both coconut milk sponge cake samples. Sensory evaluation was conducted using 40 untrained panels. There were no significant differences in colour, aroma, texture, sweetness and overall acceptance attributes compared to the control sample during the storage period. Therefore, the use of butter in cake formulation can be replaced with coconut milk, resulting in a cake with a flavour closely resembling the control cake and had a shelf life of 3 months at room temperature.

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Keywords: coconut milk, butter, sponge cake, sensory, physicochemical, storage

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Poly(lactic acid) (PLA) is a biodegradable thermoplastic synthesised through the polycondensation of lactic acid monomers. The predominant commercial production method is microbial fermentation, which is preferred for its low environmental impact, reduced carbon dioxide emissions, cost-effectiveness, and decreased reliance on fossil fuels. The demand for PLA has surged, particularly in the food packaging industry, accompanied by a significant increase in research publications on extruded PLA and PLA-based composite films. Extrusion has emerged as a favoured technique over traditional methods like solvent casting due to its scalability and environmental sustainability, particularly for industrial-scale production. This article presents a comprehensive overview of recent advancements in PLA extrusion, with a focus on its applications in food packaging. The commonly used extrusion methods include cast extrusion, blown film extrusion, and reactive extrusion. PLA composites are synthesised by incorporating various polymers, fillers, plasticisers, chain extenders, as well as antimicrobial and antioxidants. These additions enhance the physicochemical properties of PLA, such as mechanical strength, antimicrobial and antioxidant activities, and barrier properties against water vapour and gases. Extruded PLA-based composites have been successfully applied to various foods, including meats, seafoods, cakes, and crackers. Effective reinforcement of PLA composites depends on ensuring compatibility between the additives and PLA. While lower crystallinity in PLA improves biodegradation, it can compromise stability and barrier properties, posing challenges for food packaging applications. Therefore, balancing the properties of PLA composites is crucial to meet specific packaging requirements.

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Keywords: poly(lactic acid) (PLA) films, extrusion, active and intelligent packaging, biodegradable films

FSH 3rd IFRC 2024 016-009**Exploring Barriers and Drivers of Food Waste Management Digitalisation in Malaysian Public and Private Hospitals.**

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Food waste is a critical concern globally, particularly in the healthcare sector, including hospitals. Hospitals generate substantial food waste due to the high number of patients, visitors, and staff they serve daily. In fact, food waste constitutes nearly half of the total waste produced in hospitals. Current waste management practices in hospitals are often inefficient, costly, and have negative environmental impacts. Consequently, there is a growing need to explore the potential of digitalisation to address food waste management challenges in Malaysian hospitals. This study aims to investigate the barriers and drivers of food waste digitalisation in Malaysian public and private hospitals. Drawing on the diffusion of innovation theory (DOI), the research will analyse the adoption and spread of digital solutions for food waste management within the social system. A comprehensive study will be conducted, employing qualitative multiple case studies in both public and private hospitals in Malaysia. Direct observations on-sites and semi-structured interviews will be conducted with key stakeholders in hospitals. The findings will contribute to the existing literature on food waste management in hospitals food service institutions. Subsequently, the study will also provide valuable insights on digitalisation of the food waste management in hospitals food service for the considerations among the policymakers, hospital administrators, and technology providers in Malaysia. Moreover, understanding the barriers and drivers of food waste digitalisation will inform the development of appropriate strategies and interventions to promote successful implementation of digital solutions in Malaysian hospitals.

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Keywords: digitalisation, hospital, drivers, barriers, food waste management

FSH 3rd IFRC 2024 257-244**A Significant Systematic Review: Halal Supply Chain in Food and Tourism Industry**

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This research highlights the significance of the Halal Food Supply Chain (HFSC) in luring Muslim travellers, boosting traveller experiences, and building loyalty by examining how it affects the tourism and food industries. Due to standardised certification procedures and standards, the hospitality industry has difficulty maintaining an HFSC. This causes uncertainty and inconsistent purchasing practices. The concern includes quality control, logistical challenges, and technological advancements. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology was used in this paper to analyse the main data using a few keywords, including "halal food supply chain, halal assurance, and tourism industry." We discovered $n = 28$ based on in-depth searches in Scopus as well as the Web of Science (WoS). The review also draws attention to methodological flaws in the body of literature, such as the absence of longitudinal studies on destination competitiveness and sustainability and standardised frameworks for evaluating the effects of HFSCs. According to the review's findings, solving these problems is essential for maximising the efficiency of the HFSC and encouraging long-term development.

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Keywords: halal food supply chain, halal assurance system, food industry, tourism industry, tourism

FSS 3rd IFRC 2024 052-035**Consumers' Purchase Intention and Sensory Analysis of Fruit Waste Based Meat Analogue**Ga Yarn Wai^{1*}, Alicia Wong Khai Yeen²¹Hospitality, Tourism and Culinary Arts, University of Wollongong Malaysia, Selangor, Malaysia²Taching and Learning Centre, University of Wollongong Malaysia, Selangor, Malaysia

The world population is expected to increase to 9.7 billion by 2050, therefore with the rapid population growth, the demand for food is expected to increase as well. Valorisation of fruits waste in the meat product development is not only able to turn the waste into wealth, in fact, it can lead to various benefits from different perspectives such as nutrition, environments and economy. As fruit peel is a nutrient rich side product from the fruit therefore it could enhance the nutrients of the developed plant-based meat substitute. Pilot sensory analysis study (n= 30) is conducted to determine the optimum percentage of banana peel powder as a binder of the plant-based ingredients and percentage of pomelo pith as the texturising agent. A survey (n=68) is conducted randomly among the respondents to determine the knowledge, awareness and purchase intention of respondents toward the concept of fruit-waste based meat analogue. A statistical analysis of sensory attributes obtained in the consumer sensory study was performed as a one-way analysis of variance ANOVA and significant differences is detected at a level of $p < 0.05$, identified by post hoc Tukey tests using SPSS software version 25. Besides, a Pearson correlation analysis is conducted using SPSS version 25 to identify the relationship between knowledge, awareness and purchase intention of consumers. The expected result will be the meat analogue with optimum percentage of banana peel and pomelo pith which can achieve optimum sensory profile that meet the taste satisfaction of panellist. Besides, it can be concluded whether there is a significant relationship between knowledge, awareness and purchase intention of consumers. The result from the study is important to give an insight about the potential market of fruit waste-based meat analogue.

Corresponding author: gy.wai@uow.edu.my*Keywords: fruit waste, meat analogue, sensory, purchase intention****FSS 3rd IFRC 2024 061-046****Utilising Microwave Technology to Increase the Sustainability of Food and Health Goods Manufactured from Palm Oil**S. Thungtong^{1*}, M. Nisao², M. Chanpet¹, N. Wuttisit¹, A. Thungtong¹¹Science and Technology Park, Walailak University, Thailand²Plasmas and Electromagnetic Wave Research Laboratory, Walailak University, Thailand

It is common knowledge that the large-scale industrial enterprises in Thailand produce a lot of production waste because of their palm oil processing technologies. Deforestation to expand palm plantations is a result of volume-oriented industry in many places. Nonetheless, several studies demonstrate that crude palm oil (CPO) can be produced using microwave technology, a dry, clean method that enhances nutritional value and energy efficiency. Furthermore, microwave technique is low-cost, energy- and time-efficient, and does not produce biomass. It is therefore appropriate for use in small industries. Additionally, CPO made using microwave technology contains high concentrations of carotenoids, vitamin E, and numerous other essential ingredients that can be used to create a variety of food, health, and beauty products, including skin lotions, shampoos, calming gels, anti-rash creams for babies and the aged. As a result, local farmers or business owners may use this technology in-house to add value to their raw materials and increase their income without having to clear forests or process palm oil the old-fashioned way. Nonetheless, for this concept to succeed, farmers and local business owners must receive ongoing support and development. To this end, Walailak University's Science and Technology Park (WUSTP) serves as an intermediary in the development of new food items, manufacturing standards, technological transfer, and the enhancement of local entrepreneurs' capabilities through collaboration with expert in the excellent centre. The goal is to raise the number of oil palm processors to a level where the community can understand the idea of new oil palm processing. transformation into a fresh final product. As a result, communities will receive revenue and jobs, contributing to the sustainability and safety of food produced from oil palm in line with the Sustainable Development Goals.

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Insect protein has recently emerged as one of the sustainable protein supplies. Studies have demonstrated the efficiency of insect protein in feed conversion, as well as its impressive nutritional profile, capable of meeting the essential amino acid requirements for both human and animal consumption. The production of insect protein has a significantly lower environmental impact compared to traditional protein sources, requiring less land, water, and feed, while also producing fewer greenhouse gas emissions, making it a more sustainable option. Despite these advantages, several obstacles hinder the widespread adoption of insect protein, including scaling up production, navigating regulatory frameworks, addressing safety concerns such as heavy metal contamination and bioaccumulation, and overcoming technological hurdles like protein extraction. Ensuring consumer acceptance is another critical factor, as addressing perceptions and educating the public about the benefits of insect-based products will be crucial in driving mainstream adoption. Nevertheless, insect protein presents a viable solution to meet the global demand for sustainable protein, addressing issues of food security and environmental sustainability. Concerted efforts in research, innovation, and cross-sector collaboration are essential to bridge the existing gaps and unlock the full potential of insect protein for sustainable protein supply chains.

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Keywords: Insect protein; animal feed; food security; sustainability

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The widespread of antibiotic resistance bacteria in food poses a major public health threat globally. This includes seafood, which has an increase in demand substantially all over the world. However, the rise of global foodborne infections associated with seafood consumption has heightened consumer awareness regarding seafood safety issues. Thus, this study aimed to detect and quantify the microbial load of pathogenic *Vibrio parahaemolyticus* and *Vibrio vulnificus* in shrimps from different retail markets. The most probable number in combination with the multiplex PCR (MPN-mPCR) method was used to detect and quantify the presence and microbial density of the targeted bacteria. A total of 80 samples were collected from different retail markets (wet market, $n=38$; hypermarket, $n=42$). *Vibrio parahaemolyticus* was detected in all shrimp samples (100%). However, no pathogenic *V. parahaemolyticus* was detected in this study. The microbial load of *V. parahaemolyticus* ranged from 3.0 to >110000 MPN/g. Additionally, 52 (65%) samples were contaminated with *V. vulnificus*. The microbial density of *V. vulnificus* was ranged from <3 to >110000 MPN/g. The disk diffusion method was applied to determine the antibiotic resistance profile of the isolated bacteria strains. Overall, the isolates showed high resistance to ampicillin (90%) and penicillin (100%). The results demonstrate a high prevalence of *Vibrio* spp. in shrimps, suggesting that the shrimps sold in the retail markets might pose a health risk to consumers.

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Keywords: seafood, foodborne pathogens, MPN-PCR

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The growing number of individuals with gluten sensitivity has led to a rise in the demand for bakery products that are free of gluten. However, using gluten-free flour typically led to low-quality products with crumbly textures and lower volume. *Dioscorea alata* is a seasonal yam that is grown in several regions in Malaysia. Its potential use in food applications has not received much attention. This study investigated the effect of *D. alata* and the fermentation of the yam on the quality characteristics of gluten-free muffin. *D. alata* was fermented with yeast for 24 hours. Both fermented and non-fermented *D. alata* flours were used to make gluten-free muffins, and the results were compared to muffins made with wheat flour. Physico-chemical characteristics and sensory attributes of the samples were evaluated. The non-fermented *D. alata* muffins had a significantly higher height but a lower bulk volume. The fermentation process significantly increased the volume. The lower b^* and L^* and higher a^* in the gluten-free muffin crust suggest that the *D. alata* produced muffins with less yellowness and darker colour. The samples prepared with *D. alata* flour had a lower moisture content, suggesting a less moist muffin, with non-fermented flour has the lowest value. The gluten-free muffin performed better in the ranking test in terms of aroma and airy crumb. This study suggested that *D. alata* could be a potential gluten-free flour substitute for bakery applications. The fermentation of the yam increased the volume but produced a darker product.

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Keywords: *Dioscorea alata*, gluten-free, cake volume, ranking test

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The development of the plant-based cheese analogue (PBCA) from plant-based coagulant and plant-based raw materials can serve food intolerances, environmental sustainability, health, and animal welfare considerations, as well as social trends. Various social such as veganism and religious issues, entail limiting or reducing the use of chymosin, and new sources of coagulants are needed. Designing PBCA that can accurately mimic actual cheese's full range of physicochemical, sensory, and nutritional attributes is extremely challenging due to its compositional and structural complexity. In the present study, the milk clotting activity (MCA) of plant-based coagulants from morinda, papain, ginger powder extract, milk thistle, lemon extract, moringa leaf, and kiwi extract were measured and compared with commercial chymosin. The coagulants's clotting percentage (%) was also observed on different plant-based milk extracted from chickpeas, mung bean, soybean, black-eye peas, and vigna mungo. Then, the selected plant-based coagulant and plant-based milk were further studied with the addition of other formulation constituents. Fractional factorial design were used to screen significant formulations that significantly affect the textural properties of PBCA. Results: The results showed that papain showed a high clotting percentage (63.67%) in chickpea milk. Then, the addition of starch and emulsifier in the formulation significantly ($p < 0.05$) affected the textural attributes of PBCA. Papain and chickpea milk, with the addition of starch and emulsifier, can mimic actual cheese attributes and serve as green-label food.

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Keywords: plant-based coagulant, plant-based cheese, cheese analogue, green-label food, sustainable

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The nutritional composition of an ento-protein, *Hermetia illucens* larvae offers a compelling profile, rich in protein, essential amino acids, lipids, and micronutrients, aligning closely with the dietary requirements of tilapia juveniles. This paper aims to investigate the feasibility and efficacy of utilising *Hermetia illucens* larvae as a total replacement for early diet in Tilapia *Oreochromis* sp. during the nursery stage. A total of 360 tilapia, *Oreochromis* sp. fingerlings were selected based on the approximately average weight of 1.41 g and randomly distributed into 12 rectangle aquarium tank (300mm x 190mm x 210mm) at a stocking density of 30 fish per tank. The fingerlings were given commercial pellets as control diet (G1), live black soldier fly larvae (BSFL) (G2), and dead, dried BSFL (G3) at 10% of the total body weight according to respective diets in dry weight-and the feeding was carried out three times per day. The experimental set up was done in triplicate. According to our observations, fingerlings in G3 fed with dead, dried larvae had equivalent growth performance to the control group (G1). Specific growth rate (SGR) for fingerlings in G3 is slightly lower compared to control group which are 1.75 ± 0.14 % g/day and 2.24 ± 0.24 % g/day respectively. While, the fingerlings in G2 recorded the lowest SGR which just 0.87 ± 0.10 % g/day. This is due to the commercial diet is formulated specifically to meet the specific nutrition requirement. Meanwhile, the survival percentage of fingerlings in G3 is $88.33 \pm 1.44\%$, which is close to the survival rate of fingerlings fed the commercial pellet, $90.00 \pm 4.33\%$. The fingerlings in G2 recorded the lowest survival rate which just $44.17 \pm 5.20\%$. Dead, dried BSFL showed comparable growth performance parameters and might be utilised as a replacement for commercial pellets when feeding tilapia at the nursery stage

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Keywords: *Hermetia illucens*, insect meal, growth performance, survival, alternative nursing diet

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Every year, one-third of all food produced is wasted, totalling 1.3 billion tons worth \$1 trillion. Addressing food waste is crucial for food security and nutrition. As a result, exploring alternative ways to transform fruit waste into viable plant-based products becomes imperative. This approach may raise several concerns from the halalan tayyiban perspective, particularly regarding cleanliness, safety, and health. This research is to develop a framework according to halal guidelines for producing plant-based products from fruit waste biomass. This study utilised a qualitative approach, incorporating interviews and a comprehensive literature review. The data were analysed using NVivo 12 to construct a framework based on similar themes and sub-themes. The results show a halal framework for three levels of production, including pre-process, during-process, and post-process of fruit waste. Each level contains halal issues that need to be considered, such as the perception of filth, alcohol content during the process, and appropriate naming for the 'fruit-waste' product. Utilising waste and natural resources will have a significant positive impact on the environment, reducing food insecurity, carbon dioxide emissions, and soil and water pollution. The Halal framework for fruit waste biomass plays a crucial role as an important guideline in achieving the objectives of the National Agrofood Policy. It optimises food security through resource utilisation and enhances availability, quality, and resilience.

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Keywords: fruit waste, halal framework, halalan tayyiban, sustainability, waste biomass

NFF 3rd IFRC 2024 031-018**The Development of High-Calcium Guava Candy using Eggshell Powder**

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This study aims to develop high-calcium guava candy using eggshell powder (ESP) as a functional ingredient. Eggshells were cleaned, oven-dried, ground and sieved to obtain fine powder. Palm sugar, gelatine, pink guava concentrate and 1.3% ESP were heated in hot water (90°C) with continuous stirring. The resulting syrup was moulded and refrigerated to form ESP-candy. A control without ESP was prepared. The nutritional and sensory qualities of the candies were determined. The ESP-candy contained 11.18% protein, 50.91% carbohydrate, 0.54% fat, 2.33% ashes, with a pH of 6.38 and water activity of 0.82. Protein and ashes of ESP-candy were significantly higher than that of the control (10.89% and 0.18%, respectively). The pH of ESP-candy was significantly higher than that of the control (pH 4.41) due to the alkaline eggshell calcium carbonate. Calcium and vitamin C content of ESP-candy were 262 mg calcium/100 g and 91.46 mg ascorbic acid/100 g, respectively. With these micronutrients content, the ESP-candy met the criteria for "high in calcium" and "high in vitamin C" nutritional claims. Additionally, the ESP-candy exhibited a DPPH radical scavenging activity of 52.52%. The mean overall acceptability score of the ESP-candy was 5.9 out of 7 with an acceptance index of 84%, higher than that of the control (82%). The mean sensory scores of ESP-candy: colour (5.33), aroma (5.63), sweetness (5.58), gumminess (5.80), and hardness (5.58). ESP could be utilised for the development of calcium-enhanced confectioneries and its application warrants further exploration. This project aligns with the sustainable development goals - promoting good health and environmental protection.

Corresponding author: thedst@tarc.edu.my*Keywords: eggshell powder, high-calcium candy, guava, functional confectioneries****NFF 3rd IFRC 2024 031-019****Freeze-Dried Pandan-Flaxseed Oil Powder: Development and Characterisation**

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Flaxseed oil (FSO) has gained wide acceptability as a vegan source of essential polyunsaturated fatty acids (PUFAs) and it has a healthy ratio of omega-6:omega-3 fatty acids. Oxidation is a major problem of FSO due to its high PUFAs content. In this study, antioxidant pandan extract was used to encapsulate FSO and protect it from oxidation. The objective was to develop pandan-FSO powder using encapsulation and freeze-drying techniques. For sample preparation, FSO, pandan extract powder, whey protein isolate and maltodextrin at ratios 1: 1.6: 0.7: 0.7 were mixed, then water was added to the mixture at a ratio of 4:1, and homogenised (1000 rpm, 4 min) to form an emulsion with 25% oil loading (dry basic). The emulsion was frozen and freeze-dried (-55°C, 48 h) to form pandan-FSO powder. The pandan-FSO powder demonstrated a high solubility of 91.33%, suggesting its potential application in beverages. The powder has a dispersibility of 10.98%, water activity of 0.29, pH of 6.14, bulk density of 0.33 g/mL, and a product yield of 20.75%. The pandan-FSO powder was green with a colour profile: $L^*=15.2$, $a^*=-10.9$ and $b^*=6.4$. The powder exhibited a DPPH radical scavenging activity of $17.31 \pm 0.59\%$ with a total phenolic content of 3.97 ± 0.09 mg/g. No significant difference in DPPH value was observed after 3 weeks of storage at 40°C, suggesting the stability of the pandan-FSO powder. In conclusion, encapsulation of FSO with antioxidant pandan extract could protect the oil from oxidative deterioration. The freeze-dried pandan-FSO powder will have a longer shelf-life and versatile applications in food products.

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Noncommunicable diseases (NCDs) kill 41 million people each year, equivalent to 74% of all deaths globally, based on the World Health Organization Report 2023. In recent decades, many experts revealed that a desired ratio of omega-6:omega-3 essential fatty acid (n-6:n-3 EFA) has beneficial impacts on NCDs. This paper aims to review and update some health effects of n-6/n-3 EFA and the proposed mechanisms. The review was conducted via PubMed, ScienceDirect, and NCBI databases. A total of 169 publications were screened and 43 papers were selected. The clinical intervention studies showed that an n-6:n-3 ratio around 1-4:1 led to a 70% decrease in total mortality of cardiovascular diseases, reduced proliferation of colorectal cancer cells, decreased risk of breast cancer, suppressed inflammation in rheumatoid arthritis, and improved hyperinsulinemia in obese youth. Furthermore, n-3 EFA regulated platelet homeostasis and decreased the risk of thrombosis, indicating its potential use in COVID-19 therapy. Overconsumption of n-6 EFA promoted the pathogenesis of many NCDs, whereas n-3 EFA exerted suppressive effects. It was proposed that n-6 and n-3 fatty acids elicit divergent effects on NCDs through mechanisms involving modification of cell membrane structure, modulation of signal transduction pathways, gene expression regulation, and systemic inflammation. While many researchers recommended a lower dietary n-6:n-3 ratio, a Harvard study emphasised that n-6 EFA plays an equally vital role in the body and to improve the ratio of n-6:n-3, we should eat more n-3 instead of reducing n-6. Typical diets in many regions often with high n-6:n-3 ratio due to the increased consumption of n-6-rich vegetable oils such as corn oil (57:1) and sunflower oil (71:1). An optimum ratio of dietary n-6:n-3 could play a role in reducing the risk of NCDs of high prevalence among the world population.

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Keywords: omega-6:omega-3 fatty acid, health implications, noncommunicable diseases

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Roselle (*Hibiscus sabdariffa* L.) is renowned for its role as a natural food colorant. Methods: Ultrasonic-assisted extraction methods represent innovative and environmentally friendly approaches extensively employed in the extraction of natural dyes. Ethanol (95%) is diluted by half was use for extraction. The objective of this study is to utilise varying durations of ultrasonic extraction to extract total anthocyanin content and evaluate antioxidant activity from Roselle flowers. The extraction times were 15 min, 30 min, 45 min, 60 min and 2 hours of maceration as a control. Results: According to the findings, employing a solvent-to-solid ratio of 20:1 mL/g and an extraction duration of 30 minutes yielded the highest Total Anthocyanin Content (TAC) at 113.66 mg/L and exhibited an antioxidant activity of 94.89% as measured by the DPPH assay. In terms of methodology, this study underscores the superiority of ultrasonic-assisted extraction over maceration extraction in obtaining higher quality extracts from Roselle petals.

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Keywords: *Hibiscus sabdariffa* L, sonication, ethanol extraction, flavonoids, antioxidant ability

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In the past 10 years, vitamin D status in Malaysia has shown worrying deficient data on subjects blood serum 25(OH)D (<35nmol/L). While natural sunlight, readily available due to Malaysia's equatorial location, offers an optimal source of vitamin D, societal trends favouring indoor lifestyles have negated this advantage. Recognising the need to address this deficiency, food fortification has emerged as a cost-effective strategy to enhance vitamin D intake. Palm olein IV60, a commonly used cooking oil in Malaysia, has been fortified with vitamin D to facilitate broader access to this essential nutrient. This study evaluates the quality parameters of palm olein with added vitamin D during accelerated shelf-life testing at 90°C, comparing it to unfortified palm olein over a period of 5 days. Results indicated a parallel increase in free fatty acid (FFA) content, rising from 0.06% to 0.13% in both samples. Additionally, peroxide values for fortified (a) and unfortified (b) palm olein were recorded at 17.0 meq/kg and 16.7 meq/kg, respectively. There was no significant difference in the sensory scores of both oil throughout the study. Vitamin D deterioration towards the end of the study was found approximately 60% - 70%, underscores the necessity of fortifying cooking oils with vitamin D up to the maximum allowable dosage specified in Regulation 26. It is recommended that vitamin D food fortification at maximum recommended amount may be the best source of vitamin D in Malaysia to address the population's nutritional needs effectively.

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Keywords: vitamin D, deficient, fortified, deterioration, sensory

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There is increasing trend in the application of herbal throat drops nowadays. Piperine, also known as pepper bioactive compound, is amongst important herbal medicines possessing anti-oxidant and anti-inflammatory effects of which have been indicated in several studies. This study aimed to determine the antioxidant activity, anti-inflammatory, vitamins and minerals, acute toxicity test as well as sensory characteristics of Sarawak black pepper-based throat drops. *Piper nigrum*-based throat drops was formulated by using pepper oleoresin and calamansi fruit juice concentrate based on hedonic parameters. The oleoresin was extracted by using supercritical fluid extraction method. The selected formulation has gone through a series of bioassays such as DPPH free radical scavenging activity, superoxide free radical scavenging activity, tyrosinase inhibitory activity, ORAC, total phenolic content determination, protein denaturation inhibition assay, hyaluronidase inhibition assay, acute toxicity using rats model, sensory evaluation and stability testing. The formulation was found to exhibit potent antioxidant, high anti-inflammatory and vitamins contents. *Piper nigrum*-based throat drops was reported with promising tyrosinase inhibitory activity of $53.83 \pm 0.96\%$ and anti-denaturation activity of $70.18 \pm 0.96\%$. The throat drops were developed based on aroma, taste, appearance and texture. The output has the percentage of 3.02 in terms of aroma, 3.30 in terms of taste, 3.12 in terms of appearance, 3.18 in terms of texture. It was reported containing vitamin B1, B5 and minerals. In acute oral toxicity up-and-down procedure with rats model, the throat drop was tested and classified as Category 5 according to the Globally Harmonised System for the classification of chemicals. Thus, it has potential be used to replenish antioxidant and anti-inflammatory requirement in body such as polyphenols, flavonoids and free radical scavenging activity.

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Keywords: piperine, antioxidant activity, anti-inflammatory, vitamins, minerals

Evaluation of Toxicity and Safety of *Crescentia cujete* L. extracts using Zebrafish Embryo Toxicity (ZFET) assay for Future Applications as Functional Food Ingredient

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Crescentia cujete L. or known as calabash tree, is commonly used in folk medicine to treat various diseases. The leaves and fruit were typically boiled in water and used as medicinal constituents. However, the safety status of *C. cujete* has not been tested and verified. The present study aimed to determine the toxicity of the leaves, bark, and fruit of the plant extracted in hot water (HW) and 50% ethanol (ET) using Zebrafish Embryo Toxicity (ZFET) assay. The effects of the extracts on embryos mortality and developmental malformations were determined in seven different concentrations every 24 hours from 0-24 hours of post exposure (HPE). The present study reported LC₅₀, embryonic hatching delays, teratogenic defect, and heart rate response with microscopic images. The results showed that the different plant parts extracted in HW, and ET had LC₅₀ values ranged from 9.69 mg/mL (harmless) to 0.42 mg/mL (or non-toxic). There were no changes in zebrafish embryo hatching at the concentration of 50 mg/mL, 40 mg/mL 35 mg/mL, 30 mg/mL, 25 mg/mL, 20 mg/mL and 15 mg/mL for hot water and ethanol extracts of leaf, fruit and bark, respectively. Similarly, the teratogenic effect was not observed in all the tested extracts. In brief, both hot water and ethanol extracts of *C. cujete* are considered non-toxic. These preliminary findings support future applications of Thus, *C. cujete* leaves, bark, and fruit as functional food ingredient. Further in-vivo and clinical research could be conducted to validate the safety and efficacy of *C. cujete* plant prior to pilot and commercial use, such as in the treatment and management of oxidative stress related diseases.

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Keywords: calabash tree, zebrafish, toxicology, functional food ingredient

Cytotoxic Effects of *Polygonum minus* Extract on Colon Cancer Cells (SW480 And SW620) and Human Skin Fibroblast (HS27) Cell LinesMarim Abdullah¹, Norsharina Ismail¹, Chan Kim Wei¹, Md Zuki Abu Bakar@Zakaria^{1,2}, Noorjahan Banu Alitheen³, Ahmad Faizal Abdull Razis^{4,5*}¹Natural Medicines and Products Research Laboratory, Institute of Bioscience, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia²Department of Veterinary Preclinical Sciences, Faculty of Veterinary Medicine, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia³Department of Cell and Molecular Biology, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia⁴Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia⁵Laboratory of Food Safety and Food Integrity, Institute of Tropical Agriculture and Food Security, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Plants may offer numerous natural antioxidants that may lead to the development of new compound for cancer prevention. Colorectal cancer is a common and deadly malignancy. *Polygonum minus*, a herb traditionally used in Southeast Asia, shows promise due to its medicinal properties. This study aims to investigate the cytotoxic effects of *Polygonum minus* extracts on colon cancer cells (SW480 and SW620) and human skin fibroblast (HS-27) cell lines. Plant extracts were prepared by washing, drying overnight, grinding, and sieving until finely powdered before extraction. Various solvents such as methanol, water, dichloromethane, and hexane were used for the extraction followed by its characterisation and cytotoxicity studies. The choice of extraction solvent significantly affected the yield of *Polygonum minus* extract from the leaves due to the varying solubility profiles of the plant constituents. Methanol proven the most effective, followed by water, dichloromethane, and hexane. Statistical analysis revealed a significant variance ($P < 0.05$) among the solvents. Analytical techniques like liquid chromatography-mass spectrometry (LC-MS) and high performance liquid chromatography (HPLC) were employed to analyse the extract's composition and the presence of quercetin, an antioxidant. The water extract demonstrated the highest cytotoxic potential against colon cancer cell lines (SW480 and SW620) compared to other extracts, with IC₅₀ values of 12.0 ± 1.44 and 21.44 ± 2.53 , respectively. The different in solvents used for the extraction has optimised the bioactive compound yield. Water extract's selective cytotoxicity indicates *Polygonum minus*'s potential as cancer therapy.

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Keywords: colon cancer, *Polygonum minus*, human skin fibroblast (HS-27), primary colon cancer (SW480), metastatic colon cancer (SW620)

NFF 3rd IFRC 2024 204-201**Development of Red Palm Oil Candy as a Tool for Vitamin E and Carotenes Delivery**

Teck-Kim Tang*, Hazrati Wazir, Sivaruby Kanagaratnam, Radhika Loganathan, Nur Haqim Ismail, Mei Huey Saw, Soon Sen Leow, Norazura Aila Mohd Hassim
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Red palm oil (RPO) is a type of refined palm oil rich in carotenes (500ppm to 800ppm) and vitamin E (800ppm). Studies on RPO have revealed several promising health benefits, including protection against cardiovascular disease. However, RPO has heat-sensitive phytonutrients which would degrade upon high heat. Incorporating RPO into candy could protect its nutritional value. Direct compression is a method for preparing candy in tablet form, as it generates minimal heat and most of the carotenes and vitamin E can be preserved. In this study, the main objective was to optimise the amount of RPO in candy production, specifically addressing challenges related to flowability of premix and hardness of the product. Mixture design was used to study the interaction of the ingredients. The major components, sweetener, RPO powder and binder that may significantly influence the response variables (hardness and flowability) were studied. The ingredients were mixed well (referred to as the premix), and tested for angle of repose to assess flowability. The premix was then used to make candy using direct compression with a tableting machine. The hardness of the candy produced was tested using a texture analyser. The flowability of premix was not significantly influenced by RPO when amount was within 14%, with an angle of repose value below 40 (indicating it did not need aids). The maximum amount of RPO that could be incorporated was around 8.4%, while maintaining acceptable hardness (~20N). Through the optimisation process, it was found that the incorporation of RPO up to 8.4% in candy production maintained acceptable hardness levels. Additionally, adjustments to the binder amount could improve candy hardness.

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Keywords: red palm oil, candy, carotenes, vitamin E

NFF 3rd IFRC 2024 250-241**Impact of Infusion Time on Physical Characteristics, Antioxidant Properties, and In-Vitro Antidiabetic Effects of Roselle Herbal Blend Tisane**

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Roselle (*Hibiscus sabdariffa*) tisane or herbal tea is recognised for its health benefits and potential antidiabetic properties. This study aimed to assess the infusion time of Roselle blended with *Garcinia atroviridis* tisane on physical characteristics, antioxidant properties, and in-vitro antidiabetic effects. Roselle tisane was infused in hot water (100°C) for 5, 10, 15, 20, 25, and 30 minutes. The infused water at each infusion time was tested for colour, pH, total anthocyanin content, and antioxidant properties, as well as its effects on α -amylase and α -glucosidase enzyme inhibition. The pH of roselle tisane was consistent across all infusion times, ranging from 2.21 to 2.23, with no significant differences ($p > 0.05$). However, the a^* , C , and h^* values of the infusion decreased significantly ($p \leq 0.05$) with longer infusion times. The total anthocyanin content remained stable from 5 to 15 minutes, significantly ($p \leq 0.05$) increased at 20 minutes, and maintained similar values at 30 minutes. Total Phenolic Content (TPC), Ferric Ion Reducing Antioxidant Power (FRAP), Trolox Equivalent Antioxidant Capacity (TEAC), and percent of DPPH inhibition were significantly ($p \leq 0.05$) higher in the infused water at 20 minutes compared to 5 minutes. Regarding α -amylase inhibition, no significant difference ($p > 0.05$) was observed between samples soaked for 5 and 20 minutes. Conversely, the inhibitory activity of the enzyme α -glucosidase was twice as effective in roselle tisane soaked for 20 minutes. These findings suggest that roselle tisane soaked for 20 minutes exhibits superior antidiabetic potential, particularly in inhibiting the digestive enzyme α -glucosidase.

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Keywords: *Hibiscus sabdariffa*, *Garcinia atroviridis*, infusion time, antioxidant properties, in-vitro antidiabetic

Cocoa Bean Shell Characterisation at Various Roasting Conditions

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The study aimed to evaluate the microbial, physical, and chemical properties of cocoa bean shell (CBS) at various cocoa bean roasting temperatures (110°C, 115°C, 120°C, 125°C, 130°C). Quantification of microbial load, proximate composition, bioactive profile, antioxidant activity, and phenolic compounds were done to analyse the impact of the different roasting conditions on CBS. Analyses showed that cocoa bean roasting temperature significantly ($p<0.05$) affected CBS components. Total plate, and yeast and mould count of CBS were reduced to minimal levels in the roasting temperatures. Colour shades based on the L^* , a^* , and a^*/b^* were not significantly ($p<0.05$) altered between treatments, however, significant ($p<0.05$) changes in the amount of moisture, crude fibre, crude ash, and crude protein were observed from various roasting temperatures. In addition, total flavonoids (TFC), total anthocyanin (TAC), and total phenolic (TPC) contents are significantly ($p<0.05$) reduced at elevated temperatures. Values obtained for FRAP, ABTS, and DPPH peaked at 115 °C – 125°C and significantly ($p<0.05$) decreased at 130°C. Three phenolic compounds (catechin, epicatechin, and syringic acid) were detected and quantified by high-performance liquid chromatography (HPLC). High roasting temperatures could be detrimental to the functional compounds present in CBS. Therefore, roasting temperatures should be controlled to provide balance in the generation of chocolate flavour and mitigate the degradation of these functional compounds.

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Keywords: roasting, cocoa bean shell, phenolics, antioxidant

NGT 3rd IFRC 2024 274-259**Effects of Microwave Heating on FFA Reduction in Extracted Red Palm Oil**M. Nisoa^{1,2*}, S. Kaewpawong², W. Kongsawat^{2,3}, R. Taleh², K. Wattanasit^{2*}, T. Chuanchaoen⁴, K. Ninart⁴, D. Srinoum²¹School of Science, Division of physics, Walailak University, Thailand²Plasmas and Electromagnetic Wave Research Laboratory, Walailak University, Thailand³Center for Scientific and Technological Equipment, Walailak University, Thailand⁴Walailak University Science and Technology Park, Walailak University, Thailand

Red palm oil, extracted from palm fruits, contains Triglyceride 94%, free fatty acid 3-5%, minor and trace component 1%. Due to the hydrolysis reaction, the FFA content in red palm oil increases if the palm fruit is left out before extraction. If left for one week, the FFA content will increase to approximately 30%. The extracted palm oil is of good quality, can be sold reasonably, and must contain no more than 5% FFA. Microwaves are electromagnetic waves that can quickly heat palm fruit and inhibit the activity of lipase enzymes. It breaks the oil cells. As a result, the extracted palm oil has a lower FFA content and a high extraction yield. Microwaves are electromagnetic waves that can quickly generate heat in palm fruit by dielectric heating and inhibit the activity of lipase enzymes, causing the oil cells to break, resulting in the palm oil extracted having lower FFA content and higher yield. The plasma and electromagnetic waves research laboratory (PEwave) at Walailak University has developed an industrial prototype microwave technology to heat palm fruits to extract the oil in high yields and quickly reduce the amount of FFA. Heating the palm fruits with microwaves only about five times can reduce the FFA content in the palm oil extract to less than 5%. The prototype microwave technology developed is clean and environmentally friendly and has a high potential to be commercially developed for use in small-scale palm oil mills.

Corresponding author: mnisoa@gmail.com*Keywords: extracted red palm oil, FFA, microwave heating, small-scale palm oil mill****NGT 3rd IFRC 2024 277-261****Portable LED Photometer for Determination of Carotenoid Content and DOBI of Red Palm Oil**K. Wongyai^{1*}, S. Kaewpawong¹, K. Wattanasit¹, D. Srinoum¹, M. Nisoa^{1,2*}¹Plasmas and Electromagnetic Wave Research Laboratory, Walailak University, Thailand²School of Science, Division of Physics, Walailak University, Thailand

Red palm oil is a product from the mesocarp of the oil palm fruit. It is becoming increasingly popular because it is rich in beneficial phytochemicals such as carotenoids, vitamin E, phytosterols, etc. Carotenoids are provitamin A, which the body uses as a precursor to produce vitamin A, and are antioxidants that help nourish eyesight, restore the ability to see, and prevent heart disease. Red palm oil is produced at industrial, community, and laboratory levels. Industrial production of red palm oil is refined from crude palm oil. In the refining process to produce red palm oil, steps are reduced from the typical method used to produce cooking oil to retain as many carotenoids and vitamin E as possible. Laboratory research to produce red palm oil using microwaves was developed in 2000 in Malaysia. Microwaves heat the palm fruit quickly, causing the inactivation of lipase enzyme, rupturing the oil cells, and dissolving the triglycerides from the mesocarp fibres. Red palm oil with low free fatty acids, high carotenoids, and high vitamin E can be produced. Plasmas and Electromagnetic Waves Research Laboratory (PEwave), Walailak University, is developing a red palm oil production process using microwave technology to produce red palm oil at the community level. The goal is to build a prototype factory that costs less than 10 million baht, producing 500-1000 kg of fresh palm oil daily and 150-300 kg of red palm oil daily. We have also developed a portable photometer using a light-emitting diode (LED) and photodiode (PD) to measure red palm oil's carotenoid content and DOBI. The photometer is simple, accurate, robust, cheap, and suitable for small-scale palm mills.

Corresponding author: mnisoa@gmail.com*Keywords: red palm oil, microwave heating, photometer, LED, PD, carotenoid, DOBI, small-scale palm oil mill**

VIRTUAL PRESENTATION SESSION

FASQ 3rd IFRC 2024 268-256

Evaluation of a Novel Oleogel for Improved Physicochemical Properties and Bioavailability of Fish Oil

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Fish oil is rich in omega-3 fatty acids, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which have been demonstrated to offer numerous health benefits. However, fish oil is prone to oxidation and degradation, posing challenges for storage and transportation. This study utilised carnauba wax (CRW) in combination with fish oil, to form fish oil oleogel (FO). The research aimed to investigate the effects of adding different concentrations (4%, 6%, and 8% wt) of CRW on the physicochemical properties (hardness, cohesiveness, viscosity, crystallisation and melting curve, EPA and DHA content, oxidative stability) and bioavailability (cumulative release rates) of FO (FO4%, FO6%, FO8%). The results indicated that as the CRW concentration increased, the crystallisation and melting temperature of FO significantly increased, and both hardness and viscosity are markedly improved. However, the CRW concentration did not significantly affect the cohesiveness of FO, or the EPA and DHA content. In a 14-day storage test, the peroxide value (POV) and *p*-anisidine value (*p*-Av) were highest in FO8%, but the increase in *p*-Av was the smallest. Similarly, FO8% had the longest induction period. In intestinal digestion experiments, the cumulative release rates of FO6% and FO8% were similar, whereas in simulated gastric digestion experiments, FO8% had a lower release rate, which helps reduce fishy burps. Based on the above results, the 8% CRW addition in FO demonstrated the best effect and has potential for further development.

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Keywords: fish oil, carnauba wax, oil oleogel, physicochemical characteristics, biological availability

FPE 3rd IFRC 2024 083-062

Optimisation of Erythritol Production using *Yarrowia lipolytica* and Pure Glucose as a Substrate

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Erythritol is a natural sweetener used in many products, especially in food, since it has almost zero-calorie content and zero glycaemic Index, making it a practical and safe ingredient for people with diabetes and obesity. However, erythritol production has not been widely used and established, making it expensive due to low yield and high production cost. The objective of this research is to study the effect of process parameters such as airflow rate, stirring speed and pH on the production of erythritol using *Y. lipolytica* and glucose as substrate. Various factors influenced the erythritol production, including stirring speed in the range of 200 rpm – 300 rpm, airflow rate at 1.0 L/min – 2.0 L/min, and pH at 5.0 – 6.0. The factors were studied using response surface methodology (RSM) software to obtain the optimum conditions. Dry cell weight of yeast, OD600, glucose concentration, and erythritol concentration were analysed. Based on the results, it was found that pH and stirring significantly affect the dry cell weight. Meanwhile, stirring and airflow rate significantly affects the erythritol concentration. pH and stirring also slightly change the OD600 and glucose concentration. The correlation analysis was done to determine the linear relationship between the responses. O.D.600 and dry cell weight results in a moderate negative relationship; as dry cell weight increases, the O.D.600 rises. Therefore, dry cell weight and erythritol concentration were chosen to optimise the responses as these two responses are more accurate than the others. Moreover, the combined factors show that they significantly affect the responses. It was found that the dry cell weight of the yeast and concentration of erythritol would give the highest amount, which is 23.928 g/L and 204.458 g/L when operated at a stirring speed: 150 rpm, airflow rate: 1.50 L/min and pH: 5.52. After validation of dry cell weight and erythritol concentration was carried out, it was found that the percentage error for both responses were below 15%. Therefore, the optimum condition is suitable for producing erythritol.

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Keywords: erythritol, glucose, *Yarrowia lipolytica*, optimisation

FPS 3rd IFRC 2024 028-095**Red Tilapia Fish Scale Gelatine Incorporated with Kesum (*Persicaria odorata*) Leaf Powder as an Antioxidant Packaging Film**

Roseliza Kadir Basha*, Siti Nurnajihah Salahuddin, Nazatul Shima Azmi, Farah Saleena Taip, Noor Zafira Noor Hasnan, Nor Amaiza Mohd Amin

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This study investigates the potential use of waste and by-products from red tilapia fish production as a source of gelatine for effective food packaging materials. To enhance the antioxidant activity of gelatine-based films, kesum leaf powder is incorporated. However, the specific impact of kesum leaf powder on these films has not been thoroughly examined. Therefore, the study aims to address this gap by systematically analysing various parameters, including moisture content, Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), optical properties, mechanical strength, and antioxidant activity in gelatine-based films incorporated with kesum leaf powder. The results indicate that the gelatine-based film, when incorporated with kesum leaf powder, maintains transparency but imparts a darker hue, featuring shades of green and yellow. The powder also reduces moisture content and affects mechanical properties, notably increasing elongation at break (28.2%). Additionally, the gelatine film incorporated with kesum leaf powder exhibits a substantial 73.5% increase in antioxidant activity, suggesting potential applications in active packaging for food preservation. Scanning electron microscopy reveals an uneven surface, marked by white patches due to successful kesum leaf powder integration. In conclusion, the gelatine-based film incorporated with kesum leaf powder, demonstrates desirable properties, positioning it as an effective active packaging material capable of extending the shelf life of food products while preserving quality.

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Keywords: red tilapia fish scale, gelatine-based film, kesum leaf powder, antioxidant packaging

FSH 3rd IFRC 2024 016-086**Exploring Factors Influencing Digitalisation in Front-of-House (FOH) and Back-of-House (BOH) among Full-Service Restaurants in IOI City Mall Putrajaya, Malaysia**

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Digitalisation is now turning into a basis for successful food service business by involving both segments of food service operations namely Front of House (FOH) and Back of House (BOH). Digitalisation has been studied in various fields, but most of the existing research has focused on the impact of digitalisation on the food service business. This study aims to explore the factors influencing digitalisation in the FOH and BOH among the full-service restaurants in IOI City Mall Putrajaya, respectively. For this study, a qualitative research method of semi-structured interviews was conducted in a face-to-face setting with seven full-service restaurant managers in IOI City Mall Putrajaya. The results obtained reveal that factors influencing digitalisation in FOH of full-service restaurants can be categorised into external and internal - external influences are changing time, environmental sustainability, industry trend, and post-COVID-19 hygiene concern, while preference alignment and workforce optimisation consist of external and internal influence. Changing time involves time and modern age as well as heavy dependence on smartphones and technology; Environmental sustainability involves paper reduction and promotes environmental friendliness; Industry trend involves rapid evolution of the restaurant industry, adoption of digitalisation in mamak shops, and fast-food chains lead digitalisation; Post-COVID-19 hygiene concern involves QR codes and iPad for contactless ordering and preference for minimal contact with shared items; Preference alignment involves customer preference and staff preference for digitalisation and people like new things; Work optimisation involves save time, easier customer ordering, address labour shortage, cost saving (labour cost and material cost), data extraction, convenience and communication, security measure, and work efficiency. Besides, there is only one factor influencing digitalisation in BOH of full-service restaurants, internal influence - efficiency and simplicity. It involves automated order processing, orders are efficiently handled by the relevant sections, reducing errors that may occur during manual ordering, convenience, and saving manpower. This study also shows that full-service restaurants emphasise digitalisation more in FOH compared to BOH. This study contributes to enhancing the industry with the increase of restaurant managers' or owners' understanding of digitalisation in the local restaurant industry. Furthermore, this study can provide restaurants with actionable recommendations in terms of technology adoption, operational improvements, and eco-friendly practices.

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Keywords: digitalisation, factors influencing, front-of-house, back-of-house, full-service restaurant

FSH 3rd IFRC 2024192-180**Relationship between Food Safety Knowledge and Mothers' Optimistic Bias Regarding Foodborne Disease in Slum Areas of Yogyakarta City**

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Foodborne disease is now often occurring in household settings and slum areas with a high prevalence of inadequate housing (RTLH). The research location focuses on slum areas in Yogyakarta, which is the city with the highest number of foodborne disease cases in Indonesia. Mothers play a crucial role in providing family meals. Mothers' food safety knowledge is one of the factors that can prevent the risk of foodborne disease. A mother may have an overly optimistic perception of the risk associated with food handling practises, which can be observed in the concept of optimistic bias. This research uses a quantitative method with a cross-sectional design. The study uses purposive random sampling with a sample of 100 housewives located in slum areas of Yogyakarta City, Indonesia, with sample selection considering the inclusion and exclusion criteria of the study. There were 89 respondents (89%) having a high optimistic bias toward foodborne disease, and 68 respondents (68%) had a low score for food safety knowledge. Based on bivariate analysis using the Spearman Rank, the p-value obtained is 0,000 ($p < 0.05$), indicating that there is a relationship between food safety knowledge and optimistic bias with a negative direction and a correlation coefficient of 0,622. It is recommended to organise activities within the PKK (Family Welfare Movement) that invite experts in food safety to provide case studies on food safety, demonstrating healthy food processing practices together.

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Keywords: optimistic bias, food safety knowledge, foodborne disease

FSS 3rd IFRC 2024 058-050**Food Insecurity (FI) Instrumentation Review in Malaysia (FIIRM): A Systematic Review**

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The health and well-being of Malaysians can be negatively affected by disruptions to food security, particularly in low income households. Despite public assistance, this issue persists which may likely be due to the variability in measurement and under reporting of experience. Measuring food insecurity (FI) status can be achieved using reliable, valid, cultural and societal specific as well as cost effective instruments. In essence, the right and standardised instrument will gauge the population's food insecurity experience based on the frequency and severity, thus ensure achievable policy and effective public assistance. Therefore, this systematic review was conducted by collating available research in Malaysia aims to identify the most appropriately adapted FI instrument tool that suits the Malaysian context. The authors reviewed 30 publications, from a total of 2386 searches from scientific electronic bibliographic databases such as EBSCOhost, Elsevier, Emerald, Multidisciplinary Digital Publishing Institute (MDPI), Proquest, Publisher MEDLINE (PubMed), Science Direct, Scopus, Social Science Research Network (SSRN), SpringerLink, Oxford Academic, Web of Science, and Wiley Online Library, where ('food security' OR 'food insecurity' AND Malaysia) was used as the descriptor for all the databases. Majority of the difference instruments discovered, all of which were brief and easy to use, were developed in the United States. However, Food Agriculture Organisation (FAO) developed the recent global instrument named Food Insecurity Experience Scale (FIES) and that the present study showed that it is a cross culturally similar measurement instrument for delivering comparable FI data which has been used since 2014. It offers a unique chance to compare the prevalence of FI in various nations using just one metric. Modified FIES measurement in terms of languages, cultural and societal aspect may be helpful to evaluate food insecurity in sub urban, urban and rural regions. The study reviewed existing measurement instruments and discovered that researchers use unstandardised FI instruments in various studies to collect data. According to this review, the most recent appropriate adapted FI instrument that fits the Malaysian context would be the translated FIES to Malay language. The Malay version of FIES was cross culturally valid and reliable, but however must be according to cultural and societal differences. The authors suggest that further local and large scale research using the Malay version FIES are necessary. Besides, cultural and societal aspects should be taken into account in the adjustment of the instrument structure to ascertain the FI level in Malaysia. More effort is required, especially to develop standardised instrument which should be clear consistent and cost effective, to quantify FI frequency and severity in Malaysia accurately. This will result in a clear understanding, increase attentiveness to the prevalence of FI, exploration of novel strategies which includes, programme implementation, food security policy regulation for intervention and optimising effective assistance in the Malaysian community to cope with FI.

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Keywords: food security, food insecurity, Malaysia

FSS 3rd IFRC 2024 060-054**Food Security Challenges in Home-Based Cafe (HBC) at Terengganu Marine Parks: Implementation of Best Practices Food Security Framework**

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Driven by climate changes, natural disasters, market fluctuation, and food distribution system issues, small island communities face difficulties in assuring their food security, especially when food security in Malaysia is already at risk. Insufficient food resources in protected small islands cause difficulty for small-scale food business owners to sustain their food supply chain because of high dependence on imported food. Commonly, food security is covered at household levels and no study has so far been conducted on small-scale enterprises, mainly home-based cafes (HBC) that are steadily growing in rural tourism areas due to the economic recession triggered by Covid-19 pandemic. Through four pillars of food security theory, this study seeks to investigate the role of four pillars of food security (availability, accessibility, utilisation, and stability) in assuring HBC is food secure, explore food security challenges, and coping strategies. Qualitative approaches are applied by conducting semi-structured interviews among 30 HBC owners in Terengganu marine parks (Perhentian and Redang Islands). The data will be analysed using ATLAS.ti software. It is expected that all of food security pillars contribute to the enhancement of food security in HBC on small islands and poor food distribution systems might affect the food supply chain in HBC. Understanding food security in HBC on small islands might be helpful to sustain the food supply chain of the business and assist policymakers in developing a food security policy that correlates with the boundaries of the marine parks ecosystem.

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Keywords: food security, home-based cafe, marine park, small island, sustainability

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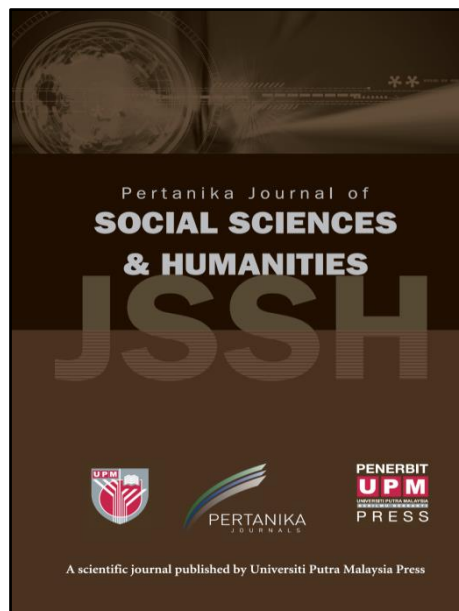
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: Assoc. Prof. Dr. Rabiha Sulaiman
: Assoc. Prof. Dr. Radhiah Shukri
: Dr. Nor Afizah Mustapha
: Dr. Muhammad Rezza Zainal Abidin
: Dr. Foong Han Lyn
: Dr. Mohd Rohaizat Abdul Wahab
: Mrs. Zaireen Zakaria
: Ms. Norhafizah Mohamad Noh

Finance Committee



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: Assoc. Prof. Dr. Rashidah Sukor
: Dr. Noor Azira Abd Mutalib
: Mr. Razali Abd. Rahman
: Mrs. Norlaili Ismail
: Ms. Nur Syafiqah Noorhadi
: Ms. Siti Fahana Mohd Ali Napiah
: Mr. Azizul Syahril Mohd Salleh (*BURSAR rep.*)
: Mrs. Siti Amira Shukor (*BURSAR rep.*)

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Assoc. Prof. Dr. Hazrina Ghazali (head)

: Assoc. Prof. Dr. Yaya Rukayadi
: Assoc. Prof. Dr. Farah Adibah Che Ishak
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: Dr. Siti Nurhayatikhairatun Mohd Sharif
: Dr. Wan Melissa Wan Hassan
: Mrs. Lilytahnani Rijela
: Mrs. Noorsafida Anuar
: Mrs. Siti Nurul Huda Sheikh Ramli
: Mrs. Wan Zarith Nattasha Zul Shamsuddin
: Ms. Nurhanim Mohd Hashim

Logistics Committee



Dr. Wan Zunairah Wan Ibadullah (head)

: Dr. Ahmad Haniff Jaafar
: Dr. Hanan Hasan
: Dr. Mohd Sabri Pak Dek
: Dr. Norhasnida Zawawi
: Dr. Nurul Hawa Ahmad
: Mr. Mohamad Nur Faizal Hamdan
: Mr. Muhamad Hilmi Al-Hijri Md Lazim
: Mr. Muhammad Hamzi Yahya
: Mr. Raheny Samian
: Mr. Rohaizat Zulkaply
: Mr. Ruzaini Tamin
: Mr. Shafarin Redzuan
: Mr. Syafiq Rabbani Mohd Hashim
: Mr. Zolkifli Johari

Sponsorship Committee



Ts. Dr. Rozzamri Ashari (head)

: Assoc. Prof. Dr. Maimunah Sanny
: Dr. Ahmad Fareed Ismail
: Dr. Norhidayah Suleiman
: Mr. Abdul Hadi Mat Amin
: Mr. Ahmad Safwan Setaffa
: Mr. Low Boon Khoon
: Mrs. Asmawati Mantali
: Mrs. Normala Abu Bakar
: Ms. Nor Shuhada Mohamad

Promotion Committee



Dr. Masni Mat Yusoff (head)

: Assoc. Prof. Ts. Dr. Ismail Fitry Mohammad Rashedi
: Dr. Nuzul Noorahya Jambari
: Dr. Siti Fatimah Mohamad
: Dr. Tan Tai Boon
: Mr. Marzum Zainawi
: Mrs. Fatimah Moktar
: Mrs. Siti Hajar Jelani
: Mrs. Umi Fahada Farouk Idnan
: Ms. Nur Syakirah Jasni
: Ts. Shahrul Hazman Shamsudeen (*PSPK rep.*)
: Mr. Ahmad Hisham Ayub (*PSPK rep.*)
: Mr. Aizat Maula Mohd Ibrahim (*PSPK rep.*)
: Mr. Azman Mohd (*PSPK rep.*)
: Mr. Hafizuddin Hamdzah (*PSPK rep.*)
: Mr. Kamarulnizam Kamal (*PSPK rep.*)
: Mr. Md Nasir Hussin (*PSPK rep.*)
: Mr. Mohammad Izrul Abdul Jabar (*PSPK rep.*)
: Mr. Mohd Shahrul Aziwan Md. Isa (*PSPK rep.*)
: Mr. Mozaid Idris (*PSPK rep.*)
: Mr. Muhamad Al-Wadud Mahmud (*PSPK rep.*)
: Mr. Muhamad Zaid Nor Akahbar (*PSPK rep.*)
: Mr. Muhammad Alif Akram Mohd Isnain (*PSPK rep.*)
: Mr. Muhammad Ezham Hussin (*PSPK rep.*)
: Mr. Muhammad Nur Zairi Mohd Nazari (*PSPK rep.*)
: Mr. Muhammd Hijazi Yahya (*PSPK rep.*)
: Mr. Noor Azreen Awang (*PSPK rep.*)
: Mr. Nur Mohamad Mohamad Syed (*PSPK rep.*)
: Mr. Redzuan Anjazi (*PSPK rep.*)
: Mr. Sabri Omar (*PSPK rep.*)
: Mrs. Marina Ismail (*PSPK rep.*)
: Mrs. Nurul Shafiza Borhanuddin (*PSPK rep.*)
: Ms. Saleha Haron (*PSPK rep.*)

Pre-Conference Committee



Dr. Nurul Shazini Ramli (head)

: Prof. Dr. Azizah Hamid
: Dr. Aliah Zannierah Mohsin
: Dr. Fatema Hossain Brishti
: Dr. Noor Hadzuin Nik Hadzir
: Dr. Nurul Izzah Khalid
: Dr. Sarina Lim Abdul Halim Lim
: Mr. Amir Zhafri Razali
: Mr. Mohamed Kidin
: Mr. Mohd Faizal Azwa Abdullah
: Mr. Muhammad Syafiq Nasrul
: Mrs. Marzieana Ab Rahman
: Mrs. Noratina Mohd Darus
: Mrs. Norhafiza Abdul Razak
: Mrs. Norliza Othman
: Mrs. Rosmawati Othman
: Mrs. Siti Khatijah Muhamad
: Mrs. Siti Fatma Othman
: Ms. Fizreena Umanan
: Ms. Nur Farahiyah Ashar
: Ms. Nurul Nadirah Zulkifli

FEEDBACK SURVEY

Please scan the QR code below, and kindly fill up the survey form for our future improvement.

The ten short survey questions will only take less than five minutes of your valuable time, but will greatly enhance the experience of our future participants, including you.

We thank you for your participation in the 3rd IFRC 2024, and sincerely hope that you have had a pleasant stay in Putrajaya, Malaysia.

Let's meet up again at the 4th IFRC!

Semoga kita berjumpa lagi!

