UTM
UNIVERSITI TEKNOLOGI MALAYSIA

2022

PROGRAMME BOOK

Japan's Agriculture & Food Technology and Innovation

22 - 24 February 2022,
Virtual Conference

IJAF 2022

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JAPAN'S AGRICULTURE & FOOD TECHNOLOGY AND INNOVATION 2022

IJAF 2022

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WELCOMING MESSAGES

DR. NICOLE LEONG HONG YENG

CHAIRPERSON, IJAF 2022

Ladies and Gentlemen,

It is my great pleasure to welcome you to the International Conference on Japan's Agriculture & Food Technology and Innovation (IJAF 2022). The conference focuses on Food and Nutrition Security, Sustainable Agriculture, Agritechnology & Innovation and Rice Cultivation. We have a total of 22 oral and poster presenters with 77 participants for both conference and workshop. The participants are coming from various countries, university, government agency, and industry working in the field of food and agriculture.

The IJAF 2022 is an event organized by Universiti Teknologi Malaysia, funded by Toshiba International Foundation and supported by Malaysia Convention & Exhibition Bureau (MyCEB), Malaysian Ministry of Tourism. Together, the conference will provide a platform for the exchange of authoritative views by leading researchers as well as industrial leaders in this exciting field. It will also provide a great opportunity to all participants to share latest research findings and innovative ideas in agriculture and food science with professionals from academia and industry. I am certain we will find the IJAF 2022 rewarding and enjoyable with opportunity for friendship and collaboration.

The organizing committee has faced a huge challenge of switching the mode of conference from hybrid mode to a full online conference in consideration to university advice due to increasing cases of COVID-19 in Malaysia. I wish to thank the organizing committee, for their dedication, time, effort, and the prompt response to such a sudden change. Without their hard work, we would not be able to create a total virtual environment in such a short notice to support your full participation.

I wish to express my heartfelt appreciation to our distinguished keynote speakers, invited speakers, paper presenters, participants and also to sponsors for their contribution in making IJAF 2022 a success. Special thanks to Professor Ts. Ali Selamat, Dean, Malaysia-Japan International Institute of Technology (MJIIT) and Prof. Dr. Masafumi Goto, MJIIT for their kind support to this conference.

Finally, I wish all participants to have a delightful and stimulating conference.

Thank you.

PREFACE

The International Conference on Japan's Agriculture & Food Technology and Innovation (IJAF 2022) is organized by Innovation Centre in Agritechnology for Advanced Bioprocessing, Universiti Teknologi Malaysia Pagoh Campus with the theme of food and nutrition security, sustainable agriculture, agritechnology & innovation and rice cultivation.

This virtual event is funded by the Toshiba International Foundation and supported by Malaysia Convention & Exhibition Bureau (MyCEB), Malaysian Ministry of Tourism.

The objectives of this conference are:

1. To promote international understanding of agriculture & food technology and innovation development in Japan and Malaysia.
2. To encourage the research collaboration between Japan, Malaysia and other countries in agriculture & food technology and innovation.
3. To create a platform for researchers and industry practitioners to exchange their research findings and experience in the field of agriculture & food technology and innovation.

This conference features outstanding keynote speakers including Prof. Hiroshi Nabetani, Prof. Kazuei Ishii, Prof. Sheng Zhou, Prof. Jean W H Yong, Prof. Jiří Jaromír Klemeš and Dr. Kamolchanok Umnajkitikorn.

On behalf of the Organizing Committee, we would like to express our thanks to all participants for joining IJAF 2022.

PROGRAMME TENTATIVE

Day 1: 22 February 2022, Tuesday

TIME	PROGRAMME
08:00 – 09:00	Registration
08:45 – 09:00	Safety Briefing
09:00 – 09:10	Opening Speech
09:10 – 09:15	Welcoming Speech
09:15 – 09.55	Keynote by **Prof. Hiroshi Nabetani,** Faculty of Food and Nutrition, Tokyo Kasei University, Japan *Title: Food Research for Achievement of Sustainable Development Goals (SDGs) (Pre-recorded)*
09:55 – 10:35	Keynote by **Prof. Dr. Sheng Zhou,** Shanghai Academy of Agricultural Sciences, China *Title: Methane emissions from paddy fields and innovative mitigation technologies (Pre-recorded)*
10:35 – 12:30	**Session I (Chaired by Ts. Dr. Cheng Kian Kai)**
10:35 – 10:50	*"Optimization of extraction parameter for antioxidant from Pandanus amaryllifolius by response surface methodology"* by **Mr. Vijehy A/L Balakrishnan,** Institute of Bioproduct Development, Universiti Teknologi Malaysia (virtual)
10:50 – 11:05	*"The scavenging activity of encapsulated EBN hydrolysates using different combination of polysaccharides as wall material by spray drying"* by **Ms. Noor Hazwani Salleh,** Universiti Teknologi Malaysia (virtual)
11:05 – 11:20	*"Phytochemicals from Beilschmiedia Species (Lauraceae) and their Potential Biological Activities for Future Drug Development"* by **invited speaker Dr. Wan Mohd Nuzul Hakimi Wan Salleh,** Department of Chemistry, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, Malaysia

PROGRAMME TENTATIVE

Day 1: 22 February 2022, Tuesday

TIME	PROGRAMME TENTATIVE
11:20 – 11:35	*"Phytochemicals from Piper caninum as potential inhibitors against dengue NS2B-NS3 protease enzyme"* by **Ms. Nur Farhana Binti Mustafa,** Universiti Teknologi Malaysia
11:35 – 11:50	*"Bioactive compounds from Hibiscus rosa-sinensis as potential anti-inflammatory agent"* by **Dr. Muhammad Helmi Bin Nadri,** Universiti Teknologi Malaysia
11:50 – 12:05	*"Determination of physiochemical characterization and bioactivities of EPS from Lactobacillus sp. with potential nutraceuticals benefit"* by **Ms. Aina Nabilah Faizah Binti Ahmad Bustamam,** Universiti Teknologi Malaysia
12:05 – 12:20	*"Nutrient density index for vegetables and fruits in Malaysia"*, by Ts. **Dr. Nicole Leong Hong Yeng,** Universiti Teknologi Malaysia
12:30 – 14:00	Break and poster session
14:00 – 15:30	**Session II (Chaired by Dr. Muhammad Helmi bin Nadri)**
14:00 – 14:15	*"Potential use of phytochemical extract as prebiotic compounds"* by **Dr. Rosnani Hasham**, Universiti Teknologi Malaysia
14:15 – 14:30	*"Metabolomics Study of the Effects of Lipopolysaccharides and Momordica charantia in RAW264.7 Cells"* by **Ts. Dr. Cheng Kian Kai,** Universiti Teknologi Malaysia
14:30 – 14:45	*"Optimization and Characterization of Crude Hyaluronic Acid Extraction from Eggshell Membrane by Enzymatic Hydrolysis"*, by **Ms. Wong Rui Fang,** Universiti Teknologi Malaysia
14:45 – 15:00	*"The effect of enzymes treatment on the oil yield and squalene content in virgin palm oil using microwave-assisted enzyme aqueous extraction method",* by **Ms. Siti Nor Azlina Binti Abd Rashid,** Universiti Teknologi Malaysia

PROGRAMME TENTATIVE

Day 1: 22 February 2022, Tuesday

TIME	PROGRAMME TENTATIVE
15:15 – 15:30	*"Anti-obesity property of saponins rich fraction of Momordica charantia"* by **Ms. Nurul Dalila Binti Abdul Rahim,** Universiti Teknologi Malaysia Pagoh
15:30 – 16:10	Keynote by **Prof. Dr. Hab Jiří Jaromír KLEMEŠ,** Centre of Excellence "Sustainable Process Integration Laboratory – SPIL", NETME Centre, Faculty of Mechanical Engineering, Brno University of Technology - VUT Brno, Czech Republic. *Title: Smart Agriculture Challenges to Reduce Environmental Footprints: Towards Smart and Precision Agriculture*
16:10	End of session

PROGRAMME TENTATIVE

Day 2: 23 February 2022, Wednesday

TIME	PROGRAMME
08:00 – 09:00	Registration
09:00 – 09:40	Keynote by **Dr. Kamolchanok Umnajkitikorn,** School of Crop Production Technology, Institute of Agricultural Technology, Suranaree University of Technology, Thailand *Title: Various methods in delaying stress induced-senescence in crop plants (live)*
09:40 – 10:20	Keynote by **Prof. Dr. Kazuei Ishii,** Graduate School of Engineering, Hokkaido University, Japan *Title: The Current Situation of biomass utilization for agriculture in Japan (live)*
10:20 – 12:30	**Session I (Chaired by Ts. Dr. Nor Zalina binti Othman)**
10:20 – 10:35	*"An Experience on implementation of Leaf Color Chart (LCC) Apps on paddy field in Malaysia",* by **Ms. Raudah Binti Talib,** Department of Agriculture, Malaysia
10:35 – 10:50	*"Application of Deep learning in Precision Agriculture: Technology and Trends"* by **invited speaker Assoc. Prof. Dr. Mohd Fauzi Othman,** Malaysia- Japan International Institute of Technology (MJIIT), Universiti Teknologi Malaysia
10:50 – 11:05	*"EM technology in Sustainable Agriculture"* by **invited speaker Mr. Jeff Tai,** Zenxin Agriculture Malaysia
11:05 – 11:20	*"Marine genetic resource and bioprospecting of Gamat as the truly Malaysian natural heritage"* by **invited speaker Ts. Gs. Dr. Kamarul Rahim Bin Kamarudin,** Centre of Research for Sustainable Uses of Natural Resources (SUNR), Universiti Tun Hussein Onn Malaysia (UTHM)

PROGRAMME TENTATIVE

Day 2: 23 February 2022, Wednesday

TIME	PROGRAMME TENTATIVE
11:20 – 11:35	*"Waste Plant-Based as a Catalyst for Food Waste Composting Process"* by **Ts. Halimatus Sa'adiah Binti Mohamed Raimi,** Universiti Tun Hussein Onn Malaysia Pagoh
11:35 – 11:50	*"Syntropic agroforestry: An upgrade for agroforestry in Malaysia towards sustainable development",* by **Mr. Wan Mohd Ridhwan Bin Wan Mohd Hanizan,** Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia
11:50 – 12:05	*"Different Microbial Inoculum on The Spent Mushroom Medium Composting"* by **Dr. Siti Nazrah Binti Zailani**, Universiti Malaysia Perlis
12:05 – 12:20	*"Mutualistic relationship is a critical factor for microbial coexistence"* by **Dr. Abd Rahman Jabir Bin Mohd Din,** Universiti Teknologi Malaysia
12:30 – 14:00	Break and poster session
14:00 – 15:30	**Session II (Chaired by Ts. Dr. Nicole Leong Hong Yeng)**
14:00 – 14:15	*"Use of EM technology in intensive shrimp aquaculture: An effective research-based tool to enhance sustainability"* by **Dr. Gustavo Pinoargote,** EM Research Organization Inc., USA
14:15 – 14:30	*"Changes in nutrition, enzyme activity and microbial community after fungi residues of Stropharia rugosoannulata addition into soil",* by **Dr. Jinjing Zhang,** Shanghai Academy of Agricultural Sciences, China
14:30 – 14:45	*"Production of GABA-rich shoyu 醤油 using the trio of Aspergillus oryzae, Bacillus cereus and Tetragenococus halophilus"* by **invited speaker Dr. Wan Abd Al-Qadr Imad Bin Wan Mohtar,** Institute of Biological Sciences, Faculty of Science, University Malaya, Malaysia

PROGRAMME TENTATIVE

Day 2: 23 February 2022, Wednesday

TIME	PROGRAMME TENTATIVE
14:45 – 15:00	*"Isolation and identification of acetic acid bacteria for single stage fermentation of pineapple juice for vinegar production"* by **Dr. Nor Zalina Othman,** Innovation Centre in Agritechnology for Advanced Bioprocessing, Universiti Teknologi Malaysia
15:00 – 15:15	*"Development of Monascus pigment via solid state fermentation"* by **invited speaker Assoc. Prof. Ts. Dr. Farhan binti Mohd Said,** Universiti Malaysia Pahang
15:15 – 15:55	Keynote by **Prof. Dr. Jean W. H. Yong,** Department of Biosystems and Technology, Swedish University of Agricultural Sciences, Alnarp, Sweden *Title: Biostimulants and the next Green Renaissance?*
15:55	Closing speech and end of session

SCIENTIFIC COMMITTEE MEMBERS

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KEYNOTE SPEAKER

PROF. HIROSHI NABETANI

Tokyo Kasei University, Japan

BIOGRAPHY

Professor Hiroshi Nabetani is a professor at the Department of Food and Nutrition at Tokyo Kasei University. His career began as researcher and had been appointed as director general at National Agriculture and Food Research Organization (NARO). He has more than 20 years of experience at National Food Research Institute, NARO under the Ministry of Agriculture, Forestry and Fisheries, Japan. His research interests include food engineering, food processing, chemical engineering, and membrane science. Notably, Professor Nabetani holds professional memberships including The Japanese Membrane Society, The Japanese Society for Bioscience, Biotechnology, and Agrochemistry and Membrane Research Circle of Food. He has published more than 100 research papers and received an award from Japan Society for Food Engineering for his work on membrane separation systems.

KEYNOTE SPEAKER 1

Food Research for Achievement of Sustainable Development Goals (SDGs)

Hiroshi Nabetani
Faculty of Food and Nutrition, Tokyo Kasei University
E-mail: nabetani-h@tokyo-kasei.ac.jp

Abstract
The Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development were adopted by world leaders in 2015 at an historic UN Summit, and officially came into force in 2016 1). SDGs are consisting of 17 goals and we are supposed to achieve each goal and target by 2030. The 17 goals include “No Poverty”, “Zero Hunger”, “Good Health and Well-being”, “Clean Water and Sanitation”, “Affordable and Clean Energy”, “Industry, Innovation, and Infrastructure”, “Responsible Consumption and Production”, “Climate Action”, “Life below Water”, “Life on Land” and so on, which are directly or indirectly related with food industry. Therefore, we are encouraged to further promote research subjects which will contribute to achievement of SDGs.

Recently, meat analogues which are produced from plant-based resources such as soy bean are attracting a great deal of attention, especially in European countries and the US. Once the plant-based resources are converted into meat, the nutritional value is reduced by a factor of 5 to 10. Therefore, direct utilization of plant-based resources is supposed to be able to support more population than utilization of meat. Production of meat analogue from plant-based resources might be an effective measure to achieve SDGs. In addition, elucidation of superior functionalities of plant-based resources such as soybean might be another effective measure to contribute to achievement of SDGs. Japanese people have been utilizing soybean as food, not as feed, for more than 2,000 years. During this long period, Japanese people have developed excellent food culture which can prepare meals with high nutritional values and attractive taste by using plant-based resources such as soybean. Now, some researchers some researchers in Japan are trying to elucidate health-promoting benefit of soybean. Results of these research works will lead to more efficient utilization of plant-based resources and contribute to achievement of SDGs

In this paper, research works for development of innovative processes which are conducted in Japan, and will contribute to achievement of SDGs, will be introduced.
1. https://www.un.org/sustainabledevelopment/

Keywords: SDGs, meat analogues, plant-based resources, functionality

KEYNOTE SPEAKER

PROF. SHENG ZHOU

Shanghai Academy of Agricultural Sciences, China

BIOGRAPHY

Prof. Sheng Zhou is a project leader at the Department of Eco-environmental Protection Research Institute, Shanghai Academy of Agricultural Sciences. His research interests include research and technology development in the fields of agricultural green house gases (GHGs) mitigation and carbon sequestration, non-point source pollution reduction, agro-waste recycling and farmland conservation and restoration, focusing particularly on the construction of low-carbon rice production system in paddy field. His expertises are in the field of soil science, environmental science, plant fertilization, animal and human nutrition. He is a member of the Scientific Committee in Shanghai Society of Soil and Fertilizer and he was a visiting scientist at the Helmholtz for Environmental Research, Germany.

KEYNOTE SPEAKER 2

Methane Emissions from Paddy Fields and Innovative Mitigation Technologies

Prof. Sheng Zhou
Shanghai Academy of Agricultural Sciences, China
Email: zhous@outlook.com

Abstract
Paddy fields are considered a major anthropogenic source of atmospheric methane (CH4) due to flooding soil conditions during the cultivation period. There are various rice farming systems in China, including single cropping rice, double cropping rice, year-round flooded paddy fields (winter paddy fields). Different systems of rice production appear different patterns of CH4 emissions. There are several innovative mitigation technologies to reduce CH4 emissions, such as low emission rice varieties, water management, straw treatment out of the field, etc. The use of water management was considered an effective tool in mitigating CH4 from the paddy field. Water management, such as alternate wetting and drying (AWD) and mid-season drainage, can decrease CH4 emissions compared with continuous flooding. The dry cultivation mode (D mode) of rice production can reduce CH4 emission more effectively. Still, it needs to be combined with special drought-resistance rice varieties to ensure no yield reduction. An innovative rice variety called water-saving and drought-resistance rice (WDR) has similar yield potential with ordinary rice varieties but requires much less water. Dry cultivation of WDR varieties (called D-WDR mode) can significantly mitigate CH4 emission from paddy fields while maintaining rice yield in rice-cultivated regions.

KEYNOTE SPEAKER

PROF. DR. JIŘÍ JAROMÍR KLEMEŠ,
Brno University of Technology, Czech Republic

BIOGRAPHY

Professor Jiří Jaromir Klemes is the Head of the Centre for Process Integration and Intensification - CPI2, University of Pannonia, Veszprem, Hungary. For the last 20 years, Professor Jiří has been leading the research and managerial post as a Senior Project Officer, Honorary Reader and Senior Lecturer at the Department of Process Integration at UMIST, The University of Manchester and the University of Edinburgh, UK. He has comprehensive industrial experience in process integration, sustainable technologies and renewable energy. He has successfully managed more than 96 major EC, NATO, bilateral and UK Know-How projects with an overall research funding attracted over 42 M€. Professor Jiří is the Co-Editor-in-Chief of Journal of Cleaner Production, Editor in Chief Cleaner Technologies and Engineering and Cleaner Chemical Engineering; Subject Editor of Energy; Regional Editor for Europe for Applied Thermal Engineering and Clean Technologies and Environmental Policies. He is also the Editor of Resources, Conservation and Recycling; Theoretical Foundations of Chemical Engineering and other journals. He is the Chair of CAPE-WP (Computer Aided Process Engineering Working Party) of European Federation of Chemical Engineering.

KEYNOTE SPEAKER 3

Smart Agriculture Challenges to Reduce Environmental Footprints: Towards Smart and Precision Agriculture

Jiří Jaromír Klemeš[a],*, Yee Van Fana, Peng Jiang[b]
[a]Sustainable Process Integration Laboratory – SPIL, NETME Centre, Faculty of Mechanical Engineering, Brno, University of Technology - VUT Brno, Technická 2896/2, 616 00 Brno, Czech Republic, *Email: jiri.klemes@vutbr.cz*
[b]Department of Industrial Engineering and Engineering Management, Business School, Sichuan University, 610064, Chengdu, China

Abstract
Smart Farming is the new term in the agriculture sector, aiming to transform the traditional techniques into innovative solutions based on Information Communication Technologies (ICT). It has a great potential to increase food production and solve the food shortage crisis worldwide. Technologies as Unmanned Aerial Vehicles (UAVs), Unmanned (Autonomous) Ground Vehicles (UGVs), Image Processing, Machine Learning, Big Data analysis, Cloud Computing, blockchain, and Wireless Sensor Networks (WSNs) are expected to bring significant improvement in this area. Smart agriculture (SA) incorporates smart management in many cases based on IoT (Internet of Things) based advanced technologies and solutions to improve operational efficiency, maximise yield, and minimise wastage through real-time field data collection, data analysis, and deployment of control mechanisms. Diverse IoT-based applications such as variable rate technology, precision farming, smart irrigation, innovative greenhouse, field monitoring and disease prediction can enhance agricultural processes. IoT can address agriculture-based issues and increase the quality and quantity of agriculture. Smart agriculture's total addressable market has grown from USD 13.7 billion (109) in 2015 to 26.8 billion by 2020, with a compound annual growth rate (CAGR) of 14.3% and robust escalating growth is expected to come. However, it is not only increasing investment. Behind the need for SA are (i) Emphasis on Enhancing Efficiency, (ii) Need for Water Conservation, (iii) Preventing Climate Change, (iv) fundamentally reducing the waste and optimising the waste treatment chains towards the Circular Economy. All of them should be evaluated and quantified, and environmental footprints are offering beneficial environmental tools. The future progress should consider, besides the others: (a) Autonomous Farming, (b) Remote monitoring systems for autonomous farming, (c) Equipment enhancement with robots penetration, implementation of drones and satellites, (d) Extensions of Precision Farming, and (e) Integration of renewable energy – e.g. Agrivoltaics.

The plenary talk attempts to sum up the opportunities and requirements, as well as consequences assessing potential benefits, requirements and challenges. The main purpose is to initiate the discussion of researchers from various fields as agriculture, ecology, electrical, mechanical and chemical engineering, as well as IT, aeronautics and space experts.

KEYNOTE SPEAKER

DR. KAMOLCHANOK UMNAJKITIKORN

Suranaree University of Technology, Thailand

BIOGRAPHY

Dr. Kamolchanok Umnajkitikorn is a lecturer at School of Crop Production Technology, Suranaree University of Technology, Thailand. She received her Ph.D. in Horticulture and Agronomy from University of California, Davis, USA. Her research interests include plant physiology, biochemistry, molecular biology, agriculture technology, plant tissue culture, plant breeding, viticulture technology, weed management. She was a visiting scholar at the Graduate School of Science and Engineering, Kagoshima University. Her current research includes improving drought tolerance in rice and bean by using nitrogen balance, genome editing in mungbean for resistance starch type 2, discovering the mechanism of chloroplast vesiculation in protein turnover and effect of light quality of productivity and bioactive compounds of cannabis plants.

KEYNOTE SPEAKER 4

Various Methods in Delaying Stress Induced-Senescence in Crop Plants

Kamolchanok Umnajkitikorn*
School of Crop Production Technology, Institute of Agricultural Technology, Suranaree University of Technology, Nakhon Ratchasima, 30000, Thailand.
*Corresponding Author: *Email: k.umnajkitikorn@sut.ac.th*

Abstract
Water deficit and elevated CO_2 condition is threatening the future crop productivity. Leaf yellowing and cellular damages are the most severe stress-induced symptoms of various plant species. Various methods have been used to delay the stress-induced senescence. Three interesting strategies will be discussed in this presentation. First, delaying chloroplast degradation: *chloroplast vesiculation* (*CV*) gene was silenced by RNA interference to minimize the expression of this gene under stress condition. CV-silencing promoted water deficit tolerance and reduced dismantling chloroplast ultrastructure under water deficit and elevated CO_2. CV-silenced rice also possesses the higher nitrogen assimilation under, together with higher nitrate reductase activity. Second, using fertilizer management: elevated level of nitrogen (N) in the fertilizer acted as the nitric oxide (NO) accumulation inducer. Elevated N enhanced antioxidant defense mechanism and decrease reactive oxygen species accumulation via the NO-associated mechanisms, as well as the maintenance of chlorophyll content and net photosynthetic rate. Third, using plant growth promoting bacteria (PGPB): *Bradyrhizobium* sp. strain SUTN9-2 contained ACC deaminase which be able to modulate stress-induced ethylene production in plants. Moreover, the enhanced strains of SUTN9-2 were also increase the ability of stress alleviation. These strategies can be selectively used in the appropriate area and situation for sustainable agriculture in the future.

Keywords: Drought, Chloroplast, Nitric oxide, Plant growth promoting bacteria, Rice

KEYNOTE SPEAKER

PROF. KAZUEI ISHII,
Hokkaido University, Japan

BIOGRAPHY

He is currently a professor at the Faculty of Engineering, Hokkaido University, Japan. His research interests are renewable energy, final disposable system biomass, recycling system, soil and groundwater pollution and waste management. Current research includes soil and groundwater contamination and remediation, final disposal system of municipal solid waste, and development of biomass utilization systems such as biogas and biosolid fuels. He has published more than 150 articles in journals, conference proceedings, book chapters and books. He is a committee member of Japan Society of Material Cycle and Waste Management.

KEYNOTE SPEAKER 5

The Current Situation of Biomass Utilization for Agriculture in Japan

Kazuei Ishii
Professor, Faculty of Engineering, Hokkaido University, Japan.
Email: k-ishii@eng.hokudai.ac.jp

Abstract
Japanese energy and agricultural policies are changing toward carbon net zero society and green agriculture, meaning that proper cycles of carbon, nitrogen and phosphors are required. I'll present the current situation of biomass utilization in the field of agriculture in Japan: the objective biomasses are food waste, cow manure, and sewage sludge: the objective technologies are composting and anaerobic digestion. New innovative utilization idea of nitrogen in the fermentation residue will be discussed in my lecture.

KEYNOTE SPEAKER

PROF. JEAN W. H. YONG,
Swedish University of Agricultural Sciences, Sweden

BIOGRAPHY

Professor Jean W. H. Yong is one of the leading experts in plant science and biochemistry. He is currently based in southern Sweden where he is the Professor in Horticulture at the Department of Biosystem and Technology, Sveriges Lantbruks Universitet (SLU) or Swedish University of Agricultural Sciences, Sweden. He has a fairly wide research interests in biological and environmental sciences including phytohormones, metabolites, plant-microbe interaction, plant-animal co-cultivation and circular bioeconomy-related research. Over the last 25 years, he has developed useful linkages and extensive network globally including the private and government sectors. He is the IUCN SSC Mangrove Red List Authority Coordinator, an advisor to Plantlink and Group Leader of the Horticultural Production Physiology at SLU. Professor Jean W.H. Yong is also an editor for the Nordic Journal of Botany and PloS One. He has published over 150 articles in various journals, conference proceedings, book chapter and books.

KEYNOTE SPEAKER 6

Biostimulants and The Next Green Renaissance?

Jean. W. H. Yong Ph.D. (Australian National University)
Department of Biosystems and Technology, Swedish University of Agricultural Sciences, Alnarp, Sweden,
Email: jean.yong@slu.se

Abstract

Global food production needs a comprehensive overhaul in terms of sustainability, with better approaches to producing safe and healthy food, while leaving little footprint. In line with UN SDG goals, a reduction in chemical fertilizer and pesticide use is required, in order to stop the serious pollution, dwindling finite resources (e.g. phosphorus) and loss of biodiversity. Intimately linked to plants and soils, insects and microorganisms are critically important to both natural ecosystems and agroecosystems. The reliability of cultivation is also disrupted by increasing extreme weather, attributed in part to climate change. Hence, alternatives to strengthen our plants need to be explored urgently that harness nature's own biological components. From a sustainability perspective, organic farming offers an eco-friendly cultivation system that minimizes agrochemicals and producing food with little or no environmental footprint. However, organic agriculture's biggest drawback is the generally lower and variable yield in contrast to conventional farming. Compatible with organic farming, the selective use of biostimulants can close the apparent yield gap between organic and conventional cultivation systems. Biostimulants are defined as natural microorganisms (bacteria, fungi) or biologically active substances that are able to improve plant growth and yield through several processes. Biostimulants are derived from a range of natural resources including organic materials (composts, seaweeds, coconut water), manures (earthworms, poultry, fish, insects) and extracts derived from microbes, plant, insect or animal origin. The integration of biostimulants with other compatible substrates into any cultivation represents added environmental and public health benefits of providing a waste management solution (circular bioeconomy). The current trend is indicative that a mixture of biostimulants is generally delivering better growth, yield and quality rather than applying biostimulant individually. When used correctly, biostimulants are known to help plants cope with stressful situations like drought, salinity, extreme temperatures and even certain diseases. More research is needed to understand the different biostimulants, key components, and also to adjust the formulations to improve their reliability in the field. With greater mechanistic clarity, designing purposeful combinations of biostimulants offer a promising, innovative and sustainable strategy to supplement and replace agrochemicals in the near future.

INVITED SPEAKER 1

Phytochemicals from *Beilschmiedia* Species (Lauraceae) and Their Potential Biological Activities for Future Drug Development

Wan Mohd Nuzul Hakimi Wan Salleh*
Department of Chemistry, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak, Malaysia
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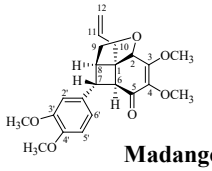
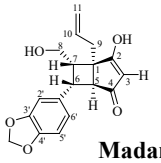
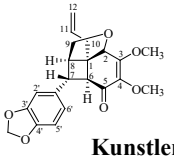
Abstract
Secondary metabolites from plants possess medicinal potentials which are active against many diseases. Before the advent of modern analytical techniques for the screening of plant actives, the traditional plants have been used primitively to alleviate symptoms of illnesses such as stomach ache, toothache, body pain and inflammation, diarrhea, malaria, typhoid, and diabetes. Therefore, the present study aimed to examine the phytochemistry and bioactivities of several *Beilschmiedia* species collected from Malaysia. Purification of the extracts of *Beilschmiedia* species yielded various types of compounds such as neolignans, lignans, triterpenes, and alkaloids, as well as two new neolignans, madangones A and B, and two new phenanthrene alkaloids, beilschglabrines A and B. Bioactivities including antioxidant, acetylcholinesterase, and anti-inflammatory activities were also investigated. Madangone B (IC_{50} 70.3 µM) was found to have the strongest DPPH assay, beilschglabrine A displayed the best acetylcholinesterase (IC_{50} 50.4 µM), while syringaresinol gave the best activity in lipoxygenase (IC_{50} 21.0 µM) assay. Conclusively, the idea of pushing natural products' research on drug discovery and development requires constant update and well-documented literature, as well as their potential in drug development, efficient delivery of drugs, and therapeutic trial.



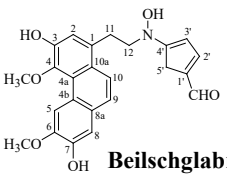
Madangone A
DPPH: IC_{50} 73.5



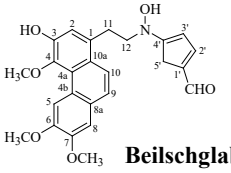
Madangone B
DPPH: IC_{50} 75.5 uM
COX-2: 27.4 uM



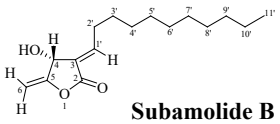
Kunstlerone
DPPH: IC_{50} 68.7



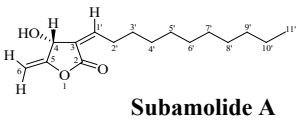
Beilschglabrine A
AChE: IC_{50} 50.4 uM



Beilschglabrine B
AChE: IC_{50} 84.6 uM



Subamolide B
LOX: IC_{50} 5.5 uM



Subamolide A
LOX: IC_{50} 5.1 uM

Keywords: *Beilschmiedia*; Lauraceae; phytochemistry; neolignan; alkaloid; inflammatory

INVITED SPEAKER 2

Application of Deep learning in Precision Agriculture: Technology and Trends

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Abstract
Farmers and researchers are all exploring on ways to reduce the amount of human labour required in agriculture. One of such ways is by transforming agriculture into a learning system which has become increasingly smarter by implementing deep learning as the key information to improve resources. Deep learning is a form of machine learning method based on artificial neural network principles and inspired by the structure of the human brain. It is regarded as a promising multifunctional tool for image processing, big data analysis and object detection in unlabeled and unstructured data. Deep learning networks that do automatic feature extraction without the need for human interaction offer a substantial advantage over earlier techniques. The goal of this research is to look into the use of deep learning in the agricultural area, depending on current technology and trends. Deep learning technology, in general, produces accurate predictions for complicated and uncertain things. It has recently become more widely employed in the said area, where it is used for variety recognition, disease detection, yield prediction, quality detection and growth monitoring. Furthermore, with the use of high technology sensors, analysis tools and image annotation techniques, example given demonstrates a method for enhancing crop yields and supporting management decisions. Furthermore, it will go through the implementation of deep learning in agriculture, as well as the models and frameworks that are utilized, the data used, and the overall performance outcomes. Finally, the current obstacles and future prospects of deep learning in agriculture will be presented in this study.

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INVITED SPEAKER 3

Production of GABA-rich *shoyu* 醤油 using the trio of *Aspergillus oryzae*, *Bacillus cereus* and *Tetragenococus halophilus*

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Abstract
The non-protein amino acid gamma-aminobutyric acid (GABA) has been found to help lower blood pressure, boost the immune system, and fight hypertension. The development of medicinal and functional foods enriched with GABA has been widely pursued, especially utilising fermentation techniques, due to its various physiological effects. GABA has a lot of promise for use in functional food development, especially in fermented foods. During two-stage *koji-moromi* soy sauce manufacturing, soy sauce, a traditional Malaysian liquid fermented food, has potential as a GABA-enriched condiment. A study on native Malaysian soy sauce '*kicap'* that can be used in Japanese *shoyu* '醤油' was performed. In liquid-state fermentation, the trio of *A. oryzae* (AO), *B. cereus* (BC), and the recently discovered *Tetragenococcus halophilus* KBC (TH) improved soy sauce fermentation. The influence of molasses (5, 10, and 20%) and wheat flour type (organic-WFO and commercial-WFC) on the *koji-moromi* formulation for efficient -aminobutyric acid (GABA) production was investigated. When compared to *koji* -WFC (13 mg/L), the *koji* -WFO produced more GABA (1290 mg/L). The *koji* -WFO produced higher GABA (1290 mg/L) compared to *koji* -WFC (13 mg/L). In the initial moromi mixture, 2 × 10 − 4 mL of BC inoculum containing 5–20% of molasses was added and replaced the same amount with TH in the second trial. Subsequently, the moromi was mixed with 1 × 10 − 4 mL of BC and TH, which shortened the 60-day *moromi* process to 30 days. Meanwhile, BC- *moromi* cultured in 20% molasses generated significantly lower GABA (118 mg/L) production compared to other percentages, however the concentration boosted for TH- *moromi* in 20% molasses (159 mg/L). The combination of BC-TH percentages (5%–20%) gave significantly lower GABA (83–137 mg/L) than the singular 20% TH treatment. The results promote the use of TH in producing high-GABA soy sauce.

Keywords: *Koji*; *Moromi*; Soy sauce; GABA; *Shoyu;* Superfood, Future Foods

ORAL PRESENTATIONS

ORAL PRESENTATIONS

ORAL PRESENTATIONS

ORAL PRESENTATION 1

Optimization of Extrac tion Parameter for Antioxidant Activity from *Pandanus amaryllifolius* by Response Surface Methodology

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Abstract
The addition of natural antioxidants in refined bleached deodorized (RBD) palm olein has less adverse effect compared to synthetically made antioxidant. Previous studies were successfully carried out on the extraction of natural antioxidants' from *Pandanus amaryllifolius* (Pandan leaves) but no study was carried out on the optimization of extraction parameter especially using green technology extraction such as microwave assisted extraction (MAE). Thus, this study aimed to optimize the extraction parameter for high antioxidant activity from Pandan leaves using a response surface methodology (RSM). The parameters investigated were extraction microwave power (350-450 Watt), extraction temperature (70-88 °C) and extraction time (10-20 min). A central composite design (CCD) was applied to optimize the MAE in this study, which consist of 20 experimental runs. The antioxidant activity from Pandan leaves were evaluated in terms of capacity to scavenge 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radicals. The results of RSM showed that the highest extraction efficiency for antioxidant activity was obtained at 400 Watt, 10 minutes, and 70 °C. Under optimum conditions, the corresponding values for antioxidant activity was 95%. Comparison of predicted and observed data through the chi-square (X^2) values demonstrated that RSM model was useful for predicting responses. As a conclusion, the optimization of extraction parameter of Pandan leaves using MAE may provide useful experimental result prior to the development of natural antioxidant that can be used for palm oil and food industry.

Keywords: *Pandanus amaryllifolius*, optimization, extraction, antioxidant,RSM

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ORAL PRESENTATION 2

The Scavenging Activity of Encapsulated EBN Hydrolysates Using Different Combination of Polysaccharides as Wall Material by Spray Drying

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Abstract

Encapsulation process has been widely applied in food industry to improve its properties and stability. However, suitable type of wall material needs to be studied and analyzed. This research aims to evaluate the influences using different combination polysaccharides as wall material on the encapsulation process of edible bird's nest (EBN) hydrolysates based on its scavenging activity. 3 % w/v of EBN hydrolysates was spray dried with 10 % w/v maltodextrin (MD) as a control followed by combination of 9 % MD and 1 % carboxymethyl-cellulose (CMC) and combination of 9.95 % MD and 0.05 % xanthan gum (X) at the same ratio of volume. The recovery yield, scavenging activity, moisture content and morphology of encapsulated EBN hydrolysates were evaluated. EBN hydrolysates produced the highest yield when encapsulated with 10 % w/v MD and the lowest yield when encapsulated with combination of 9 % w/v MD and 1 % w/v CMC while the DPPH (1,1-diphenyl-2-picrylhydrazyl) scavenging activity analysis results showed the highest when encapsulated with combination of 9.95 w/v % MD and 0.05 w/v % X and the lowest when encapsulated with 10 % w/v MD. EBN hydrolysates contain the least moisture content when encapsulated with 9.95 w/v % MD and 0.05 w/v % X. However, the morphology of encapsulated EBN hydrolysates were depending on the type of wall material used as it affects the spray drying process. Thus, different concentrations of MD and the presence of other polysaccharides can affect the recovery yield, scavenging activity, moisture content and morphology of encapsulated EBN hydrolysates.

Keywords: scavenging activity, edible bird's nest, hydrolysates, encapsulation, spray drying

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ORAL PRESENTATION 3

Phytochemicals from *Piper Caninum* as Potential Inhibitors Against Dengue NS2B-NS3 Protease Enzyme

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Abstract
Piper caninum, locally known as “cabai hutan" in Malaysia belongs to the Piperaceae family. Traditionally, *Piper* species are used as a treatment for hoarseness and as a tonic after childbirth. Several phytochemicals found in *P. caninum* include stilbene, flavonoids, phenolic acid amides, alkaloids and bornyl hydroxycinnamic esters. Besides, *P. caninum* was reported to have anti-oxidant, anti-microbial, anti-tyrosinase and anti-bacterial activities. Five phytochemicals were selected from *P. caninum* which were (+)-bornyl p-coumarate, bornyl caffeate, cepharadione A, N-cis-feruloyl tyramine, and safrole. To date, there are no reports on potential anti-dengue activity of these phytochemicals. Therefore, the objective of this study was to evaluate anti-dengue activity of phytochemicals from *P.* caninum. Molecular docking was used to predict binding energy and binding interaction between phytochemicals and NS2B-NS3 protease. Drug-likeness and pharmacokinetics properties of these phytochemicals were further analysed using the SwissADME server. From the docking analysis, cepharadione A had strong interaction with NS2B-NS3 protease enzyme of dengue virus with binding energy of -8.4 kcal/mol which comparable to quercetin as reference compound (-8.1 kcal/mol). Analysis of pharmacokinetics properties and drug-likeness prediction showed that this phytochemical had good pharmacokinetics properties and its complies with the Lipinski’s Rule of Five. The results of this study indicate the potential of cepharadione A as an anti-dengue agent which warrants *in vitro* validation.
Keywords: Dengue virus, NS2B-NS3 protease enzyme, *Piper caninum*, molecular docking

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ORAL PRESENTATION 4

Bioactive Compounds from *Hibiscus Rosa-Sinensis* as Potential Anti-Inflammatory Agent

Muhammad Helmi Nadri[1,2], Ain Ilmiah Anhar[3], Wan Nur Akma Wan Mazlan[3], Kian-Kai Cheng[1,2]

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Abstract
Hibiscus rosa-sinensis is cultivated throughout Malaysia for its beautiful vibrant-colour flowers. This plant is locally known as Bunga Raya and was certified as National Flower of Malaysia in 1960. In traditional medicine, this plant has been used as an expectorant for bronchitis, to relieve headaches and swellings. This study is aimed to discover anti-inflammatory properties of bioactive compounds from *H. rosa-sinensis* through silico study. A total of 24 compounds were screened against ten inflammatory-related protein targets. Molecular docking was performed to predict interaction between compounds and targeted proteins using CB-Dock. This study identified a few compounds including stigmasterol and rutin which have high docking scores against lipoxygenase and secretory phospholipase A2. Results from this study indicate that bioactive compounds from this plant have potential as anti-inflammatory agents.

Keywords: *Hibiscus rosa-sinensis*, anti-inflammatory, bioactive compounds

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ORAL PRESENTATION 5

Determination of Physiochemical Characterization and Bioactivities of EPS From Lactobacillus Sp. With Potential Nutraceuticals Benefit

Ms. Aina Nabilah Faizah Binti Ahmad Bustamam

Universiti Teknologi Malaysia

ORAL PRESENTATION 6

Nutrient Density Index for Vegetables and Fruits in Malaysia

Kian-Kai Cheng [1,2], Muhammad Helmi Nadri[1,2], Nor Zalina Othman[1,2], Siti Rafeah Binti Ibrahim Tey[3], Siti Aisyhah Binti Omar[4], Ummi Khalidah binti Abu Bakar[5], Ainnur Masyitah binti Ahmad Hamizi[5], Aliya Kamalia binti Mohd Kodeem[5], Nur Ain Najwa binti Edi Mohamad[5], Nurul Shazleen binti Zain[6], and **Hong-Yeng Leong**[1,2*]

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Abstract

Malnutrition resulted from unhealthy eating are commonly linked to non-communicable diseases like obesity, high blood pressure, cholesterol, diabetes, and cardiovascular disease. Nutrient density index and nutrient profiling models have been developed as potential tools to facilitate healthier food choice in fighting against these nutrition-related diseases. However, most of the nutrient index and nutrient profiles available are focusing on foods commonly consumed in European and US regions. To date, there is a lack of systematic nutrient density index cater for Malaysian food products. In the present study, we have developed a scoring system to estimate the nutritional adequacy of vegetables and fruits in Malaysia on a per weight and per calorie basis. This study used the existing data from Malaysian Food Composition Database 1997 and Recommended Nutrient Intakes for Malaysia 2017 established by Ministry of Health Malaysia for 110 vegetables and vegetables product, 93 fruits and fruits products and 11 key nutrients including protein, fibre, calcium, iron, phosphorus, potassium, vitamin C, thiamin (B1), riboflavin (B2), niacin (B3), and vitamin A to calculate the nutrient density score. The nutrient density score per 100 kcal and per 100g were calculated as the mean of percent daily intake values for 11 key nutrients of fruits and vegetables products. The common vegetables and fruits consumed by Malaysia were then ranked according to the nutrient density score. In addition, a novel nutrient score plot had been developed to facilitate visualization of the nutrient profiles of foods. The results showed some of the Malaysian vegetables and fruits are rich source of the key nutrients. These data may be useful for nutritional planning and counselling and development of nutrient-dense food products in Malaysia.

Keywords: Nutritional Guidelines for Malaysian, food, nutrient density, nutrient-rich food index, nutrient score

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ORAL PRESENTATION 7

Potential Use of Phytochemical Extract as Prebiotic Compounds

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Abstract
Prebiotics are regarded as the non-digestible food constituents that are selectively consumed by health-promoting bacteria (probiotics). In fact, a number of active metabolites is released due to intensive interaction between prebiotics and probiotics in the intestine which exert local and systemic beneficial effects including regulation of intestinal disorders and modulation of host immunity. *Curcuma xanthorrhiza* (CX) is one of the most important medicinal herbaceous that is locally famed as Temulawak. *Xanthorrizol* is a well-recognized component of CX which contributes to the prevention of multiple inflammatory diseases. Despite *xanthorrizol* as a well-known compound, few researchers have focused on the CX extract (CE) and its potential as prebiotic. The aim of this study was to evaluate the prebiotic potential and the effect of CE on *Lactobacillus casei* and *Lactobacillus paracasei* fermentation. Several formulations of CE and other ingredients were used to investigate this effect. Interestingly, time course experiment showed that the synergistic of CE with other herbs were not only being digested by probiotics including *L. casei* and *L. paracasei*, but also supports the growth of these bacteria even after 48 h ($p \leq 0.05$). High performance liquid chromatography (HPLC) analysis revealed the accumulation of lactic acid after 48 h fermentation. To the best of knowledge, this is the first report evaluating prebiotic potential of CE on *L. casei* and *L. paracasei*.

Keywords: Prebiotic, Phytochemical, Inflammatory, Probotic

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ORAL PRESENTATION 8

Metabolomics Study of the Effects of Lipopolysaccharides and *Momordica charantia* in RAW264.7 Cells

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Abstract
Inflammation is a response of immune system towards cell injury caused by trauma or infection. In laboratory, inflammation can be studied by using macrophage cell models activated with lipopolysaccharide (LPS). *Momordica charantia* (*M. charantia*) or bitter gourd is climber plant that is widely cultivated and used as food in Asia, Africa and South America. The plant is known for its anti-diabetic activity. Previously, we had reported potential anti-inflammatory effects of *M. charantia* in LPS-induced RAW264.7 macrophage cells, however the underlying mechanism of its anti-inflammatory activity is not established. In the present study, we investigated the metabolic perturbation linked to the anti-inflammatory activities of the *M. charantia* treatment using a combination of a ^{1}H-NMR metabolomics and multivariate data analysis approaches. A total of 41 differential metabolites were detected and assigned in ^{1}H NMR spectra acquired from intracellular extract, extracellular medium, and fresh *M. charantia* extract. The present findings suggested that the anti-inflammatory effect of *M. charantia* may be associated with the regulation of glycolysis and the TCA cycle, modulation of amino acid metabolism, and the action of potential anti-inflammatory metabolites from Momordica charantia. Taken together, the current results may provide novel insights into the anti-inflammatory activity of *M. charantia*, and supported its potential as an alternative therapeutic strategy against inflammation.

Keywords: metabonomic, bitter gourd, inflammation, macrophage

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ORAL PRESENTATION 9

Optimization and Characterization of Crude Hyaluronic Acid Extraction from Eggshell Membrane by Enzymatic Hydrolysis

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Abstract
Hyaluronic acid which is highly demand in medical and cosmetic field is available in eggshell membrane. Reuse of eggshell membrane as a material source in hyaluronic acid production is an alternative to reduce the eggshell wastes problem. The objective of the study was to compare and optimize the crude hyaluronic acid extraction from eggshell membrane by papain and bromelain hydrolysis. The effect of ultrasonic pretreatment on papain hydrolysis is also assessed in this study. The optimal conditions were determined by using Response surface methodology (RSM) and Box-Behnken design. The optimum conditions for papain hydrolysis obtained for hydrolysis time, pH, enzyme concentration was 3 hours, pH 8 and 4.252 g/g, while bromelain hydrolysis was 3 hours, pH 7 and 4.703 g/g, respectively. Meanwhile, the optimum condition for papain hydrolysis with ultrasonic pre-treatment was 3 hours of incubation time, 4.306g/g enzyme concentration, pH 7 and 2 minutes of ultrasonic time. The optimized yield of hyaluronic acid was determined by carbazole method which the bromelain hydrolysis, papain hydrolysis and the papain hydrolysis with ultrasonic pre-treatment recorded with 2.79%, 4.069% and 3.833% hyaluronic acid per 1 g of dried eggshell membrane. The structure of sample hyaluronic acid was determined by Fourier transform infrared spectra (FTIR). The antioxidant activity of extracts was studied using DPPH radical scavenging and FRAP assay methods. The IC_{50} value and FRAP value of hyaluronic acid by bromelain extraction, papain extraction, and papain extraction with ultrasonic pre-treatment were 75.84, 19.73 and 23.55 µl/ml toward DPPH and 0.0289±0.0053, 0.2924±0.0043, and 0.3103±0.0015 mmol Fe(II)/g dry weight respectively. The samples were tested for the anti-inflammatory activity by 15-lipoxygenase (15-LOX). The results showed that the 15-LOX inhibition activity of the hyaluronic acid extracted by bromelain hydrolysis, papain hydrolysis, and papain hydrolysis with ultrasonic pretreatment were 0.60%, 54.42%, and 9.41% inhibition. In conclusion, eggshell membranes as a source for hyaluronic acid with antioxidant and anti-inflammatory properties that could maximize the value of eggshell wastes.

Keywords: Hyaluronic acid, Eggshell membrane, Enzymatic hydrolysis, Antioxidant activity, Anti-inflammatory activity

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ORAL PRESENTATION 10

The Effect of Enzymes Treatment on The Oil Yield and Squalene Content in Virgin Palm Oil Using Microwave-Assisted Enzyme Aqueous Extraction Method

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Abstract

Microwave-assisted enzyme aqueous (MAEA) extraction is an alternative method to produce virgin palm oil (VPO). It uses cell wall degrading enzymes to improve the oil yield and concentration of bioactive compounds, such as squalene. However, the effect of different types of enzymes and their processing conditions on the squalene content in VPO is not established. Therefore, the present study used four types of enzymes; hemicellulase, cellulase, pectinase, phospholipase, and their mixture at different pH condition and incubation time to study their effects on the oil recovery, squalene content and fatty acid profile of VPO and compared with palm oil, palm olein and red palm oil (RPO). The total reducing sugar was also analysed to determine the efficiency of the enzyme reaction. The squalene content and fatty acids profiles in the obtained VPO was analysed using gas chromatography with a flame ionizer detector (GC-FID). The oil yield obtained from Soxhlet, and microwave-assisted aqueous (MAA) methods were 67.16 ± 1.46 % and 18.23 ± 8.62 %, respectively and their squalene content were 87.07 ± 1.92 mg/100 g and 96.66 ± 14.34 mg/100 g, respectively. Using MAEA method, the highest oil yield (39.48 ± 4.03 %) was obtained using mixed enzymes at pH of 4.5. The supernatant obtained from the same conditions also resulted in the highest total reducing sugar, 86.06 mg/100 ml. Meanwhile, the highest squalene content, 961.77 ± 53.16 mg/100 g was obtained from palm mesocarp treated with a mixed enzyme at pH 8. Incubation time has a positive relationship with oil yield and squalene content. Similarly, squalene content also has a positive relationship with enzyme concentration and incubation time. Based on the findings, the MAEA extraction techniques is feasible in producing VPO rich in squalene compared to Soxhlet and MAA extraction.

Keywords: Virgin palm oil, enzyme, microwave-assisted enzyme aqueous extraction, squalene.

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ORAL PRESENTATION 11

Anti-obesity properties of Saponins Rich Fraction of *Momordica charantia.*

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Abstract
Momordica charantia (MC) is known for its bioactivities including anti-diabetic and anti-inflammatory properties. However, the potential anti-obesity effects of MC is not fully established. In the present study, we aimed to investigate the anti-obesity effect of MC focussing on its saponin-rich fraction on adipogenesis and lipolysis in 3T3-L1 pre-adipocytes cell lines. Briefly, the cells were maintained in Dulbecco's modified Eagle's medium (DMEM) supplemented with 10% fetal bovine serum (FBS) and 1% penicillin-streptomycin. The adipogenesis and lipolysis of MC saponin-rich fraction (MCF) on the 3T3-L1 adipocytes measured with Oil Red O (ORO) lipid staining assay and non-esterified free fatty acids (FFA) content assay kit. The current results showed that MCF inhibited intracellular lipid droplets accumulation by dose dependent manner. In addition, the release of free fatty acids from the cells were also significantly reduced following MCF treatment. Taken together, these results suggested that the saponin-rich fraction in *Momordica charantia* regulates lipid metabolism in cells and may have potential therapeutic property to protect against obesity.

Keywords: *Momordica charantia*, adipogenesis, lipolysis, saponin-rich fraction.

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ORAL PRESENTATION 12

An Experience on implementation of Leaf Color Chart (LCC) Apps on paddy field in Malaysia

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Abstract
Leaf Color Chart (LCC) was developed by IRRI (*Philrice)* from the Japanese prototype to measure the Nitrogen (N) requirements for rice crops according to the needs in the field. The color intensity of the leaves is closely related to the chlorophyll content and the Nitrogen (N) status of the leaves. Farmers often use leaf color during the cropping season as a visual indicator of the rice crops nitrogen status and to determine the need for fertilizer N application. The leaf color chart (LCC) is an easy to use and inexpensive diagnostic tool compared to SPAD Meter or also known as the Chlorophyll Meter which costs up to RM15, 000.00 per unit to monitor plant N status during the season and as a decision aid to plan fertilizer N topdressings.

The Department of Agriculture Malaysia has developed an application to replace the function of the tool, namely '**LCC Padi'**. The advantages of this application are more user can benefit from this application as its free download in Android Play Store with bilingual features (Bahasa Malaysia and English) and easy to understand with simple instruction provided. The application can be use offline with requires only 18MB of storage and works well with basic smartphone available in the market. But the drawback of this applications is only applicable for Android user.

The principle behind LCC Padi APPS is based on IRRI Guidelines. The photos of 10 leaves of the hills within a field randomly taken and choose the topmost fully expanded leaf (Y leaf) for leaf color measurement because it is good indicator of the N status of rice plants. During taking photos for measurement, always shade the leaf being captured with the body because the leaf color chart reading is affected by the suns angle and sunlight intensity. The same person should take the photos at the same time of day each time measurements is taken. Each results from the data collection will be provided with recommendation for further action whether to add fertilizer or not.

This helps farmers to adjust fertilizer N application to season-specific climatic conditions that affect crop growth (termed 'real time' N management). Good real time N management reduces N fertilizer needs, increases N use efficiency, and reduces the rice crop's susceptibility to pests and diseases. The farmers also can avoid excessive N fertilizer use to prevent the development of a lush green foliage that attracts pests and diseases. Efficient N fertilizer use and balanced nutrition minimize the risks of lodging, pest and diseases. All the cost of the production can be reduces and maximizing the profit of the farmers.

Keywords: LCC Paddy Apps, rice, nutrient management

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ORAL PRESENTATION 13

Waste Plant-Based as a Catalyst for Food Waste Composting Process

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Abstract

Increasing food waste (FW) generation present a significant threat to the environment and has increased the financial cost of its inappropriate management. Composting method is one of the economical technologies for FW recycling since it can reduce the amount of perishable food and produce bio-fertilizer. However, one of the problems in a composting method is the long duration of time to complete the process. Another issue with this method is the emission of an unpleasant odor generated from the volatilization of an organic compound and fine aerosol during the composting process. Hence, the primary objective of this paper was to investigate the potential waste plant-based as a catalyst to accelerate the FW composting process. Then, the physiochemical and biological tests were conducted to determine the effect of the component and its ratio on FW composting. Based on visual observation (gas hissing and odour), 7 out of 17 plant-based fermented solutions (FS) met catalyst maturity, including lettuce, cucumber, carrot, green spinach, iceberg lettuce, pineapple, and banana. On day 1, the pH profile of FS produced by pineapple attained a maturity pH of 3.5, followed by carrot and cucumber on day 2. Cucumber FS, on the other hand, has the largest acid lactic (bacterial) and yeast (fungal) population before being mixed with bulking agents. In the meanwhile, lettuce, spinach, and pineapple do not generate yeast or lactic acid. The important microorganism to speed up the decomposition process is yeast and lactic acid. During the composting process, the temperature rises immediately after the composting process begins (Day 1) and progressively falls after reaching a high. On Day 1, the composting process inoculated with cucumber solution had the highest temperature (36.8°C), followed by others (30.7-30.5°C). As a consequence of the findings, the FS produced from cucumber waste in this study is sufficient as a catalyst to accelerate the composting process. Furthermore, the ideal component ratio to generate cucumber fermentation solution was investigated based on maturity pH, microbe population, odour, and gas emission. The optimal ratio to water, according to the results, is 1:4.

Keywords: Waste plant-based, Fermentation solution, Composting, Food waste

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ORAL PRESENTATION 14

Syntropic Agroforestry: An Upgrade for Agroforestry in Malaysia Towards Sustainable Development

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Abstract
This article reviews the practices of agroforestry in Malaysia as well as its benefits in carbon sequestration and ecosystem services improvement. Environmental issues with regards to conventional monocrop farming is discussed and linked towards importance of adopting carbon farming method such as Syntropic Agroforestry (SAF). Carbon farming technicalities such as valuation of carbon captured in soil and plant mass is also reviewed. To conclude the review, the economics of adopting carbon farming with the vision of subscribing to carbon trading mechanism as well as the complexity of carbon captured auditing will be synthesized and commented upon.

Keywords: Agroforestry, Syntropic Agroforestry, Carbon Farming, Carbon Sequestration, Sustainable Development.

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ORAL PRESENTATION 15

Different Microbial Inoculum on The Spent Mushroom Medium Composting.

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Abstract

The production of spent mushroom medium are increasing over time with every production of one kilogram of oyster mushroom, it produced about five kilograms of spent mushroom medium. The nutrients in the medium decreased after multiple cycles of mushroom growing and conventionally, the cultivators dump the medium into the dumpsite or landfill. Spent mushroom medium enriched with the organic elements with the potential to be converted into valuable compost and organic fertilizer with the right methods. Therefore, three compost beds with 3 kg consisting of spent mushroom medium, bio-ethanol waste and chicken manure contain with three different types of microbial inoculants (EM-1, tempeh fermented liquid and food waste fermented liquid) at the initial carbon-to-nitrogen ratio 22.81 and the composting process was carried out for 12 days. Parameters such as pH, temperature, moisture content and total organic matter degradation were evaluated to determine the effect of compost at the onset of microbial inoculation that was different from the compost beds. On the first day of composting, the temperature of the compost container with different microbial inoculant began to reach maximum temperature with only 54 until 56 % moisture content maintaining the thermophilic phase (> 40 °C) for about one day. Compost layer with EM-1 was found to have the highest degradation rate k (0.0225) and R^2 value (0.9556). In conclusion, each compost beds (EM-1, tempeh fermented liquid and food waste fermented liquid) can determine the rate of total organic matter degradation for spent mushroom medium, bio-ethanol waste and chicken manure.

Keywords: Bio-ethanol Waste, Chicken Manure, Composting, Microbial Inoculum, Spent Mushroom Medium

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ORAL PRESENTATION 16

Mutualistic relationship is a critical factor for microbial coexistence

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Abstract
Functional stability plays a crucial role in many ecosystem functioning including maintenance of rhizosphere microbiome. As for simplification of complex bacterial system, we aimed to elucidate the mutualistic interaction by using phenol-fed chemostat culture. Compared to batch culture, phenol-degrading *Comamonas testosteroni* strain R2 was found collapse and loss their viability. Fortuitously, we found that strain R2 had maintained the phenol-degrading activity with non-phenol degrader *Stenotrophomonas* sp. strain Y. Population densities of each strain were monitored using real time PCR. Phenol-degrading activities were measured kinetically to investigate whether metabolites affect the growth of strain R2. While the phenol-degrading activity was inhibited by the supernatant of strain R2-chemostat culture, the activity was not inhibited by the supernatant strain Y was inoculated in. These results suggested that the growth of strain R2 was negatively affected by inhibitory metabolite(s) known as SIC produced from itself and caused a negative feedback. Interestingly, non-phenol degrader *Escherichia coli* strain BW25113 also coexisted with strain R2 under chemostat condition and had maintained phenol-degrading activity of the chemostat culture. KEIO library mutants were used to investigate how strain BW25113 made the mutualistic relationship with strain R2. We found that mutants with knockout genes related to purine metabolism (*purH*, *purC* and *guaA*) reduced the growth recovery of strain R2, suggesting that the purine metabolic pathway to have a potential connection towards SIC degradation. Our results provide novel insight to improve stabily coexistence of microbial ecosystem by means rhizosphere microbiome engineering that lead to better understanding of agricultural ecology. (248 words)

Keywords: Mutualistic interaction, stable coexistence, chemostat, collapse, microbial communities

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ORAL PRESENTATION 17

Use of EM Technology in Intensive Shrimp Aquaculture: An Effective Research-Based Tool to Enhance Sustainability

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Abstract

As the demand for farmed shrimp continues to grow worldwide, the use of probiotics to address the sustainability of intensive shrimp farming has gained much attention. Emerging diseases, such as acute hepatopancreatic necrosis disease (AHPND), pose a threat to sustainable intensification of shrimp aquaculture due to its devastating economic impact. This paper extends the application of Effective Microorganisms (EM) from a controlled setting to a commercial scale. A previous scientific study conducted on live shrimp evaluated the use of EM to mitigate the effects of the pathogenic *Vibrio parahaemolyticus* strain that causes AHPND. In laboratory conditions, the analysis of shrimp survival and bacterial community composition in the gastrointestinal tract of shrimp showed 73.3% survival and higher weight gains (31.2%) versus the negative control (11.2%). In the present study, comparable results were obtained in a commercial shrimp farm located in Thailand, in a region where the shrimp industry had been decimated by AHPND. Survival rate increased from 58% to 91% and Food Conversion Rates decreased from 1.36 to 1.22. These results validate the efficacy of EM in inhibiting bacterial diseases and increasing the sustainability of intensive shrimp production systems.

Keywords: AHPND, bacterial community composition, Effective Microorganisms, probiotics, sustainability

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ORAL PRESENTATION 18

Changes in nutrition, enzyme activity and microbial community after fungi residues of *Stropharia rugosoannulata* addition into soil

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Abstract: *Stropharia rugosoannulata* has the ability of high efficient transformation of rice straw into nutrients available to plant and soil microorganisms. In order to study the effect of *S. rugosoannulata* residue returning to the field, the changes of soil organic matter, nitrogen, phosphorus, potassium, soil enzyme activities and microbial diversity were investigated after the use of rice straw. The results showed that the fungi residue significantly increased the content of organic matter, nitrogen, phosphorus and potassium in the soil. The activities of sucrase, polyphenol oxidase, catalase and urease in treatment group were significantly higher than those in the control group. After the residue treatment, the diversity level of soil bacteria was increased, but the diversity level of soil fungi was decreased, which might be as the inhibition of the *S. rugosoannulata* mycelia to other fungi. In the residue treatment group, *Anaerolineaceae*、*Ardenticatenia*、*KD4-96*、*Xanthomonadales*、*Pseudarthrobacter*、*43F-1404R*、*Geobacter*、*Sphingomonas*、*Bacillus*、*SBR2076*、*Variibacter*、*Caldilineaceae*、*Bryobacter and Saocharibacteria* were the dominant bacteria groups; *Hypocreales*, *Sordariales*, *Ascomycota*, *Capnodiales*, and *Agaricomycetes* were the dominant fungi groups. The results suggested that the application of *S. rugosoannulata* residue provided nutrients for the soil, promoted the improvement of soil organic matter, increased the soil enzyme activities, and increased the bacterial diversity, which indicated that the return of *S. rugosoannulata* residue into soil had positive effect on increasing soil fertility.

Keywords: *Stropharia rugosoannulata*; fungus residue; organic matter; enzyme activity; microbial diversity

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ORAL PRESENTATION 19

Isolation and Identification of Acetic Acid Bacteria for Vinegar Production by Single Stage Fermentation of Pineapple Juice

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Abstract
Currently, the production of vinegar from fruits is processed through double stage fermentation; the fermentation of carbohydrates to ethanol and the conversion to acetic acid. Due to several problems occurring during fermentation, the conversion of ethanol to acetic acid is not completed. If the concentration of residual ethanol is more than 0.5%(v/v), it is incompliance with Halal certification from JAKIM. The aim of this study is to isolate and identify bacteria for single-stage fermentation of pineapple juice for acetic acid production with low ethanol residual. Samples from matured pineapple were screened for the presence of acetic acid bacteria on the glucose, yeast extract calcium carbonate(GYC) agar and showed a clear zone around the colonies after 48-hour incubation. Only two strains showed as organic acid producer from the GYC agar. The sequencing and restriction analyses of 16S rRNA discovered a strain of *Acetobacter lovaniensis* and *Lactobacillus paracasei subsp casei.* From the submerged cultivation of *A.lovaniensis, L.casei* and mixed cultured of both strains under aerobic condition acetic acid production about 2.03, 2.20 and 3.63 % (v/v), respectively at 30 °C after 7 days incubation with ethanol production for *A.lovaniensis* and *L. casei* about 0.99 and 1.97 %(v/v), respectively and the mixed cultured 0.38 % (v/v). The concentration of acetic acid in the pineapple juice started to decrease after 7 days of cultivation for *L.casei* and mixed cultured. However, cultivation with *A.lovaniensis* showed low acetic acid deterioration without ethanol residual after 21 days of cultivation. Optimization of processing conditions is suggested to study on the isolated strain to increase acetic acid production.

Keywords: natural vinegar, acetic acid, pineapple, isolation, identification

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POSTER PRESENTATION

Pesticides Registration Review of The Benomyl, Thiophanate-Methyl and Carbendazim in Malaysia

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Abstract

Both benomyl and thiophanate-methyl were first registered in 1977 and 1980 respectively in Malaysia's, gazettes in the First Schedule of the Pesticides Act 1974. A total of 56 products of benomyl, carbendazim and thiophanate-methyl have been registered with various formulations in Malaysia. They are used as fungicides and preservatives in the agriculture and manufacturing sectors. Consideration for the review of products registered with the active ingredient is based on the technical assessment (product specification, toxicological, efficacy) as well as residual analysis using QuEChERS method by LCMS-MS detection and other additional information to support the banning and restriction of these active ingredients. Benomyl and thiophanate-methyl are rapidly converted mainly to carbendazim when exposed in the environment. Carbendazim is a major metabolite of benomyl that has close similarity in its structural and toxicological characteristics as parent compound. Based on the Department of Agriculture's pesticides residue monitoring program, which includes the myGAP certification scheme as well as pesticides risk profiling for export commodities, there have been 18 Maximum Residue Limits (MRLs) violations recorded in the period of 2019 - 2021. Toxicological studies conducted worldwide concluded that these 2 out of 3 active ingredients are highly toxic to humans, the ecology and the environment. As such, it has been recommended for the discontinuance of usage of these active ingredients in pest control applications and the revocation of all existing registered pesticides bearing these active ingredients in order to improve the quality of food safety, protection of human health and the environmental sustainability in Malaysia.

Keywords: benomyl, thiophanate-methyl, carbendazim, toxicology assessment, food safety

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