AFOB MCIS 2019

AFOB MALAYSIA CHAPTER INTERNATIONAL SYMPOSIUM 2019

Biotechnology for Sustainability and Social Well Being

20-23 OCTOBER 2019

The Everly Hotel Putrajaya MALAYSIA

http://afobmcis.my/

MAIN ORGANIZERS

AFOB Asian Federation of Biotechnology MALAYSIA CHAPTER

UPM UNIVERSITI PUTRA MALAYSIA BERILMU BERBAKTI

UTM UNIVERSITI TEKNOLOGI MALAYSIA

UNIVERSITI TEKNOLOGI MARA

AFOB MALAYSIA CHAPTER
Asian Federation of Biotechnology

AFOBMCIS 2019

TENTATIVE PROGRAMME

DAY 1 — 20 October 2019

14:00	Registration *Irama - M Floor*
20:00	Welcome Reception *Irama - M Floor*

DAY 2 — 21 October 2019

08:00	Registration *Irama - M Floor*
09:00	Plenary Speech 1 *Prof Dr Tai Hyun Park* *Mesmera Hall - First Floor*
10:00	Morning Tea and Poster Presentation *Mesmera Hall - First Floor*
10:30	Opening and MoU Signing Ceremony *Mesmera Hall - First Floor*
12:00	Lunch *Fuze Restaurant - G Floor*
14:00	Technical Sessions *Mesmera Hall,* *Irama 5, Irama 6/7*
16:30	Afternoon Tea and Poster Presentation *Mesmera Hall - First Floor*
20:00	Gala Dinner *Mesmera Hall - First Floor*

DAY 3 — 22 October 2019

08:00	Registration *Irama - M Floor*
09:00	Plenary Speech 2 *Prof Dr Ari Sadanandom* *Mesmera Hall - First Floor*
10:00	Morning Tea and Poster Presentation *Mesmera Hall - First Floor*
10:30	Technical Sessions *Mesmera Hall,* *Irama 5, Irama 6/7*
12:30	Lunch *Fuze Restaurant - G Floor* Poster Presentation *Mesmera - First Floor*
14:30	Technical Sessions *Mesmera Hall,* *Irama 5, Irama 6/7*
16:00	Afternoon Tea
16:30	Closing and Awards Ceremony *Mesmera Hall - First Floor*

DAY 4 — 23 October 2019

08:00	Technical and Cultural Visit

WELCOME ADDRESS

Professor Dato' Dr Mohd Ali Hassan, FASc
President
AFOB-Malaysia Chapter

I am so pleased to welcome many international and local academicians and researchers from various institutions as well as our aspiring postgraduates in various Biotechnology fields to the 2nd Asian Federation of Biotechnology Malaysia Chapter International Symposium (AFOBMCIS 2019) on 20th - 23rd October 2019 at The Everly Hotel Putrajaya, Malaysia. This symposium is organised by AFOB-Malaysia Chapter (AFOB-MC), Universiti Putra Malaysia (UPM), Universiti Teknologi Malaysia (UTM) and Universiti Teknologi MARA Sarawak (UiTM).

AFOB-MC is a non-profit organization, established and registered with the Registrar of Society in 2013. In line with the function of Asian Federation of Biotechnology (AFOB), AFOB-MC also aims to promote cooperation on scientific grounds, between the scientists from academia and industry in Asian region, for the general advancement of biotechnology as an interdisciplinary field of research and as a means of bringing the scientific development to the industrial level. As a Federation, AFOB works to promote the safe, sustainable and beneficial use of Nature's resources in life sciences and technologies by supporting sound science as well as the application of engineering and technology. The Federation also strives to improve public perceptions and education, to facilitate exchange of people and ideas, and to stimulate innovation and technology transfer with the common goal of advancing biotechnology in Asia and in the rest of the world. The Federation seeks to expand the network of regional scientists and organizations to enhance mobility and to facilitate exchange of skills and ideas among Asian nations.

Therefore, to meet the mission of AFOB and AFOB-MC, the 2nd AFOBMCIS 2019 with the theme of "**Biotechnology for Sustainability and Social Well Being**" is organized. It is intended to create a platform for all scientists interested in biotechnology and related research fields to meet and discuss the relevant issues. For the record, the AFOB-MC has previously organized the AFOB Regional Symposium 2014 (ARS2014) at Seri Pacific Hotel, Kuala Lumpur, Asian Congress on Biotechnology 2015 (ACB2015) at Hotel Istana, Kuala Lumpur and AFOBMCIS 2018 at Pullman Hotel, Kuching.

I hope that this symposium will help establish collaborative research programs, hence strengthening research relations and networking between universities, industries and government. I would like to express appreciation to the AFOBMCIS 2019 Organizing Committee members for their effort and hard work to ensure a successful and meaningful symposium for all of us. Thank you!

Best regards.

WELCOMING REMARKS

Professor Dr Suraini Abd Aziz
Chairperson
AFOB-Malaysia Chapter International Symposium 2019
(AFOBMCIS2019)

Dear delegates, it is a great pleasure to welcome you to the 2nd Asian Federation of Biotechnology Malaysia Chapter International Symposium (AFOBMCIS 2019).

The AFOBMCIS 2019 emphasizes the multidisciplinary focus, emerging scientific and technological developments in several areas related to biotechnology. The AFOBMCIS 2019 is aimed to provide a platform for local and international scientists, academia and industries to present current research findings, sharing ideas and opinions in various biotechnological fields. The theme of the symposium is "**Biotechnology for Sustainability and Social Well Being**" that covers various fields i.e.: Agricultural and Food Biotechnology; Applied Microbiology; Biopharmaceutical and Medical Biotechnology; Biocatalysis and Protein Engineering; Bioprocess and Bioseparation Engineering; Bioenergy and Biorefinery; Environmental Biotechnology; Marine Biotechnology; Nanobiotechnology, Biosensors and Biochips; Systems and Synthetic Biotechnology; and Tissue Engineering and Biomaterials arranged into 5 technical sessions.

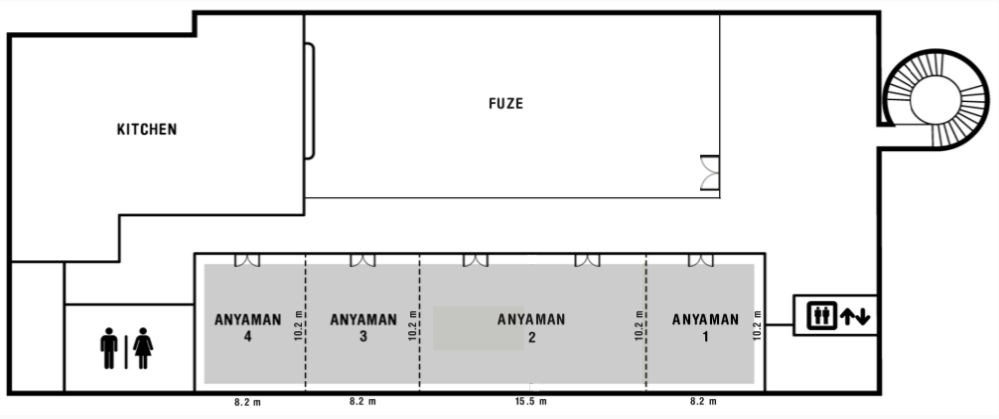
This symposium also invites prestigious speakers in the biotechnology field worldwide to share their knowledge and expertise. We would like to thank our Plenary, Keynote and Invited Speakers from various countries and institutions for accepting our invitation. We also would like to express our gratitude to all the oral presenters for sharing your findings and ideas. This symposium also organizing 4 Young Researcher Sessions and Poster Sessions that will be evaluated by our appointed judges. The best Young Researchers and Poster Presenters will be awarded.

Along with this symposium, a signing ceremony between AFOB-MC and Thai Society for Biotechnology (TSB) will also be held after the opening ceremony. Besides, suitable topics presented in this symposium will be invited for publication in Special Issues by Processes by MDPI (IF: 1.963), Bioengineered by Taylor & Francis (IF: 1.544) and BMC Energy by Springer Nature.

I would like to extend my gratitude to Assoc Prof Dr Phang Lai Yee (Co-chair), Assoc Prof Dr Mohamad Faizal Ibrahim (Secretary), Dr Huszalina Hussin (Treasurer) and all the organising committee and event team members of the AFOBMCIS 2019 for their efforts and supports in developing such a stimulating and interesting symposium programme. On behalf of all organizers, I would like to express appreciation for the sponsorship given by the respective organizations towards the success of this AFOBMCIS 2019.

Best wishes.

CONFERENCE VENUE LAYOUT



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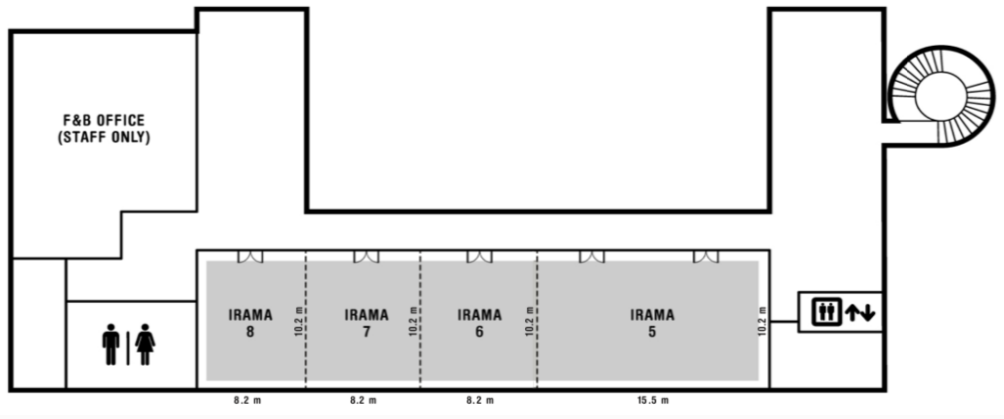

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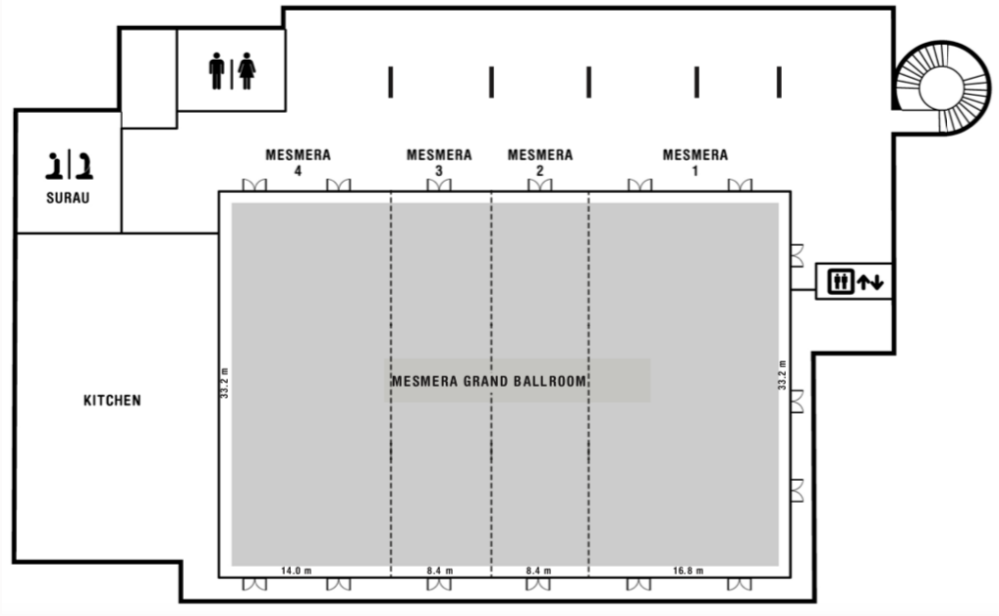

MESMERA - FIRST FLOOR

EVENT PROGRAMME

Day 1	20 October 2019		
1400 – 1700	Registration (Irama – M Floor)		
2000 – 2300	Welcome Reception (Irama – M Floor)		
Day 2	**21 October 2019**		
0800 – 0900	Registration (Irama – M Floor)		
0900 – 1000	Plenary Speaker 1 **Prof Dr Tai Hyun Park** **Seoul National University, South Korea** Magnetic bacteria & stem cell research Chairman **Assoc Prof Dr Madihah Md Salleh** **Universiti Teknologi Malaysia** (Mesmera Hall – First Floor)		
1000 – 1030	Morning Tea Break and Poster Presentation (Mesmera – First Floor)		
1030 – 1200	Opening Ceremony & MoU Signing Ceremony between **AFOB Malaysia Chapter** and **Thai Society for Biotechnology** (Mesmera Hall – First Floor)		
1200 – 1400	Lunch (Fuze Restaurant – G Floor)		
1400 - 1630 Afternoon Sessions	**Technical Session 1** *Agricultural and Food Biotechnology* *Biocatalysis and Protein Engineering* Chairman **Assoc Prof Dr Mohamad Faizal Ibrahim** **Universiti Putra Malaysia** (Mesmera Hall – First Floor)	**Technical Session 2** *Environmental Biotechnology* Chairman **Prof Dato' Dr Mohd Ali Hassan** **Universiti Putra Malaysia** (Irama 5 – M Floor)	**Technical Session 3** *Biopharmaceutical and Medical Biotechnology* *Systems and Synthetic Biotechnology* *Tissue Engineering and Biomaterials* Chairman **Dr Mohd Shamzi Mohamed** **Universiti Putra Malaysia** (Irama 6/7 – M Floor)
1400 – 1430	Keynote 1.1 **Prof Dr Sung Ok Han** **Korea University, South Korea** Designer multi-functional enzyme complexes for advanced conversion and production	Keynote 2.1 **Prof Dr Yoshihito Shirai** **Kyushu Institute of Technology, Japan** POST JST/JICA SATREPS from 2013 to 2017 seeds of new business for encouraging green economy between Japan and Malaysia	Keynote 3.1 **Prof Dr Polkit Sangvanich** **Chulalongkorn University, Thailand** Bioactive proteins and peptides from the rhizomes of Z*ingiberaceae* Plants: Angiotensin I-converting enzyme inhibitory

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1430 – 1500	Keynote 1.2 **Assoc Prof Dr Nor Azman Kasan** **Universiti Malaysia Terengganu** Challenges and sustainable solution for marine shrimp aquaculture industry: An implementation of rapid biofloc	**1430 – 1450** Invited 2.1 **Assoc Prof Dr Norjan Yusof** **Universiti Pendidikan Sultan Idris** Biosynthesis of biofuels feedstock from *Chlorella vulgaris* and *Tetradesmus obliquus* under nitrogen stress condition	Invited 5.2 **Assoc Prof Ir Dr Show Pau Loke** **University of Nottingham, Malaysia** Liquid biphasic partitioning system: Recent advances in downstream bioprocessing engineering
1500 – 1520	Invited 1.1 **Dr Wan Abd Al-Qadr Imad Wan Mohtar** **University of Malaya** Development of Malaysian soy sauce Koji-Moromi fermentation for γ-aminobutyric acid production: An immunity-booster condiment	**1450 – 1510** Invited 2.2 **Assoc Prof Dr Vichai Leelavatcharamas** **Khon Kaen University, Thailand** Polylactic acid packaging degrading actinomycete: Isolation and optimization of growth and enzyme production	Invited 3.1 **Assoc Prof Dr Noorjahan Banu Alitheen** **Universiti Putra Malaysia** Anticancer effects of curcumin analogue dk1 towards colon carcinoma *in vitro*
1520 – 1540	Invited 1.2 **Dr Koh Soo Peng** **Malaysian Agricultural Research and Development Institute** Kombucha papaya beverages: A natural way to lose weight	**1510 – 1530** Invited 2.3 **Dr Chun Shiong Chong** **Universiti Teknologi Malaysia** Exploring lignocellulose degrading bacteria from mangrove environment	Invited 3.2 **Assoc Prof Dr Siti Sarah Othman** **Universiti Putra Malaysia** Seeing is believing: Bactofection of the human colorectal cancer cells by *Lactococcus lactis* M4
1540 – 1555	Oral 1.1 **Dr Noor Liyana Yusof** **Universiti Putra Malaysia** Reduction of the chilling injury in baby spinach leaves by vacuum impregnation with selected compounds	**1530 – 1545** Oral 2.1 **Prof Dato' Dr Mohd Ali Hassan** **Universiti Putra Malaysia** Clean and green technology for sustainable palm oil industry	**1540 – 1600** Invited 3.3 **Assoc Prof Dr Zetty Norhana Balia Yusof** **Universiti Putra Malaysia** Microalgal vaccines: Transgenic algae to deliver antigens to fish
1555 – 1610	Oral 1.2 **Dr Ezzat Mohamad Azman** **Universiti Putra Malaysia** Extraction of anthocyanins and phenolics from dried blackcurrant (*Ribes nigrum* L.) skins	**1545 – 1600** Oral 2.2 **Dr Siti Fatimah Zaharah Mohamad Fuzi** **Universiti Tun Hussein Onn Malaysia** Cell immobilization of recombinant yeast *Kluyveromyces lactis* using nanomaterials for stability and enhance xylanase production	**1600 – 1620** Invited 3.4 **Dr Nadiah Sulaiman** **Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia** How to mend a broken heart? Decellularised veins as a scaffold for *in-situ* vascular tissue engineering
1610 – 1625	Oral 1.3 **Assoc Prof Dr Ahmad Tariq Jameel** **International Islamic University Malaysia** Irreversible inhibition kinetics of alpha-naphthyl acetate esterase enzyme by organophosphorus compounds	**1600 – 1615** Oral 2.3 **Assoc Prof Dr Shafinaz Shahir** **Universiti Teknologi Malaysia** Screening of microbial consortium from local hot springs for biohydrogen production	**1620 – 1640** Invited 3.5 **Assoc Prof Dr Tzann-Shun Hwang, Chinese Culture University, Taiwan** Discovery of inhibitors against *Mycobacterium bovis* branched-chain amino acid aminotransferases through *in silico* screening and experimental evaluation

EVENT PROGRAMME

1625 – 1640	Oral 1.4 **Dr Lisa G A Ong** **Universiti Tunku Abdul Rahman** Structural triacylglycerol hydrolysis and glycerol esterification with partial purified *Schizophyllum commune* UTARA1 lipases	**1615 – 1630** Oral 2.4 **Dr Mohd Huzairi Mohd Zainudin** **Universiti Putra Malaysia** Biochar enhanced nitrifying and denitrifying bacterial community during the composting of poultry manure and rice straw	**1640 – 1655** Oral 3.1 **Dr Darman Nordin** **Universiti Kebangsaan Malaysia** Antibacterial activity of poly (lactic-co-glycolic acid) reinforced hydroxyapatite functionalized graphene oxide nanocomposite against *Staphylococcus aureus* and *Escherichia coli*
		1630 – 1645 Oral 2.5 **Siti Jamilah Hanim Mohd Yusof** **Universiti Putra Malaysia** Production of xylooligosaccharides by carbon dioxide-assisted hydrothermal pretreatment of oil palm biomass	**1655 – 1710** Oral 3.2 **Dr Syazwani Itri Amran** **Universiti Teknologi Malaysia** Molecular docking and 3D QSAR analysis of plant phytochemicals for new FTO inhibitors
1630 – 1730	Afternoon Tea Break and Poster Presentation (Mesmera – First Floor)		
2000 – 2300	Gala Dinner (Mesmera Hall – First Floor)		
Day 3	**22 October 2019**		
0800 – 0900	Registration (Irama – M Floor)		
0900 – 1000	Plenary Speaker 2 **Prof Dr Ari Sadanandom** **Durham University, United Kingdom** Exploiting protein modifications systems to boost crop productivity under environmental stress Chairman **Assoc Prof Dr Phang Lai Yee** **Universiti Putra Malaysia** (Mesmera Hall – First Floor)		
1000 – 1030	Morning Tea Break and Poster Presentation (Mesmera Floor – First Floor)		
1030 – 1240 (Morning Sessions)	**Technical Session 4** *Applied Microbiology* *Marine Biotechnology* *Nanobiotechnology, Biosensors and Biochips* Chairman **Dr Huszalina Hussin** **Universiti Teknologi Malaysia** (Mesmera Hall – First Floor)	**Technical Session 5** *Bioprocess and Bioseparation Engineering* *Bioenergy and Biorefinery* Chairman **Dr Mohd Helmi Sani** **Universiti Teknologi Malaysia** (Irama 5 – M Floor)	**Young Researcher Session 1** Chairman **Dr Helmi Wasoh @ Mohamad Isa** **Universiti Putra Malaysia** (Irama 6/7 – M Floor)

EVENT PROGRAMME

1030 – 1100	Keynote 4.1 **Prof Dr Kenji Sakai** **Kyushu University, Japan** Profiling of bacterial community structure on evidences in forensic investigation	Keynote 5.1 **Assoc Prof Dr Penjit Srinophakun** **Kasetsart University, Thailand** Sustainable integrated bioenergy research projects: Tips for success project management	**1030 – 1045** Speaker YR 1.1 **Syamirul Haidil Sharulnahar** **Universiti Teknologi Malaysia** Production of bioethanol by marine yeast strain A3P1 using seawater medium in fed-batch culture
1100 – 1130	Keynote 4.2 **Prof Dr Charles Santhanaraju Vairappan** **Universiti Malaysia Sabah** Marine eco-chemicals as lead pharmaceutical agents: Anti-inflammation and anti-cancer	Keynote 5.2 **Dr Nashrul Fazli Mohd Nasir** **Universiti Malaysia Perlis** The application of Malaysian bioresources for bone tissue scaffold	**1045 – 1100** Speaker YR 1.2 **Fatin Nur 'Aliya Mohamad Ros** **Universiti Kebangsaan Malaysia** The production of influenza vaccine compliance shariah by using an avian cell: DuckCelt-T17 via simulation
1130 – 1150	Invited 4.1 **Dr Abdul Rasheed Pathath** **Hamad Bin Khalifa University, Qatar** Electrochemical performance of MXenes ($Ti_3C_2T_x$ and $Nb_4C_3T_x$) and its nanocomposite in aqueous media: Towards enhanced sensing applications	Invited 5.1 **Prof Dr Chi-Wei Lan (John)** **Yuan Ze University, Taiwan** The application of Electro-Fermentation on improving production of echinenone by marine microorganism	**1100 – 1115** Speaker YR 1.3 **Izza Nadira Abu Bakar** **Universiti Putra Malaysia** Characterization of different accessions of Pegaga (*Centella asiatica* L.) from Malaysia and Thailand
1150 – 1210	Invited 4.2 **Dr Che Azurahanim Che Abdullah** **Universiti Putra Malaysia** Nanotechnology and sustainability: Where are we heading to?	Invited 5.3 **Dr Nur Syakina Jamali** **Universiti Putra Malaysia** Thermophilic biohydrogen production utilizing activated carbon as immobilized cells: Effect of sugar concentration and inoculum to substrate ratio in food waste variations	**1130 – 1145** Speaker YR 1.4 **Siti Fatimah Jamaludin** **Universiti Teknologi Malaysia** Application of seawater as a medium for lignocellulolytic enzymes production by marine fungi using oil palm empty fruit bunch in solid state fermentation
1210 – 1230	Invited 4.3 **Assoc Prof Dr Norhayati Ramli** **Universiti Putra Malaysia** Bacterial indicator as a specific tool in assessing the river water contamination due to palm oil mill effluent final discharge	Invited 5.4 **Dr Nahrul Hayawin Zainal** **Malaysian Palm Oil Board** Current technologies available for the carbonization and activation of oil palm kernel shell	**1145 – 1200** Speaker YR 1.5 **Wan Nurul Akmal Wan Murni** **Universiti Teknologi Malaysia** Antioxidant activity of local commercial homemade juice
1230 – 1245	Oral 4.1 **Dr Tengku Arisyah Tengku Yasim Anuar** **Universiti Putra Malaysia** Characterization of nanobiochar from oil palm empty fruit bunch by ball milling	Oral 5.1 **Assoc Prof Dr Hidayah Ariffin** **Universiti Putra Malaysia** Enhanced productivity of nanocellulose by using resources from palm oil industry	**1200 – 1215** Speaker YR 1.6 **Nurul Atiqah Osman** **Universiti Putra Malaysia** Effect of palm oil mill effluent final discharge on the characteristics of Napier Grass
1245 – 1300	Oral 4.2 **Assoc Prof Dr Mas Jaffri Masarudin** **Universiti Putra Malaysia** Enhanced therapeutic delivery of hydrophobic and hydrophilic compounds via polymeric nanoparticle system based on chitosan	Oral 5.2 **Dr Mohd Zulkhairi Mohd Yusoff** **Universiti Putra Malaysia** Biodiesel derived crude glycerol as a substrate for biohydrogen production using engineered *Escherichia coli* strain	**1215 – 1230** Speaker YR 1.7 **Nor Farhana Aziz Ujang** **Universiti Putra Malaysia** Treatment of POME final discharge using Napier Grass in wetland system

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			1230 – 1245 Speaker YR 1.8 **Kajan Muneeswaran** **University of Colombo** CADMA and allele specific qPCR techniques outperforms end-point PCR based SNP genotyping techniques
1230 – 1430	Lunch and Poster Presentation (Fuze Restaurant – G Floor and Mesmera – First Floor)		
1430 – 1615	**Young Researcher Session 2** Chairman **Dr Ezyana Kamal Bahrin** **Universiti Putra Malaysia** (Mesmera Hall, First Floor)	**Young Researcher Session 3** Chairman **Dr Nozieana Khairuddin** **Universiti Putra Malaysia** (Irama 5 – M Floor)	**Young Researcher Session 4** Chairman **Assoc Prof Dr Shafinaz Shahir** **Universiti Teknologi Malaysia** (Irama 6/7 – M Floor)
1430 – 1445	Speaker YR 2.1 **Nathania Puspitasari** **National Taiwan University of Science and Technology, Taiwan** Recombinant hydrophobin HGFI stimulated enzymatic hydrolysis of polyethylene terephthalate	Speaker YR 3.1 **Abubakar Abdullahi Lawal** **Universiti Putra Malaysia** Pyrolysis degradation behaviour of oil palm woody biomass and industrial wood chip using thermogravimetric analysis	Speaker YR 4.1 **Muhamad Aidilfitri Mohamad Roslan** **Universiti Putra Malaysia** Phenotypic characterization of plant-beneficial traits of *Enterobacter* sp. for soil bioinoculant application
1445 – 1500	Speaker YR 2.2 **Mohd Azwan Jenol** **Universiti Putra Malaysia** Enhanced volatile fatty acid production from sago hampas via anaerobic digestion by *Clostridium beijerinckii* SR1	Speaker YR 3.2 **Leow Yew Seng** **Universiti Putra Malaysia** Production of biosurfactant using *Bacillus subtilis* natto fermentation	Speaker YR 4.2 **Auwalu Hassan** **University of Malaya** Simultaneous metal bioremoval by a novel fungus (*Daldinia korfii*) from heavy metals contaminated medium
1500 – 1515	Speaker YR 2.3 **Muhammad Redza Mohd Radzi** **Universiti Teknologi Malaysia** Anticancer activity of carbon nanotubes-mediated hyperthermia treatment in murine breast cancer model	Speaker YR 3.3 **Nur Haida Syazana Zainol** **Universiti Putra Malaysia** In vitro responses of plant growth factors on growth of *Clinacanthus nutans* (Sabah Snake Grass)	Speaker YR 4.3 **Mohammad Sobri Merais** **Universiti Putra Malaysia, Bintulu** Preliminary study of isolation and characterization of bacteria from organic waste in Kampung Bako, Sarawak
1515 – 1530	Speaker YR 2.4 **Faridah Aminullah** **Universiti Teknologi Malaysia** Biosynthesis of silver nanoparticles using *Persicaria odorata* (L.) Sojak and their antibacterial activity: A preliminary finding	Speaker YR 3.4 **Song Yu Qing** **Universiti Teknologi Malaysia** Effect of arsenate-reducing bacteria in facilitating arsenic uptake by Kangkung (*Ipomoea aquatica* L.)	Speaker YR 4.4 **Wan Muhamad Asrul Nizam Wan Abdullah** **Universiti Putra Malaysia** Vacuolar processing enzymes are required for host susceptibility in *Fusarium oxysporum* f. sp. *cubense* tropical race 4 infection
1530 – 1545	Speaker YR 2.5 **Zetty Amirah Zulkifli** **Universiti Teknologi Malaysia** Antioxidant protein profiling of Moringa oleifera petiole	Speaker YR 3.5 **Nurul Atiqah Ahmad** **Universiti Malaysia Perlis** Human spiking interaction towards the binding activity of tat protein on nanocrystalline diamond based electrolyte-gate field effect transistor	Speaker YR 4.5 **Nur Akma Razali** **Universiti Teknologi Malaysia** Inhibitory effect of algae based product against the bacteria and fungi growth

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1545 – 1600	Speaker YR 2.6 **Nurfadhila Nasya Ramlee** **Universiti Teknologi Malaysia** Production of biobutanol by *Clostridium beijerinckii* SR1 using glucose in seawater medium	Speaker YR 3.6 **Nurul Haziqah Alias** **Universiti Putra Malaysia** Fed-batch saccharification of sago hampas into fermentable sugars for biobutanol production	Speaker YR 4.6 **Fatihatul Zuriati Makmon** **British Malaysia Institute, Universiti Kuala Lumpur** Development of modified graphene nanoplatlets biosensor on disposable screen-printed electrodes for electrochemical detection of EGFR, leading to lung cancer
1600 – 1615	Speaker YR 2.7 **Muhammad Norhelmi Ahmad** **Universiti Malaysia Sarawak** Novel fermentable sugar from sago frond sap as feedstock to produce l-lactic acid using *Lactococcus lactis* IO-1	Speaker YR 3.7 **Nur Fatin Najihah Mat Husin** **Universiti Teknologi Malaysia** Antibacterial activity of *Juniperus virginiana* essential oil against oral bacteria	Speaker YR 4.7 **Nurfatihah Mohd Shariff** **Universiti Teknologi Malaysia** Development of antibacterial electrospun polyvinyl-alcohol/multi-walled carbon nanotubes/curcumin (PVA/MWCNT/CUR) nanofiber
1600 – 1630	Afternoon Tea Break (Mesmera – First Floor)		
1630 – 1730	Closing and Awards Reception Ceremony (Mesmera Hall – First Floor)		
Day 4	**23 October 2019**		
0800	Technical and Cultural Visit		

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Asian Federation of Biotechnology

AFOBMCIS 2019

SPECIAL ISSUE

processes

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Biotechnology for Sustainability and Social Well Being

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Message from the Guest Editors

Bioprocessing is a very important technology that utilizes living organisms and their components to produce various types of products. The products and services that depend on bioprocessing can be grouped into the following: (1) Biopharmaceuticals that involve in the production of therapeutic compounds, vaccines, and diagnostic components. (2) Specific bio-based chemicals such as biofuels, food, and agricultural products; fine chemicals derived from and/or by living organisms; and other types of bioproducts. (3) Environmental management aids that use bioprocessing to treat, control, or remediate pollutants and toxic components. Bioprocessing is one of the key factors in several emerging industries of biofuels, used in the production of biogas, bioethanol, and biodiesel; industrial enzymes; waste management through biotechnology; new vaccines; and many more. Bioprocessing is always referred to as the technology that produces products and provides services that are environmentally friendly, sustainable, and renewable.

Deadline for manuscript submissions:
31 May 2020

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Special Issue

AFOB MALAYSIA CHAPTER
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SPECIAL ISSUE

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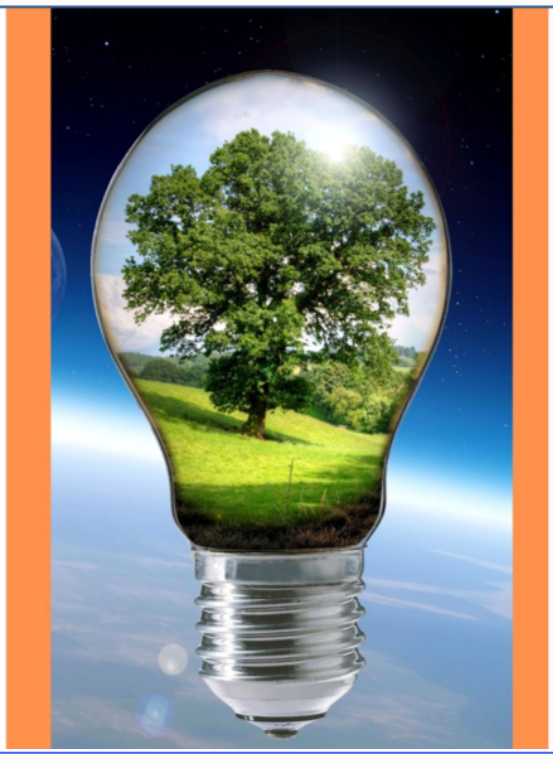

Biotechnology for Sustainability and Social Well Being

PLENARY SPEAKER 1

Professor Dr Tai Hyun Park
Seoul National University, South Korea

Magnetic Bacteria and Stem Cell Research

Tai Hyun Park

School of Chemical and Biological Engineering, Institute of Chemical Processes, Seoul National University, Seoul 08826, Republic of Korea

Magnetic bacteria have unique characteristics. They contain magnetosomes, which cause them to orient and swim along geomagnetic field lines. The magnetosomes are magnetic nanoparticles surrounded by lipid bilayer membrane. Magnetic particles have been used for various applications, including enzyme and antibody immobilization, microfluidic mixing, and drug delivery and monitoring. Magnetic nanoparticles can be easily incorporated into cells, including stem cell. Then, the magnetic nanoparticles-incorporated stem cells become to have magnetic property. We can manage the magnetized stem cells by external magnetic force. For example, the magnetized stem cells in suspension culture can be efficiently clustered into 3D spheroid by magnetic pin-based external magnetic forces. The spheroid size can be controlled simply by varying the suspended cell numbers, and the size of spheroid plays a significant role for the lineage specific differentiation of the stem cells. Neural induction was improved using small-sized spheroid generated from the magnetized mesenchymal stem cells. Magnetically derived physical stimuli induced chondrogenic differentiation, and osteogenetic differentiation was induced by tension controlled by magnetic field. In this presentation, I am going to show and discuss the application of the bacterial magnetic nanoparticles to the stem cell research.

Keywords: Magnetic bacteria; Magnetic nanoparticle; Stem cell

PLENARY SPEAKER 2

Professor Dr Ari Sadanandom
Durham University, UK

Exploiting Protein Modifications Systems to Boost Crop Productivity under Environmental Stress

Ari Sadanandom

Department of Biosciences, Durham University, Stockton Road, Durham, United Kingdom

Post-translational modifications (PTMs) act at the core of cell function. The advent of whole genome analysis has revealed that biological complexity is largely orchestrated not through gene number but through variation at the protein level (proteoforms). PTM events generate proteoforms that orchestrate cell signalling in almost every biological process. Furthermore, the dynamic nature of PTMs allows organisms to respond to even highly transient changes in the environment with precise fine-tuning. Due to their sessile nature, plants adapt to changes in their environment by modifying their growth and development through PTMs. Despite the critical importance of PTM's in every living cell, our understanding of the language and rules of this code remain rudimentary. However, advances in mass spectrometry, systems biology, genome editing and plant phenomics now make it possible to decipher the proteome wide PTM code.

In recent years, SUMO (Small Ubiquitin-like Modifier) has emerged as a very influential class of PTM. A key function of SUMO is to act as a vital counterpoise to Ubiquitination, adding a layer of control above ubiquitination including competition for targets and prevention of ubiquitin dependent protein degradation. Phosphorylation is also regulated by SUMOylation of kinases and phosphatases. This places SUMOylation as a central modifier of signalling in eukaryotes. This presentation will provide state of the art knowledge on the molecular mechanisms that are controlled by SUMO in models and crop plant species. The talk will provide an insight into how this emerging protein modification system can be exploited to boost crop productivity.

KEYNOTE SPEAKER 1.1

Professor Dr Sung Ok Han
Korea University, South Korea

Designer Multi-functional Enzyme Complexes for Advanced Conversion and Production

Sung Ok Han

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In the practice of converting primary bioresource into valuable biomaterials, the critical step is the decomposition process to give fermentable monomeric sugars. Thus, the designed microbes based on enzyme complexes are a key biological technology for biorefinery. For utilizing of polysaccharides by simultaneous saccharification and fermentation, a recombinant scaffolding protein from *Clostridium cellulovorans* and a chimeric hydrolysis enzymes were assembled as complex system. The utilization of scaffolds for enzyme immobilization involves advanced bionanotechnology applications in biorefinery fields, which can be achieved by optimizing the function of various enzymes. The assembly of minicellulosomes by *Saccharomyces cerevisiae* and *Corynebacterium glutamicum* increased the activity against various lignocellulosic materials by approximately 3-fold compared with control. Also, red algae-degrading complexes increased the activity against the marine biomass substrate by approximately 2-fold. Final, Carbon monoxide (CO) was successfully converted by functional complexes containing carbon monoxide dehydrogenase and carbon monoxide sensing heme protein with enhanced CO binding affinity. An enzyme complex was anchored on the cell surface of CO2-utilizing *Ralstonia eutropha* and successfully showed 3.3-fold increased conversion efficiency. Moreover, the electrical conductivities of hemozoin prepared by heme polymerase enzyme complexes were investigated and compared with those of the heme monomer. Because of the synergetic effects of polymerized heme, synthesized artificial nanocrystals exhibited a greater conductive property than a heme monomer. Intelligent application of various scaffolds to couple with nanoscale engineering tools and metabolic engineering technology may offer particular benefits. The development of multi-functional protein complexes for use as tools in whole-cell biocatalyst systems has drawn considerable attention as an attractive strategy for bioprocess applications.

KEYNOTE SPEAKER 1.2

Assoc Prof Dr Nor Azman Kasan
Universiti Malaysia Terengganu, Malaysia

Challenges and Sustainable Solution for Marine Shrimp Aquaculture Industry: An Implementation of Rapid Biofloc

Nor Azman Kasan

Institute of Tropical Aquaculture (AKUATROP), Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia.

A green technology known as rapid biofloc was implemented to reduce environmental damages while improving production of Pacific Whiteleg shrimp, *Litopenaeus vannamei* to meet global market demand. Since there was no intensive application of biofloc technology being implemented in industrial scale, this program aimed to assess the effect of biofloc in order to optimize water quality and maximize overall shrimp production. To speed-up the development of biofloc in *L. vannamei* cultures, an isolated biofloc boost-up bacteria inoculum was added during new stocking program of shrimp post-larvae (PL). Samples of water, shrimp and biofloc were collected at every ten days interval from new stocking of shrimp PL up to harvesting periods (±100 days). Amazingly, biofloc was observed to have formed as early as 10 days after shrimp cultivation periods. Addition of inoculum sped up biofloc formation, thus effectively enhanced good water quality which resulted in the increased shrimp biomass. Rapid formation of biofloc and aggregation of beneficial microbes in biofloc were responsible in maintaining water quality and optimizing shrimp survival and production. Thus, addition of known microbial composition in biofloc is deemed important for successful design and application of biofloc technology for sustainable shrimp aquaculture industry.

Keywords: Marine shrimp, rapid biofloc, green technology, *Litopenaeus vannamei*

KEYNOTE SPEAKER 2.1

Professor Dr Yoshihito Shirai
Kyushu Institute of Technology, Japan

POST JST/JICA SATREPS from 2013 to 2017 Seeds of New Business for Encouraging Green Economy between Japan and Malaysia

Yoshihito Shirai [a] and Mohd Ali Hassan [b]

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"PROMOTION OF GREEN ECONOMY WITH PALM OIL INDUSTRY FOR BIODIVERSITY CONSERVATION IN MALAYSIA" is the project title of our Science and Technology Research Partnership for Sustainable Development (SATREPS) sponsored by JST, JICA and The Ministry of Higher Education Malaysia. This is a matching grant project between Japanese and Malaysian Governments. A Part of the project sponsored by the Japanese Government has started in 2013 Nov. and terminated in 2017Nov. Another part of project sponsored by the Malaysia Government has started from 2014 Aug. and should terminate in 2018 in the end of Aug. Here we report some seeds of new business for encouraging green economy between Japan and Malaysia. Currently the Japanese Government encourage to use green electric power from any sustainable resources including biomass, wind, geothermal, solar etc. to set several Feed in Tariff (FIT) prices as subsidies from the Government. Especially only biomass is allowed to obtain from outside of Japan for applying power generation with FIT. Palm oil industry has great potential to provide biomass resources including EFB, PKS, Sludge Oil, Palm Trunk, Palm Frond etc. Malaysia can provide those palm biomass as a form of pellets to Japan for biomass power generation. However, the spec of the quality of the pellet should be so high. for example, they request a quite less ash content in the pellet as less than 1000ppm, for example. That is why we need to develop such technologies to answer their requests. We universities must contribute to develop them collaboratively.

Keywords: Palm oil industry; Green economy; Biodiversity; Zero emission

KEYNOTE SPEAKER 3.1

Professor Dr Polkit Sangvanich
Chulalongkorn University, Thailand

Bioactive Proteins and Peptides from the Rhizomes of Zingiberaceae Plants: Angiotensin I-Converting Enzyme Inhibitory

Polkit Sangvanich

Chulalongkorn University, Thailand

Screening of the crude ammonium sulphate cut protein extracts, and their pepsin-derived peptides, from the rhizomes of plants in the Zingiberaceae family for potential ACEI activity is a potentially promising means for the isolation of new natural ACEI proteins and peptides. *Zingiberaceae ottensii* showed the highest ACEI activity. For proteins, the main ACEI activity containing fraction was enriched to apparent homogeneity by just a simple discontinuous moderate cation exchange chromatography leading to three ACEI positive fractions. The main ACEI activity was ascribed to a 20.7-kDa protein which was described as a chitinase homolog, and revealed a strong ACEI activity as a competitive inhibitor of ACE (Ki was 9.1×10-5 M) that was active over a broad pH range and moderately thermostable. For the peptides, they were easily resolved to single peptides by RP-HPLC and revealed a strong ACEI active hexapeptide. This *in vitro* study represents the starting point for the discovery and evaluation of novel natural. ACEI proteins or peptides, and further research will be performed to evaluate the *in vivo* antihypertensive activities.

KEYNOTE SPEAKER 4.1

Professor Dr Kenji Sakai
Kyushu University, Japan

Profiling of Bacterial Community Structure on Evidences in Forensic Investigation

Kenji SAKAI[a], Eiji NISHI[b], Kota WATANABE[a], Yukihiro TASHIRO[a]

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Nowadays bacterial community in various natural environmental sampleshave beenanalyzed by using culture-independent molecular methods. We found that sufficient bacterial DNA can be recovered from unused forensic evidences such as truncated hand prints and hair shafts to investigate their microbiome structures. Simple capillary electrophoretic analysis of theirterminal restriction fragment polymorphism (T-RFLP) is helpful to differentiate individuals. In this talk, phylogenetic characteristics of bacteria found on hair shafts will also be introduced.

Keywords: Bacterial community structure, Hand prints, Hair shafts, Forensic investigation

KEYNOTE SPEAKER 4.2

Professor Dr Charles Santhanaraju Vairappan
University Malaysia Sabah

Marine Eco-chemicals as Lead Pharmaceutical Agents: Anti-inflammation and Anti-cancer

Charles Santhanaraju Vairappan

Laboratory of Natural Products Chemistry, Institute for Tropical Biology and Conservation, Universiti Malaysia, Sabah, 88450, Kota Kinabalu, Sabah, Malaysia

Marine flora and fauna are valuable sources of biologically active compounds with therapeutic benefits and represent a valuable source of novel compounds. Biodiversity of the tropical marine environment and its associated chemical diversity contribute to an almost unlimited resource of new bioactive compounds. This is particularly true for the Sulu-Sulawesi Coral Triangle Region of Borneo. Bioactive compounds can be isolated from various marine plants, animals, and microorganisms with unique set of molecules. Bioactive compounds extracted from these organisms are effective against different infectious and non-infectious diseases. In the last 15 years, knowledge on the chemical ecology of marine plants and animals has paved the path to better understand their biological potentials and to utilize these compounds as candidates for modern medicine. A total of 500 compounds were isolated, their diversity was studied, and their anti-inflammation/anti-cancer activities investigated. Inflammation is a powerful innate immune system defense mechanism that is an orchestrated maneuver designed to eliminate cellular treats. Chronic inflammatory response plays an important role in cancer development and resistance to chemotherapy. Molecular mediators that regulate inflammation and cancer are promising targets for preventing and treating these diseases. In this study, we have identified novel secondary metabolites isolated from marine plants and animals. Compounds were isolated and their structures elucidated based on spectroscopic data. Their inflammatory potential and mechanism of action was evaluated using RAW 264.7 macrophages, their PGE2, TNF-a, IL-1b, IL-6, iNOS, and COX2, were evaluated. Cancer cell bioassay was concluded using HL60 and MCF 7 cell lines, with control normal cells. Apoptosis mechanism was evaluated using Sub-G1 proportion, microscopic technique, Bax, Bcl-xl, Cleaved Capcase 3 and b-actin. In addition, we also investigated the microarray gene expression on the cells when these compounds were tested.

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KEYNOTE SPEAKER 5.1

Assoc Prof Dr Penjit Srinophakun
Kasetsart University, Thailand

Sustainable Integrated Bioenergy Research Projects: Tips for Success Project Management

Penjit Srinophakun

KU-biodiesel Project, Chemical Engineering Department, Kasetsart University, Thailand

Recently, integrated research projects have been required to solve the bioenergy issues in many countries. Therefore, the project management becomes very important to manage such big projects comprising of many sub-projects and many researchers. Integrated research projects do require, not only many people in the same disciplines but also contain researchers in cross discipline. Communication is truly essential for the flow of the cross-link information but making pleasant environment for the researchers is also important. Among top scientists of the project whose time is limited, and efficient brainstorming is a must. Good and reliable supporting team is, therefore, critical. Although, the key success of the project is a good teamwork, but this project team will be segregated into many small teams according to the key scientists. Thus, many tools must be embedded into the management system to facilitate every small team of the researchers, technical supporters, students etc aiming to one target of the integrated project.

In this presentation, the successful tips for integrated research management will be shared with the show case of bioenergy projects. One example is the large integrated project comprising of more than 40 sub-projects and 100 people involving which includes experts, researchers, technical supports, students and skill labors. As this project has been grated from many sources of funding such as government, private companies and the university, both internal and in-house management has to be clear and transparent. The second case will be a smaller project which comprises of 9 sub-projects, but the researchers come from different universities. The challenges of this integrated project will be how to select the best technique from several proposed and make a final good technical-environmental bioenergy project. The last case study will be the project management of different disciplines and group of researchers. With these all tips, it will make the integrated project successful in terms of pursuing the research project goals and create strong and sustainable network between people/institutions in bioenergy.

KEYNOTE SPEAKER 5.2

Dr Nashrul Fazli Bin Mohd Nasir
Universiti Malaysia Perlis, Malaysia

The Application of Malaysian Bioresources for Bone Tissue Scaffold

Nashrul Fazli Mohd Nasir

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Bone tissue scaffold had been ventured for over the decades as a solution for bone failure and trauma. Here, two of Malaysia's natural biomaterials are investigated as a potential material for tissue scaffold which are starch and hydroxyapatite. Hydroxyapatite is an inorganic bioceramics calcium phosphate which is abundantly available in human bone. Due to this, it is commonly used for bone tissue scaffolds for its excellent biocompatibility and tissue bio-activity properties. Malaysia has numerous resources of seashells which could be used as calcium precursor in formation of hydroxyapatite (HA). Corbiculacea (Etok) and Pholas orientalis seashells were chosen as the calcium precursor to form hydroxyapatite (HA) and the precipitation method was used due to its simplicity and robustness. Meanwhile, starch is the most common natural polymer that has been used as a biomaterial. Native starches may contribute differently in terms of their amylose content, interactions between granules, swelling ability and solubility in which those differences can be mainly due to the botanical origin. In Malaysia herself, there are various resources of starches. Balik Wangi, Bubuk Wangi, Bario rice, Ubi Badak, Ubi Kemili and Ubi Gadong starches were used to fabricate the scaffold via solvent casting and salt leaching technique. Thus, various characterization techniques were applied to investigate the properties of these biomaterials for tissue scaffold applications.

INVITED SPEAKER 1.1

Dr Wan Abd Al-Qadr Imad Wan Mohtar
University of Malaya

Development of Malaysian Soy Sauce *Koji-Moromi* Fermentation for γ-Aminobutyric Acid (GABA) Production: An Immunity-booster Condiment

Wan Abd Al Qadr Imad Wan-Mohtar[a] *, Safuan Ab Kadir[a], Ooi Poh Suan[b] and Alan Wong Weng Loen[b]

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Non-protein amino acid γ-aminobutyric acid (GABA) is recognised as a principal inhibitory neurotransmitter in the mammalian central nervous system. GABA has been shown to be useful for reducing blood pressure, stimulating the immunes system, and combating hypertension. Due to its numerous physiological functions, the development of pharmaceutical and functional foods enriched with GABA has been actively pursued, primarily using fermentation techniques. There is significant potential for GABA to be employed in functional food development, such as in fermented foods. Soy sauce, a traditional-popular Malaysian liquid fermented food, have potential in GABA-enriched condiment during two-stage *koji-moromi* soy sauce production. A collaborative agreement was made between the project leader and Malaysian soy sauce factory to change a standard soy sauce into a bioactive soy sauce by process optimisation using *Aspergillus oryzae* strain NSK and other identified salt-tolerant species for GABA production. Our recent results proved that *A. oryzae* strain NSK produced the highest 3278.31 mg/L of GABA in *koji* submerged-liquid fermentation at 72 h incubation times, 30 °C, initial pH 5, 100 g/L sucrose, yeast extract-glutamic acid combination, and (C8N3) carbon to nitrogen ratios. The targeted local soy sauce company was halal-certified by JAKIM Malaysia, 100% non-GMO product, approved by MESTI (Ministry of Health Malaysia) and received a vegetarian logo, thus this would enhance their acceptance for wide consumers. Together, this blueprint will provide innovative strategies to improve the competitiveness of locally produced Malaysian food in the global food trade.

Keywords: *Koji*; *Moromi*; Soy sauce; GABA; *Aspergillus oryzae*

INVITED SPEAKER 1.2

Dr Koh Soo Peng
Malaysian Agricultural Research and Development Institute (MARDI)

Kombucha Papaya Beverages: A Natural Way to Loseweight

Koh Soo Peng[a]*, Sarah Sabidi[a], Shazwan Abdul Shukor[b], Sew Yun Shin[b], Shaiful Adzni Sharifudin[a], Norhazniza Aziz[a], Nur Diyana Alyasa[a], Syahida Maarofa[a], Rosmawati Abdullah[a], Razali Mustaffa[c]

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Obesity is one of the major health concern, characterized by disturbance on the energy homeostasis equilibrium which depend on dietary intake and expenditure. The prevalence of obese populace has increased exponentially worldwide, cause an economic burden to the government and consumption of medical resources. In this study, we have developed new Kombucha papaya beverages using selected symbiotic culture of bacteria and yeast (SCOBY) under controlled biofermentation process. Two months of treatment on high fat diet-induced obese mice with Kombucha papaya beverages showed a remarkable body weight loss of 21.3% (SCOBY papaya leaves) and 23.4% (SCOBY papaya pulp), significantly higher than commercial anti-obesity drug, Orlistat (11.3%). Further investigation on blood glucose profile of all mice group revealed a healthy level of blood glucose with no hyperglycemia or hypoglycaemia effect. Haematology analysis of obese mice fed with Kombucha papaya beverage demonstratedno adverse effect on white blood cells, lymphocytes, haemoglobins, haematocrits, red blood cells and platelets. The changes in gut microbiome of obese mice underwent different treatment interventions were evaluated also. The 16S rRNA metagenomics sequencing analysis confirmed that gut microbiome of high fat diet-induced mice fed with Kombucha papaya beverages showed an increase in beneficial gut microbe abundances, particularly *Bifidobacterium, Faecalibaculum, Akkermansia, Lactobacillus* and *Bacteroides*. This finding indicated a great potential of Kombucha papaya beverages as a food remedy in weight management control.

Keywords: Papaya leaves; anti-obesity; papaya pulp, fermentation, gut microbiota

INVITED SPEAKER 2.1

Assoc Prof Dr Norjan Yusof
Universiti Pendidikan Sultan Idris, Malaysia

Biosynthesis of Biofuels Feedstock from *Chlorella vulgaris* and *Tetradesmus obliquus* under Nitrogen Stress Condition

Norjan Yusof[a], Norazela Nordin[a], Syafiqah Md Nadzir[a], Hanisom Abdullah[a], Mohd Zulkhairi Mohd Yusoff[b], Toshinari Maeda[c], Mohd Ali Hassan[b]

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Microalgae is a popular alternative source of biomass energy to replace fossil fuels. Its response in accumulating lipids and carbohydrates is varied and can be influenced by environmental factors such as nitrogen stress. The study aims to optimize the growth conditions to increase the carbohydrate, lipid, and biomass yield while improving the productivity of *C. vulgaris* UPSI-JRM01 and *T. obliquus* UPSI-JRM02. The objective is also to elucidate the mechanism of carbon partitioning towards starch and triacylglycerol under nitrogen stress condition. Statistical optimization designs were used to optimize biomass, lipid, and carbohydrate productivities of both strains. Meanwhile, the transcriptome analysis was performed using RNA sequencing before validated with qRT-PCR. The results showed that light intensity profoundly influences the productivity of the biomass, lipid, and carbohydrate compared to other factors for *T. obliquus*. It was also found that the optimum lipid yields and FAME composition achieved under nitrogen stress condition for *C. vulgaris* and *T. obliquus*were 45.4% and 36.5% lipids, with 59.47% and 54.07% of unsaturated fatty acid, respectively higher than optimized condition. The properties of the obtained biodiesel complied with the EN14214 and ASTM D6751-02 biodiesel standard. Moreover, the results of gene expression study revealed the two-stage responses to nitrogen stress in *C. vulgaris*. Early nitrogen starvation triggered high carbohydrate accumulation before the carbon partitioned into lipid. It is suggested that the strain accumulates TAG using two different pathways; i) chloroplastic TAG synthesis, and ii) glycerolipid metabolism. These results demonstrate promising development of biofuel feedstock from microalgae for future application.

Keywords: Microalgae; Nitrogen stress; Biofuels; *C. vulgaris*; *T. obliquus*

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INVITED SPEAKER 2.2

Assoc Prof Dr Vichai Leelavatcharamas
Khon Kaen University, Thailand

Polylactic Acid Packaging Degrading Actinomycete: Isolation and Optimization of Growth and Enzyme Production

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Nowadays polylactic acid (PLA) is used extensively with respect to environmental concern and good practice in solid-waste management, as food packaging. The study on biodegradation of PLA packaging is very limited. In this work, isolation, identification and biomass production of PLA packaging degrading microorganisms were carried out. These microorganisms grown in basal medium containing PLA packaging as sole carbon source were selected after 5 passages transferring consecutively in liquid broth. Among them, the isolate KKU215 gave the highest cell density after 4-week incubation. The results from scanning electron microscopy analysis indicated that the isolate KKU215 could clearly degrade PLA packaging. The 16S rDNA gene sequence of the isolate KKU215 was related to the genus *Streptomyces*. *Concentration* of yeast extract, initial pH, temperature and agitation speed for PLA packaging degradation were optimized by response surface methodology with Box-Behnken design. The highest growth of *Streptomyces* sp. KKU215 was found in basal medium with 3.26% (w/v) yeast extract, initial pH value of 7.69, and agitated at 149 rpm at 33.7 °C. PLA packaging weight loss under the optimal conditions by *Streptomyces* sp. KKU215 was 84.04% (w/w) within 4 weeks. Effect of pH, temperature, inoculum size, carbon compounds, nitrogen compounds and incubation time on the PLA packaging-degrading enzyme activity of *Streptomyces* sp. KKU215 was also studied. Up to date, there is no report of relevant *Streptomyces* species capable of degrading PLA. Therefore, *Streptomyces* sp. KKU215, a novel polylactic acid packaging degrading actinomycete, will be a promising strain for use in biodegradation of PLA packaging.

Keywords: Biodegradable plastic, Polylactic acid packaging, PLA packaging degrading microorganism, *Streptomyces*

INVITED SPEAKER 2.3

Dr Chun Shiong Chong
Universiti Teknologi Malaysia

Exploring Lignocellulose Degrading Bacteria from Mangrove Environment

Chun Shiong Chong[a], Ming Quan Lam[a], Muhammad Ramziuddin Zakaria[a], Mohamad Hamizan Abd Karim[a], Chen Sye Jinn[a], Kian Mau Goh[a], Lili Tokiman[b], Madihah Md Salleh[a], Adibah Yahya[a], Neil C. Bruce[c]

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Mangrove forests inhabit over 15,200,000 ha of coastal area that cover only less than 1% of world's coastal zone. These unique forests are mostly found in South and South East Asia. In general, mangrove forests are unique ecosystem that are highly resisting to environmental changes.This area is the habitat for unique terrestrial and marine flora, fauna and microorganisms.Whilst the diversity of plants with medicinal values and animals from mangroves are received considerable attention, less research has been performed on exploring the bacteria from mangroves. In this study, a total of 45 bacteria were isolated from Tg Piai mangrove sample that was co-incubated with oil palm residues throughout a period of 14 days.All the isolates were screened for lignocellulolytic enzymes activity on agar plates. It was found that all the isolate produced at least one extracellular CMC-ase, xylanase or ligninase. Furthermore, 40 out of 45 isolates produced extracellular xylanase, accounted for most of the positive results. Identification of these bacteria revealed that some of them are underexplored bacteria including*Zhouia* sp. and *Meridianimaribacter*sp. To explore the lignocellulose degrading abilities in*Meridianimaribacter* sp., the genome of this isolate was sequenced and analysed. More than 25 encoded protein in genome of the isolate was found to be related to lignocellulose degradation. The isolate also showed its ability to decompose empty fruits bunch, demonstrating its potential to be used for lignocellulosic biorefining under halophilic condition.

Keywords: Lignocellulose degrading bacteria; mangrove; xylanase; *Meridianimaribacter*

INVITED SPEAKER 3.1

Assoc Prof Dr Noorjahan Banu Mohamed Alitheen
Universiti Putra Malaysia

Anticancer Effects of Curcumin Analogue dk1 towards Colon Carcinoma *In Vitro*

Noorjahan Banu Mohamed Alitheen[a]*, Yazmin Hussin[a] , Mas Jaffri Masarudin[a] and Yeap Swee Keong[b]

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Curcuma longa, commonly known as turmeric, contains curcumin which is its main compound which has been reported to possess a wide variety of pharmacological activities such as anti-carcinogenic, antioxidant, antibacterial, anti-inflammatory and immunomodulatory effects. Although it has many strong biological properties, curcumin lacks in its bioavailability. A curcumin analogue, DK1, had recently been found to possess antiproliferative effects towards breast cancer and osteosarcoma *in vitro*. The main objective of this study is to investigate the anticancer effects of DK1 towards human colon cancer cell lines, HT29 and SW620. Results showed DK1 inhibiting cell viability and proliferation in 48 hours with IC50 values of 7.57±1.69 µM for HT29 cells and 14.50±4.31 µM for SW620 cells, causing cell cycle arrest with cell population of 23% at S phase and 28% cell accumulation at sub-G0/G1 phase. Quantitative Real-Time PCR showed significant up-regulation in the expression of caspase-9 in HT29 and SW620, cells. Compared to the untreated cells, the migration and invasion characteristics of SW620 cells were inhibited by 59% and 65%, respectively at 48 hours. Based on the analysis of Microarray-based gene expression profiling, the exposure of DK1 towards HT29 cells had up-regulated 1558 genes and down-regulated 1068 genes, compared to untreated HT29 cells. Pathway analysis indicated the influential expression of genes was related to apoptosis, cell cycle mechanism and metastasis due to their major roles in cancer cell proliferation and growth. The outcome of this study suggests that DK1 is a potential anti-cancer agent for colon cancer due to its anti-apoptotic attributes.

Keywords: colon carcinoma, curcumin analogue, DK1, apoptosis, metastasis.

INVITED SPEAKER 3.2

Assoc Prof Dr Siti Sarah Othman
Universiti Putra Malaysia

Seeing is Believing: Bactofection of the Human Colorectal Cancer Cells by *Lactococcus lactis* M4

Siti Sarah Othman[a]*, Hanis Faudzi[a], Habibah Faroque[a], Suet Lin Chia[b,c], Raha Abdul Rahim[a]

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Lactococcus lactis, a generally recognised as safe (GRAS) bacteria is an excellent candidate for DNA vaccination. Current systems that have been established for this bacterium usually involve the use of invasive recombinant strains for enhanced DNA delivery. However, this approach has raised some concerns over its safety. Previously, a local dairy isolate of *L. lactis* M4 was characterised and identified as a new potential lactococcal strain for biomedical applications. In order to develop this strain for DNA delivery, a better understanding of the interaction that occurs between *L. lactis* M4 with eukaryotic host cells is required. The interaction between *L. lactis* with human colorectal cancer cells were analysed using adherence and internalisation assays. *L. lactis* M4, along with commercial control strains were incubated with the cells for 2 hours. The number of viable cancer cells was quantified using Trypan blue exclusion test, and the number of bacteria was determined based on the number of colonies formed on GM17 agar plates. Antibiotic protection assay was included to evaluate bacterial internalisation. Bactofection of the colorectal cancer cells by *L. lactis* M4 was demonstrated through the expression of fluorescent proteins from a novel dual-expression plasmid, pHSR. For MOI ranging from 250 to 1 (bacteria/cancer cell), the number of adhered and internalised *L. lactis* M4 was 17.23 log CFU and 4.89 log CFU, respectively. *L. lactis* M4 was also found to enable expression of the red fluorescent protein intracellularly of the colorectal cancer cells, which were subsequently observed to express green fluorescent protein at 3 hours post-invasion. The ability of *L. lactis* M4 to adhere and get internalised into the cancer cells is as effective as the commercial *L. lactis* strains. The expression of fluorescent proteins from pHSR resulted from the bactofection of colorectal cancer cells by *L. lactis* M4 has proven that this strain can be developed as a vector to deliver plasmid DNA into the cancer cells.

Keywords: *Lactococcus lactis*, interaction, adherence, invasion, human colorectal cancer cells

INVITED SPEAKER 3.3

Assoc Prof Dr Zetty Norhana Balia Yusof
Universiti Putra Malaysia

Microalgal Vaccines: Transgenic Algae to Deliver Antigens to Fish

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The global aquaculture industry has grown rapidly and most aquatic organisms is farmed. Therefore, protection of farmed fish against diseases is of enormous importance. The vibriosis disease, caused by *Vibrio* species is reported to be one of the most prominent and detrimental diseases in tropical aquaculture industries. Infection of farmed fish causes substantial losses in production and revenue. At present, the most effective method for protecting fish utilizes big amount of antibiotics, synthetic chemicals and they could also induce other side effects. Administering oral vaccines has the potential to reduce costs, simplify vaccine delivery and storage, as well as provide animal welfare benefits. Here we describe the development of microalgal-based immunization systems. Our study aims to utilise locally isolated *Nannochloropsis* sp. as a host for recombinant oral vaccine production. Constructs containing a versatile vaccine candidate for the prevention of infections due to *Vibrio* species in fish were produced using established techniques for genetically modifying the algal genome including homologous recombination and CRISPR Cas9 gene editing strategies. In order to enhance the production and to test the applicability of this algal vaccine, we will investigate the influences of different growth parameters and different feeding strategies. Following this, we will investigate how different harvesting, drying techniques and feed formulation may influence the yield and stability of the vaccine. The algal vaccine will then be tested in animal trials to establish how effective this may be in comparison to the established vaccination method. The effectiveness of the oral vaccine will depend on the digestion and immune response elicited by the microalgae within the gut of the fish. Following the scale up of cultivation and the resulting animal trials, it is hoped that this algal-based oral vaccines will be a good alternative strategy to control diseases in aquatic animals generally, and farmed fish specifically.

Keywords: Microalgae; *Nannochloropsis* sp.; vaccine; expression system; transformation

INVITED SPEAKER 3.4

Dr Nadiah Sulaiman
Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia

How to Mend a Broken Heart? Decellularised Veins as a Scaffold for *In-situ* Vascular Tissue Engineering

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Development of new arterial-like vascular conduits for coronary and peripheral bypass grafting surgery is desirable to overcome the limitations of currently available biological and/or synthetic grafts; to reduce the incidence of early thrombosis, late intimal thickening and infection. One alternative is to use arterialised decellularised venous scaffolds. The aim of this project was to assess the feasibility and suitability of human saphenous vein (hSV) decellularisation as a way to obtain effective biological acellular scaffold for vascular grafting.

We identified the optimal sodium dodecyl sulphate (SDS) concentration needed to decellularise short segments of hSVs (~0.5 cm). Low concentration (0.01%) (w/v) SDS removed most of the nuclei, but this approach was not effective in removing nuclei when using ~4 cm long hSVs. Hence, a modified flow technique of decellularisation was established with successful decellularisation of longer hSV segments. Biocompatibility and integrity of decellularised hSVs were then evaluated. Methylene blue assay detected only trivial residual concentrations of SDS after decellularisation. This was biocompatible as this residual amount of SDS did not affect the viability of porcine carotid artery endothelial cells (pCA ECs) to populate the acellular hSV (AlamarBlue) and to proliferate (EdU proliferation assays). Next, the ECM integrity of acellular hSVs was assessed by quantifying major ECM proteins (collagen, elastin and glycosaminoglycan). Results revealed that decellularisation with ≤0.01% (w/v) SDS did not have a significant impact on ECM content. We then tested the feasibility, safety and capacity of acellular hSVs to arterialise following surgical implant with end-to-end anastomoses in pig without immunosuppression. This pilot study showed that porcine carotid artery xenograft of decellularised hSV was feasible and safe, with 50% graft patency rate at 4 weeks and signs of in situ vascular tissue engineering by host cells. In conclusion, effective decellularisation of hSV is feasible, safe and reproducible as potential acellular vascular scaffolds. Acellular hSVs may be used as vascular acellular scaffolds either for in situ vascular engineering by host cells or following ex vivo manipulation before implantation. However, this approach warrants further investigations.

INVITED SPEAKER 3.5

Assoc Prof Dr Tzann-Shun Hwang
Chinese Culture University, Taiwan

Discovery of Inhibitors against *Mycobacterium bovis* Branched-Chain Amino Acid Aminotransferases through *In Silico* Screening and Experimental Evaluation

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Branched-chain aminotransferases (BCATs) catalyze the transamination of branched-chain amino acids (BCAAs), including leucine, isoleucine, and valine. BCATs have been classified to the fold type IV class of PLP-dependent enzymes. *Mycobacterium bovis* is one of the most dangerous infectious disease between human and bovine; therefore, it requires searching and discovering new medicines against mycobacteria. Polyamine synthesis and its associated methionine (Met) regeneration pathway have been found to be good drug targets in a variety of microorganisms. *Mycobacterium bovis* BCAT (*Mb*BCAT) was reported to be the key enzyme for methionine synthesis. Blocking of methionine synthesis in *M. bovis* was a considerable solution to inhibit the growth of *M. bovis*; therefore, screening inhibitors was a good way to develop medicine against *Mb*BCAT. In order to construct an active form of *Mb*BCAT for an effective docking by *in silico* screening. PMP cofactor of *Mb*BCAT was replaced by PLP cofactor, and then, PLP-form *Mb*BCAT was used as target for autodocking software to perform *in silico* screening of approximately 100,000 compounds. 10 compounds with the highest affinity to *Mb*BCAT were chosen. Evaluating experiments were carried out to determine their inhibitory effects against *Mb*BCAT. All of these candidates were found to possess inhibitory activity against *Mb*BCAT, and compound 4 was found to have the best inhibitory effect with IC50 and *K*i values of 2.37 and 0.45 M, respectively. This candidate was potential to be modified further by the beneficial tool of structure-based chemical design to develop a new drug against *M. bovis*.

Keywords: Aminotransferase, BCAT, Inhibitor, Kinetics, *Mycobactecrium Bovis*

INVITED SPEAKER 4.1

Dr Abdul Rasheed Pathath
Hamad Bin Khalifa University, Qatar

Electrochemical Performance of MXenes (Ti3C2Tx and Nb4C3Tx) and Its Nanocomposite in Aqueous Media: Towards Enhanced Sensing Applications

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Recently, MXene, 2D metal carbides, have been used in different environmental and biological sensing applications such as detection of glucose, hydrogen peroxide, bromate, phenol and heavy metal ions. Pristine MXenes have demonstrated a strong potential in these applications, thanks to their ordered structure, high surface area, metallic and electronic conductivity, etc. Among other research groups, we have developed an ultrasensitive and selective electrochemical sensor based on nafion-Ti3C2Tx for the detection of bromate in drinking water with a detection limit of 41 nM. However, it was demonstrated that the pristine Ti3C2Tx itself is not stable at the anodic potential window which limit its applications in the anodic potential window. In this talk we will highlight our recent efforts to prepare highly stable MXene composted electrodes with the hope to promote MXenes in the electrochemical sensing applications. A nanocomposite of platinum or palladium nanoparticles (PtNPs or PdNPs) and Ti3C2Tx have been made to overcome the instability of Ti3C2Tx and evaluated its sensing performance. The nanocomposite was prepared by self-reduction of platinum (IV) or palladium (II) on the surface of delaminated Ti3C2Tx nanosheets to form Pt or Pd@Ti3C2Tx in which MXene acted simultaneously as a conductive matrix and a reducing agent. The sensor is constructed from Pt or Pd@Ti3C2Tx film casted on glassy carbon electrode and the deposition of PtNPs or PdNPs onto Ti3C2Tx nanosheets has improved the stability as well as the electrocatalytic activity. It was found that Pt@Ti3C2Tx nanocomposite provided very good response towards the electrochemical determination of bisphenol A (an environmental pollutant) with a detection limit of 32 nM and Pd@Ti3C2Tx nanocomposite is capable of giving good response towards the electrochemical determination of L-Cysteine (a biomolecule) with a detection limit of 140 nM.

In addition, the electrochemical stability of Nb4C3Tx MXene as well as its electrochemical behavior towards oxygen reduction reactionswere also carried out. It was found that the Nb4C3Tx is electrochemically stable upto an anodic potential of 0.5 V. The electrochemical stripping analysis is performed to evaluate the lead detection capability of Nb4C3Tx modified electrode after optimizing the influencing parameters such as pH, deposition time and deposition potential. The electreochemical stripping analaysis showed that the Nb4C3Tx based sensor can be used for sensitive detection of lead ion with a detection limit of 12 nM. Additionally the developed sensor showed promising selectivity, stability, repeatability and regeneration.This work demonstrate the potential application of Nb4C3Tx towards the development of different electrochemical sensors.

INVITED SPEAKER 4.2

Dr Che Azurahanim Che Abdullah
Universiti Putra Malaysia

Nanotechnology and Sustainability: Where are we Heading to?

Che Azurahanim Che Abdullah

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Nanotechnology is creating a wealth of new materials and manufacturing possibilities, which in turn will profoundly impact our economy, our environment, and our society. In the proposed presentation an overview on our previous, current and future nano- research activities in the medical, environmental and energy applications driven by basic research will be highlighted. For medical application, nanotechnology offers a real hope in the development of new medical techniques for diagnosis, therapy and specific treatment, regenerative medicine which allow regeneration as well as patient follow-up. For environmental application, nanomaterials offer a profound potential for remediation of various contaminants in the environment. Previous research endeavors have focused on producing various nanomaterials using chemical methods for various applications, but the production of nanomaterials remains costly. In this regard, we need to develop, optimize, and validate innovative green synthesis techniques to sustainably scale-up production of novel nanomaterials. Our continuous research strives for the development of low-cost, non-toxic nanomaterial having capability for affordable application in healthcare, environmental and energy will also be highlighted. The integration of nanosciences and nanotechnologies with other emergent technologies and topics of interests such as biotechnology, environmental remediation, and data-driven design of new materials (materials informatics) will be discussed.

Keywords: nanotechnology, production, application, medical, environment, energy

INVITED SPEAKER 4.3

Assoc Prof Dr Norhayati Ramli
Universiti Putra Malaysia

Bacterial Indicator as a Specific Tool in Assessing the River Water Contamination due to Palm Oil Mill Effluent Final Discharge

Siti Suhailah Sharuddin[a], Diana Mohd-Nor[a,b], Nurhasliza Zolkefli[a], Noor Shaidatul Lyana Mohamad Zainal[a], Mohd Ali Hassan[a], Toshinari Maeda[b], Norhayati Ramli[a]*

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The generation of a huge amount of wastewater known as palm oil mill effluent (POME) by the palm oil industry has become a critical issue to satisfy the increasingly stringent environmental regulations of the final discharge. The use of bioindicator is one of the promising approaches to determine the impact of POME to the receiving river. A thorough outlook on the effect of POME final discharge towards the bacterial community in the receiving river was provided in this study by using flow cytometry and high-throughput MiSeq. The bacterial community dynamics in POME final discharge was compared with the bacterial community in the unpolluted and polluted river due to final discharge. The shift of low nucleic acid (LNA) to high nucleic acid (HNA) bacterial cells in the affected river suggests the transformation of dormant to active cells due to POME final discharge. Hence, it could be served as potential bioindicator in the screening of anthropogenic effect in the receiving river due to this effluent. Besides, the *Chromatiaceae* and *Alcaligenaceae* which were not detected in the upstream but were detected in the downstream part of the river were proposed as the bioindicators to indicate the river water contamination caused by the POME final discharge. These bioindicators were also shown to be present in the different final discharges produced from different biotreatment processes. Specific monitoring of the effluent discharge at low trophic level is considered as an accurate pollution monitoring approach which could be used to complement the conventional POME pollution assessment method.

Keywords: bioindicator; HNA/LNA; palm oil mill effluent; river water pollution; MiSeq

INVITED SPEAKER 5.1

Prof Dr Chi-Wei Lan (John)
Yuan Ze University, Taiwan

The Application of Electro-Fermentation on Improving Production of Echinenone by Marine Microorganism

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Carotenoids are natural pigments which exhibit great biological activities such as antioxidant, anti-inflammatory and provitamin A activities. Owing to their advantageous health effects, carotenoids are widely applied in food, animal feeds, pharmaceuticals and cosmetics industries. Due to the increasing demand for natural carotenoids, interest has been raised by industries and researchers in the production of microbial carotenoids which serve as a promising alternative source of natural carotenoids to substitute the synthetic carotenoids. This first-attempt study tended to decipher synergistic interactions of model redox mediators (RMs) to echinenone production for electrochemically-steered fermentation (ESF). The findings indicated that supplement of RMs could significantly stimulate the production performance of fermentation (e.g., 36% for 4-aminophenol) which was parallel with stimulation of bioelectricity generation in microbial fuel cells (MFCs) as prior studies mentioned. Although redox mediators could usually enhance electron transport extracellular compartment, the mechanisms of bioelectricity generation in MFCs and echinenone production in ESF were very likely functioned in the extracellular and the intracellular compartment, respectively.

Keywords: Redox mediators; Echinenone production; Does-response analysis; Synergistic interaction; Electro-fermentation

INVITED SPEAKER 5.2

Assoc Prof Ir Dr Show Pau Loke
University of Nottingham, Malaysia

Liquid Biphasic Partitioning System: Recent Advances in Downstream Bioprocessing Engineering

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Rapid improvements in bioseparation technology, new regulatory directives, product quality constraints, and the production efficiency have necessitated the development of more advanced and powerful downstream bioprocesses for biotechnology and biopharmaceuticals industrial. This has transformed in dramatically improvements in traditional bioseparation processes as well as the development of entirely new approaches. In this paper, we highlight some of these recent advances. This includes extractive fermentation, extractive bioconversion aqueous two-phase system, aqueous two-phase flotation, and newly developed liquid biphasic flotation. Alcohol/salt liquid biphasic flotation (LBF) with aid of ultrasonication which have the ability of killing two birds with one stone, it not only capable in cell rupturing, it also able to recover bioproducts simultaneously and continuously. The effect of varying crude feedstock concentration, flotation time, type of salt, concentration of salt, type of alcohol, concentration of alcohol, initial volumes of salt and alcohol were investigated. The type of low molecular weight aliphatic alcohols include methanol, ethanol, 1-propanol and 2-propanol, whereas the type of salts tested were dipotassium hydrogen phosphate (K2HPO4), magnesium sulphate (MgSO4), ammonium sulphate ((NH4)2SO4) and potassium dihydrogen phosphate (KH2PO4). The optimal condition for the microalgae protein extraction was achieved with ammonium sulphate at 250 g/L, 2-propanol at 60 % (v/v), VR,initial of 1.0, crude biomass load of 20 g/L, air flowrate of 4 mm3/min and flotation time of 10 min. The recycling of phase components was also introduced to minimize the use of alcohol and salt in the corresponding LBF. It was demonstrated that top phase (alcohol) recycling can achieve increasing performance for three consecutive recycling runs. Under optimized process conditions, the proportion of protein recovered in the top phase was 88.86 % for the third recycle run in microalgae recovery studies.

INVITED SPEAKER 5.3

Dr Nur Syakina Jamali
Universiti Putra Malaysia

Thermophilic Biohydrogen Production utilizing Activated Carbon as Immobilized Cells: Effect of Sugar Concentration and Inoculum to Substrate Ratio in Food Waste Variations

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In this study, the influence food waste in an immobilized sludge reactor (ISR) using granular activated carbon (GAC) as support carrier for dark fermentative hydrogen production was evaluated. Initially, the biofilm was developed through self-attachment immobilization technique in repeated sequencing system of 2 days-HRT until stable hydrogen production was achieved with consistent hydrogen production rates (HPRs) of 3.1 mmol H2/l.h and yield of 1.6 mol H2/mol substrate consumed. The effect of sugar concentration in different types of food wastes were examined. Three type of food wastes consisting bread, rice, fruit were examined at 5% increment of total carbohydrates (TC) from 5g/l to 25 g/l, with one substrate as control. The HPRs of 4.6 mmol H2/l.h with TC of 20g/l rice waste was significantly highest than the results obtained from bread and fruit waste at all concentrations examined. Next, the variation ratio of inoculum to substrate was determine using the optimize TC obtained towards hydrogen production at different variation ratio of GAC-biofilm as inoculum. 5.2 mmol H2/l.h HPR at 15g/l GAC-biofilm to 20 g/l TC rice waste was significantly obtained highest hydrogen production with yield 2.2 mol H2/mol TC consumed. This work has proven the possible future of GAC attached biofilm sludge as promising attachment system to achieve consistent hydrogen production at variety of food waste used as substrate.

INVITED SPEAKER 5.4

Dr Nahrul Hayawin Zainal
Malaysian Palm Oil Board

Current Technologies Available for the Carbonization and Activation of Oil Palm Kernel Shell

Nahrul Hayawin Zainal[a], Astimar Abdul Aziz[a], Noorshamsiana Abdul Wahab[a], Nor Faizah Jalani[a], Ropandi Mamat[a], Mohamad Faizal Ibrahim[b], Suraini Abd-Aziz[b]

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Malaysia, a tropical country is blessed with the abundance of biomass, mostly generated from the agricultural activities especially palm oil industry. Huge amount of biomass has led to the research and development to convert this biomass into value added product. One of the products that can easily being converted from biomass is biocharcoal and activated carbon using oil palm kernel shell (OPKS). Approximately 4.44 million tonnes of OPKS is being generated every year. This OPKS has the most appropriate characteristics to be used as materials for biocharcoal and activated carbon production. There are various carbonization and activation technologies available such as rotary kiln, hollow plinth brick carbonization system, taki carbonization system, microwave carbonization system and two-in-one carbonization-activation system. Some of these technologies are a pilot-scale study and ready for commercialization stage. Overall, this study assists researcher to move forward and work together in exploring a simple and economically-viable technique to produce oil palm biomass wastes-based biocharcoal and activated carbon for a bright future of our industry.

Keywords: oil palm kernel shell; carbonization system; activation system; biocharcoal; activated carbon

ORAL 1.1

Dr Noor Liyana Yusof
Universiti Putra Malaysia

Reduction of the Chilling Injury in Baby Spinach Leaves by Vacuum Impregnation with Selected Compounds

Nazatul Umira Karim[a] and Noor Liyana Yusof[a]

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The global food losses have been making news since ages, with an estimate of 40% of all fresh produce are going to waste before it can be consumed. Spinach is easily injured by low temperature, thus reducing its marketability. In this study, we aimed for alleviating the chilling injury, hence improving its shelf life and quality by using vacuum impregnation (VI) method. This non-destructive method is used to introduce salicylic acid and γ-aminobutyric acid into the spinach tissue, as these compounds have been proven to reduce the chilling injury by increasing its proline content. The control and impregnated leaves were stored up to 7 days in a saturated atmosphere of 2 °C and the proline content, chilling injury (CI) index, weight loss (WL), electrolyte leakage (EL), total soluble solid (TSS), titratable acidity (TA), TSS/TA ratio and pH were determined for every 12 hours. Results showed that the salicylic acid and γ-aminobutyric acid impregnated leaves stored at 24 h after VI treatment have significantly increased the proline content up to 61% and 53% respectively, as compared to the control. The results of CI index, WL, and EL showed that impregnated spinach leaves could be stored cold without significant chilling injury for up to 7 days. The results of TSS of impregnated leaves did not change significantly and the TSS/TA ratio was decreased up to 5 days but subsequently increased to the highest ratio at the end of the storage. The results obtained provides new insights of how spinach leaves could be metabolically affected by impregnating different compounds, subsequently reducing the chilling injury and thus combating the global food losses.

Keywords: salicylic acid; γ-aminobutyric acid; metabolic activity; proline; shelf life

ORAL 1.2

Dr Ezzat Mohamad Azman
Universiti Putra Malaysia

Extraction of Anthocyanins and Phenolics from Dried Blackcurrant (*Ribes Nigrum* L.) Skins

Ezzat Mohamad Azman[a,b], Afroditi Chatzifragkou[a] and Dimitris Charalampopoulos[a*]

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The aim of this study was to develop a process for the extraction of anthocyanins and phenolics from dried blackcurrant skins (DBS) and investigate the stability and antioxidant activity of the extracts. Water, methanol, mixtures of methanol/water and acetic acid buffer solutions were employed and the effects of solvent, temperature, time and pH on the anthocyanin extraction yield was assessed. Acetic acid buffer (pH 1.5) resulted in the highest free anthocyanin and total phenolic content [17.0 mg/g and 37.5 mg gallic acid equivalent (GAE)/g, respectively] after 2 h extraction at 70 °C from DBS amongst all solvents. Also, acetic acid buffer extracts exhibited high antioxidant activity according to the 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay (~60.7% inhibition for extracts containing 37.5 mg GAE/g of total phenolics). Moreover, moderate correlations were observed between anthocyanin content and chroma and redness, depended considerably on the extraction conditions.

Keywords: Dried blackcurrant skins; Anthocyanins; Extraction; Antioxidant activity; Acetic acid buffer

ORAL 1.3

Assoc Prof Dr Ahmad Tariq Jameel

International Islamic University Malaysia

Irreversible Inhibition Kinetics of Alpha-Naphthyl Acetate Esterase Enzyme by Organophosphorus Compounds

Ahmad Tariq Jameel and Nurul Awanis Abdullah

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Alpha-naphthyl acetate esterase (ANAE), an enzyme from plant source is known to be inhibited by organophosphates (OPs) and thus used in biosensors for pesticide detection. Many previous researches have studied the kinetics of inhibition of commonly used enzyme in biosensor applications, i.e., acetylcholinesterase (AChE) by OPs. However, kinetics of ANAE inhibition by OPs has been scantly reported in current literature. The aim of this study is to investigate the kinetics of irreversible inhibition of ANAE by methyl parathion and dichlorovos pesticides. Methyl parathion is an effective, but highly toxic, organothiophosphate insecticide. Dichlorvos is an organophosphate, widely used as an insecticide in household, in public health, and agriculture. Both these compounds inhibit the esterase enzyme. The enzyme ANAE was extracted from the wheat flour and purified using aqueous two-phase separation. The kinetic constants of an irreversible inhibition model were predicted by following the substrate reaction in the presence of the inhibitor for varying incubation times, and for different concentrations of the inhibitor (OP). The hydrolysis of alpha naphthyl acetate by ANAE in the presence of inhibitors, i.e., methyl parathion and dichlorovos was monitored for 1-5 min incubation time by measuring the product alpha naphthol using spectrophotometric method. Then the irreversible inhibition model and graphical approach was adopted to calculate the kinetic constants, k_p (phosphorylation rate constant), and k_d (dissociation constant of enzyme-inhibitor complex). The bimolecular constant, k_i was calculated as ratio k_p/k_d. The experimental data analysis obtained the kinetic constants k_p and k_d, for dichlorovos and methyl parathion which were found in conformity with the values reported in literature.

Keywords: Organophorphates; pesticides; plant esterase; irreversible inhibition; kinetic constants

ORAL 1.4

Dr Lisa Gaik Ai Ong
Universiti Tunku Abdul Rahman, Malaysia

Structural Triacylglycerol Hydrolysis and Glycerol Esterification with Partial Purified Schizophyllum Commune UTARA1 Lipases

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In recent years, lipases gain attention in the removal of oil and grease from wastewater which can be considered as 'green' approach. The main aim of this study was to evaluate the actions of the partial purified lipases toward structural triacylglycerol hydrolysis and glycerol esterification. Based on the results obtained from the primer pairs ITS1 and ITS4, and its morphology, the fungus isolated from rotten oil palm was identified as Schizophyllum commune UTARA1. 2-Level Fractional Factorial Design and 3-Level Factorial Design (Design Expert® ver. 7.0.0) were used to screen and optimise the factors involving in the lipase production. It was found that moisture ratio and use cooking oil ratio influenced the production and these two factors have no interaction among each other. Two fractions with significant lipase activities were obtained from partial purification, named as ScLipA and ScLipB, respectively. Hydrolysis was carried out with three substrates, i.e. crude fish oil, coconut oil and butter. ScLipA was able to hydrolyse all three substrates; however ScLipB only degrades crude fish oil. Oleic acid, lauric acid and acetic acid glacial which represent long, medium and short chain of fatty acids were used for the esterification process. ScLipA was able to form trilaurin and triacetin. While the formation of 2-mono-olien and triacetin were obtained with ScLipB. The partial purification strategy proved to be feasible for partial purification of S. commune UTARA1 lipases that has potential towards wastewater treatments.

Keywords: Solid state fermentation; Saturated fatty acid; Polyunsaturated fatty acid.

ORAL 2.1

Prof Dato' Dr Mohd Ali Hassan
Universiti Putra Malaysia

Clean and Green Technology for Sustainable Palm Oil Industry

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The current practice in the palm oil industry is to optimise oil palm growth for maximum oil yield and improve mill operations for maximum oil recovery. Many of the waste streams in the palm oil mill, especially the palm oil mill effluent (POME) - the main waste stream from the palm oil mills - is treated mainly to remove its high biological oxygen demand (BOD) in order to meet discharge standards prior to disposal. The most common treatment system presently employed for POME is the anaerobic ponding system whereby the biogas produced is released into the atmosphere, causing environmental pollution due to the greenhouse effect. However, for biogas capture projects as suggested in the Economic Transformation Programme under Palm Oil Sector EPP5, in each mill, the scrubbed biogas can be fed into a gas engine to generate easily 1MW of green renewable electricity for grid connection. With the availability of this constant energy, the treated POME with a low BOD which is conventionally discharged can be aerated for recycling into the mill. The anaerobic sludge can be co-composted with biomass such as empty fruit bunch to produce organic compost. With these strategies in place, the palm oil mills can further improve their operations towards achieving a clean and green technology for a more sustainable palm oil industry in the near future.

ORAL 2.2

Dr Siti Fatimah Zaharah Mohammad Fuzi
Universiti Tun Hussein Onn Malaysia

Cell Immobilization of Recombinant Yeast *Kluyveromyces lactis* using Nanomaterials for Stability and Enhance Xylanase Production

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Traditional approach of fermentation by free cell system have a few limitations that need to be encountered for better production especially in industrial scale. In short, alternative approach to overcome the limitations occurred in traditional method of free cell system should be discovered. Thus, cell immobilization is gaining world attention for better advantages in fermentation system especially in industrial scale. Due to economic importance, immobilization have been employed extensively in fermentation industry. Several benefits have been found on the immobilization technology implementation such as higher cell densities, increases stability, can be reuse and reduce the need for cell separation from substrate products for further process. Immobilization also provide protection for cell against shear force. Many types of immobilization methods applied with different kind of carriers and support. With the emerging of nanomaterials application globally, it can be applied for cell immobilization as a support material since it is known to have catalytic behavior that can improve their applied surroundings. Here is the attempt to immobilize recombinant yeast cell of *Kluyveromyes lactis* by using carbon-based nanomaterials with expected high and stable xylanase production.

ORAL 2.3

Assoc Prof Dr Shafinaz Shahir

Universiti Teknologi Malaysia

Screening of Microbial Consortium from Local Hot Springs for Biohydrogen Production

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Biohydrogen production from microorganisms is a form of renewable energy that could supplement the depletion of fossil fuels. In producing biohydrogen, microbial consortia are more feasible than pure cultures because of its operational ease and stability and it is more favourable energetically at elevated temperatures which enables thermophiles to reach higher biohydrogen production than mesophiles. Thus, the aim of this research is to screen the microbial consortium for optimum biohydrogen production isolated from various hot springs in Malaysia. Sampling was conducted at Gadek, Cherana Putih, Gersik and Selayang hot spring and the samples were enriched in Mineral Salt Succinate medium. Upon observing the pigmentation of the samples, the enriched cultures were characterized by pigment analysis and screened for its ability to produce hydrogen under thermophilic and mesophilic conditions using Gas Chromatography-Thermal Conductivity Detector (GC-TCD). The consortium with the highest hydrogen production were identified via isolation and identification by 16S rRNA and the pure isolates were screened for hydrogen production in comparable with the mix bacteria culture. Microbial consortium from Gadek hot spring (GDC) yielded the highest biohydrogen production of 10.2 mmol/L hydrogen compared to other consortia. GDC was isolated and identified to discover the bacterial community of the consortium, however only one bacterium was isolated, identified and screened for biohydrogen production. The isolated pure culture (PJa) has a similarity of 99% to an uncultured *Thauera* sp. and was unable to produce hydrogen at a detectable rate. In conclusion, microbial consortium from Gadek hot spring (GDC) produces the highest biohydrogen production at 50°C in comparison to its pure culture and other hot spring consortia.

Keywords: Biohydrogen, consortium, hot spring

ORAL 2.4

Dr Mohd Huzairi Mohd Zainudin
Universiti Putra Malaysia

Biochar Enhanced Nitrifying and Denitrifying Bacterial Community During the Composting of Poultry Manure and Rice Straw

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Biochar has been shown to be useful additive for mitigating the nitrogen losses during the composting process. This study aims to evaluate the influence of biochar addition on the dynamics of the bacterial community and physicochemical properties including ammonium (NH_4^+), nitrite (NO_2^-) and nitrate (NO_3^-) contents during the composting of poultry manure. The composting was carried out by adding 20% (w/w) of biochar into the mixture of poultry manure and rice straw (PMB) with a 2: 1 ratio and the same treatment without biochar (PMC) was prepared as a control. The finished compost of PMC recorded higher contents of NO_2^- and $NO_3^-$and thus reducing the NH_4^+ content to 10 mg/kg. Meanwhile, a higher amount of the total NH_4^+ content (110 mg/kg) in the finished compost of PMB was achieved with low amounts of NO_2^- (161 mg/kg) and NO_3^- (137 mg/kg) emissions, respectively. The principal component analysis showed that the shift of dominant genera related to Halomonas, Pusillimonas, and Pseudofulvimonas, all of which were known as nitrifying and denitrifying bacteria, significantly correlated with the transformation of NO_2^- and NO_2^-content throughout the PMB composting process. The results showed that the addition of biochar increased the nitrifying and denitrifying community, which promotes the loss of nitrogen content. Higher NH_4^+ content in PMB compost indicates the potential of biochar for capturing the NH_4^+ and thus reducing the loss of nitrogen. This study revealed the bacterial community shifts corresponded with the change of physicochemical changes, which provides essential information for a better understanding of monitoring and improving the composting process.

Keywords: Biochar; Composting; Ammonium, Nitrite, Nitrate; Bacterial community

ORAL 2.5

Siti Jamilah Hanim Mohd Yusof
Universiti Putra Malaysia

Production of Xylooligosaccharides by Carbon Dioxide-Assisted Hydrothermal Pretreatment of Oil Palm Biomass

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Huge amount of oil palm biomass is generated in Malaysia annually alongside with the production of palm oil, leading to an alarming waste management issue. One of current approach to overcome this problem is by utilizing biomass as a raw material for the production of a useful compound such as xylooligosaccharides. A study was conducted to investigate the potential of oil palm biomass, namely oil palm frond, oil palm mesocarp fiber and empty fruit bunch for the production of xylooligosaccharides by carbon dioxide- assisted hydrothermal pretreatment. The biomass was ground prior to pretreatment for 20 minutes at different combined severity factors, achieved by manipulating the operating temperature and initial pressure of carbon dioxide added. It was found that the presence of carbon dioxide at selected pressures has successfully enhanced the hydrolysis of hemicellulose in the oil palm fiber, hence improved the amount of xylooligosaccharides produced. Among all sample tested, the maximum xylooligosaccharides' concentration of 153.06 mg/ g biomass was obtained following pretreatment of oil palm frond at a combined severity factor of -0.40. This result was further supported by the particle size analysis and SEM micrograph, which showed a reduction of particle size and modifications of the surface morphology of the treated fibers. Hence, hydrothermal pretreatment with the addition of carbon dioxide was promising for the production of xylooligosaccharides from oil palm biomass.

Keywords: Hydrothermal pretreatment; Oil palm frond; Empty fruit bunch; Mesocarp fiber; Carbon dioxide, Oligosaccharides.

ORAL 3.1

Dr Darman Nordin
Universiti Kebangsaan Malaysia

Antibacterial Activity of Poly (Lactic-Co-Glycolic Acid) Reinforced Hydroxyapatite Functionalized Graphene Oxide Nanocomposite against *Staphylococcus aureus* and *Escherichia coli*

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Bacterial infection associated with implant materials used in medical devices is the major cause of implant failures. The aim of this study to synthesis graphene oxide (GO) - hydroxyapatite (HA) composite via solid-to-solid method and addition of poly (lactic-co-glycolic acid), PLGA through solution blending method. The effectiveness of antibacterial properties of GO-HA-PLGA composite on bacterial cell also was investigated. The synthesis of exfoliated graphene oxide nanosheets (GO) through Hummers' method was successfully carried out. GO-HA composite was carried out through solid-to-solid method with content of GO were 0.0 wt%, 0.25 wt%, 0.5 wt%, 1.0 wt% and2.0 wt%. An addition of PLGA toward GO-HA composite with ratio of Ca/P (GO-HA: PLGA) was 7:3. An optimum HA powder has been successfully produced through wet precipitation method with synthesis temperature of 40°C and calcined temperature of 600°C. GO-HA composite was successfully produced by characterization of GO-HA composite using Transmission electron microscopy (TEM) proved that HA was randomly dispersed on surface and denser as GO content increases. The existing of all functional group by GO-HA-PLGA composite such as (PO43-) in HA, (C=C, OH) in GO and (CH2, CH3, C-O and C=O) in PLGA were confirmed by Fourier transform infrared (FTIR). The Field Emission Scanning Electron Microscopy (FESEM) morphology showed that all GO-HA-PLGA composite have porous structure with HA randomly distributed on the surface and at porous with enhanced mechanical properties. Raman's analysis revealed that there are D and G stretching bands assigned as GO, =C-H, C-O, C-H and C=O stretching bands assigned as PLGA bands and PO43- assigned as HA. Based on agar diffusion method, the minimal antibacterial activity was carried out by GO-HA composite for both bacterial but more affinity towards negatively gram (E. coli). However, GO-HA-PLGA composite were not inhibit bacterial at all. An optimal antibacterial was 1.00 wt% GO-HA composite against E. coli bacteria. GO-HA-PLGA triphase composite act as antibacterial coatings and enhance mechanical towards biomedical implant.

Keywords: Poly (lactic-co-glycolic acid); Nano-Hydroxyapatite; Graphene Oxide; Antibacterial

ORAL 3.2

Dr Syazwani Itri Amran
Universiti Teknologi Malaysia

Molecular Docking and 3D QSAR Analysis of Plant Phytochemicals for New FTO Inhibitors

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Obesity contributes to severe chronic diseases such as diabetes, heart diseases, cardiovascular diseases and certain cancer types. Inhibition of fat mass and obesity-associated protein (FTO) is associated with anti-obesity properties hence is a potential pharmacological target for anti-obesity medicines. To identify FTO inhibitors, we screened a set of phytochemical compounds extracted from an indigenous plant in Sarawak using molecular docking approach. A three-dimensional quantitative structure activity relationship (3D-QSAR) was performed to investigate the binding between FTO and these compounds in order to design potent inhibitors. Based on these satisfactory results, we designed several new FTO inhibitors and their inhibitory activities were predicted by the molecular models. Additionally, those newly designed inhibitors, showed promising results in the preliminary *in silico* ADMET evaluations, compared to reference inhibitor; Orlistat. The results expand our understanding on the structure of FTO inhibitor and could be of great help in lead optimization for early drug discovery of highly potent inhibitors.

Keywords: Fat mass and obesity-associated protein (FTO); FTO inhibitor; molecular docking; three-dimensional quantitative structure activity relationship (3D-QSAR)

ORAL 4.1

Dr Tengku Arisyah Tengku Yasim-Anuar
Universiti Putra Malaysia

Characterization of Nanobiochar from Oil Palm Empty Fruit Bunch by Ball Milling

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Growing environmental consideration have led to search for advanced nanomaterials in order to be used as a reinforcement material for biocomposite preparation. Nanobiochar (NBC) has caught tremendous interests mainly due to its renewability, biodegradability and availability. NBC has a few unique features such as great porous structure, big surface to volume ratio and high degradation temperature, which makes NBC the best reinforcement material for polymer composite. This study focused on producing NBC from oil palm empty fruit bunch (OPEFB) by a planetary ball mill. OPEFB was pyrolyzed at 500°C prior to ball milling for 90 – 450 minutes to produce NBC. Morphological analysis using field emission scanning electron microscope and dynamic light scattering confirmed the occurrence of NBC with size less than 50 nm after 90 minutes of milling. The NBC produced was also thermally stable at temperature between 450 – 500 °C.

Keywords: Nanobiochar, Oil palm empty fruit bunch, Ball milling

ORAL 4.2

Assoc Prof Dr Mas Jaffri Masarudin

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Enhanced Therapeutic Delivery of Hydrophobic and Hydrophilic Compounds via Polymeric Nanoparticle System Based on Chitosan

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Polymeric nanoparticles have been a staple nanomaterial for encapsulation and enhanced delivery of therapeutic compounds. Nano-mediated delivery promotes a better distribution of energy in vivo by increasing intracellular uptake of such compounds for enhanced therapeutic uptake. Due to its biologically-inert nature and robustness, chitosan nanoparticles have found many beneficial uses in a myriad of applications including in non-parenteral drug deliveries of anticancer therapy, gastrointestinal and pulmonary diseases, as well as drug delivery to the brain. We describe in this study, an optimised monodispersed chitosan nanoparticle system systematically modified for increased localisation, accumulation, and release of compounds in various cancer cells. Nanoparticles were synthesised at diameters below 70 nm, modified for fluorescent tracking and increased encapsulation of hydrophobic compounds. Encapsulation of compounds including chlorogenic acid and silibinin led to particle size expansion and hybrid compound-chitosan chemical properties analysed via DLS, IR, TEM, and flow cytometry. In addition to augmented therapeutic responses of the compounds, the nanoparticles were shown to inhibit proliferation and migration of cancer cells; indicating potential anti-metastatic properties. Findings arising from cellular uptake analyses surmised nanoparticle-cancer cell entry 30 mins post-treatment; where this process continually occurred up to 48 hours. Interestingly, cargo release only occurred 6 hours post treatment and a controlled release system was exhibited up to 48 hours without extracellular leakage. Findings from this study provides fundamental evidence towards understanding cell-nanoparticle interaction dynamics and contribute towards critical developments of the drug delivery system for targeted and enhanced drug delivery parameters, most pertinent in pharmaceutical and medical fields.

Keywords: nanobiotechnology; drug delivery; chitosan nanoparticles

ORAL 5.1

Assoc Prof Dr Hidayah Ariffin

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Enhanced Productivity of Nanocellulose by using Resources from Palm Oil Industry

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Malaysia is the second largest producer of palm oil in the world with more than 100 million tonnes of oil palm fresh fruit bunches being processed annually. From this amount, only 24% goes to crude palm oil and the rest are mainly solid residue in the form of lignocellulosic biomass. Other than biomass, palm oil industry also has a valuable untapped resource which is steam energy due to the excessive burning of the biomass. These two resources are the key resources in cellulose nanofibrils (CNF) production as the mechanically processed CNF requires high energy for its production. In this study, CNF from OPB was produced using a lab scale wet disk mill (WDM) and characterized for their morphological, thermal stability and crystallinity properties. The CNF produced had average width of less than 10 nm when observed using a TEM, crystallinity between 50 – 60 % and thermally stable up to 350 °C. Superheated steam (SHS) was used as a method of pretreatment prior to the WDM processing to improve the productivity. It was found that the productivity of the CNF improved by more than 100% after the cellulose was treated with SHS. Our results showed that SHS is an efficient pretreatment method to improve the productivity of CNF. With the integration of resources available from the palm oil industry, it is foreseen that sustainable CNF production can be realized in Malaysia.

Keywords: Cellulose nanofibrils, oil palm biomass, productivity, superheated steam, wet disk mill

ORAL 5.2

Dr Mohd Zulkhairi Mohd Yusoff
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Biodiesel Derived Crude Glycerol as a Substrate for Biohydrogen Production Using Engineered *Escherichia coli* Strain

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Biohydrogen is one of the alternative renewable energies that could be produced from numerous renewable substrates such as biomass. It is an attractive energy source due to its high energy content and produces only water vapour instead of greenhouse gasses during combustion.Biohydrogen from biomass is a fascinating approach as it comes from renewable material such as crude glycerol from biodiesel production. Biodiesel is a promising alternative, and renewable, fuel. As its production increases, so does a production of the principal co-product, crude glycerol. The effective utilization of crude glycerol will contribute to the viability of biodiesel. The glycerol is an attractive carbon source for biofuel production since it is cheap and abundant due to the increasing demand for renewable and clean energy sources, which includes the production of biodiesel.In the previous investigation, the metabolic engineering approach was applied to the Escherichia coli wild-type by knocking out several genes. The engineered strain had able to utilize glycerol and reached the theoretical maximum yield of 1 mol H_2/mol glycerol after 48 h. Under low partial pressure fermentation, the strain grew over 2-fold faster, indicating faster utilization of glycerol, respectively. A big challenge for this study is to evaluate the competency of the engineered strain to maintain the performance of biohydrogen productivity by utilizing organic waste (glycerine waste) as a carbon source.

Keywords: Biohydrogen; Escherichia coli; Glycerol; Renewable energy

SPEAKER YR 1.1

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Universiti Teknologi Malaysia

Production of Bioethanol by Marine Yeast Strain A3P1 Using Seawater Medium in Fed-Batch Culture

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The uncertainty of crude oil reservoir has made biofuels as an alternative fuel source where research is rapidly been carried out. However, biofuels production requires large amount of fresh water thus the usage of seawater as the replacement provides advantages in terms of cost and availability. Bioethanol production by strain A3P1 in batch culture was conducted in 2L bioreactor using seawater medium. The depletion of glucose (S) in batch culture and maximum biomass (Xmax) was at 12 hours with the specific growth rate (μ) of 0.263 h-1. Furthermore, the Yx/s was recorded at 0.147 g/g with Yp/s and Yp/x were calculated at 0.138 g/g and 0.936 g/g respectively. In fed-batch culture, effects of different dilution rates were studied with optimum dilution rate (D) for highest bioethanol production was recorded at 0.049 h-1 with 4.534 g/L and productivity of 0.302 g/L/h. The effects of different glucose concentrations of 50, 70 and 100 g/L were performed using 0.049 h-1 dilution rate. Glucose concentration of 100 g/L gives the highest bioethanol production of 4.534 g/L with productivity of 0.302 g/L/h followed by 70 and 50 g/L. The Yx/s was recorded at 0.035 g/g with Yp/s and Yp/x were calculated at 0.045 g/g and 1.292 g/g respectively. The kinetic comparison of batch and fed-batch cultures were observed with fed-batch shows the highest bioethanol production with fold of 6.638 and ethanol percentage yield of 663.8% compare to batch culture. Overall, bioethanol production in 2L bioreactor in variable feeding mode of fed-batch culture proved to be more efficient than batch culture.

Keywords: Marine yeast strain A3P1, Bioethanol, Fed-batch, Seawater

SPEAKER YR 1.2

Fatin Nur 'Aliya Mohamad Ros

Universiti Kebangsaan Malaysia

The Production of Influenza Vaccine Compliance Shariah by Using an Avian Cell: Duckcelt-T17 via Simulation

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Recently, influenza vaccines' manufacturing become widen and be a crucial sector in the pharmaceutical industry in the world. Hence, a lot of improvisation of the process needed from time to time according to the cell line available as the virus always undergo genetic changes and form a new virus that cannot be detected by the immune system. Most of the researcher are looking for the new effective cell line which have a high yield production, easily scalable and permissive to multiple viruses. Certain Muslims' community do not accept vaccine as they know the ingredients of the vaccine comes from the prohibited animals such as dog and pig. Most of the current industry using the mammalian cell as the cell lines which is prohibited to the Muslims. The uses of avian cell will be the solution for the problem. However, the optimum production of avian cell still in time of reaction, substrate concentration is still in the development. Avian cell line is from the bird's species can be used as the host cell and will solve the halal's status. This study mainly focuses on the reaction and process in the bioreactor by using a cell line named DuckCelt-T17 and will be simulated by a software called SuperPro® Designer. The reaction time are 24, 36, 48 and 72 hours will be tested in this research. It is predictable to get 6.5 x 10^6 cells/mL of vaccine between 24 to 36 hours.

Keywords: Influenza vaccine; Shariah compliance; DuckCelt-T17, SuperPro® Designer

SPEAKER YR 1.3

Izza Nadira Abu Bakar
Universiti Putra Malaysia

Characterization of Different Accessions of Pegaga (*Centella asiatica* L.) from Malaysia and Thailand

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Centella asiatica (L.) Urb. is the scientific name to the common herb called Pegaga which originates from the Apiaceae family have been commonly used around the world especially in the tropical regions such as India, Southeast Asia and Asia due to its beneficial properties found in its bioactive compounds, mainly the biomarkers of this herb; the triterpenes. The usage of this herb has undeniable benefits to its consumers as it is now listed as one of the top 10 herbs in Malaysia by the Ministry of Agriculture (MoA). Confusion in its various accessions have led to uncertainty in which accession is superior for planting, consumption, pharmaceutical and nutraceutical products. This study focuses on determining the best accession with supporting findings from 4-analysis conducted; bioactive compound (Asiaticoside), total phenolic content (TPC), antioxidant activity and antimicrobial properties. This study also focuses on comparing different accessions of Pegaga from 2 countries that extensively uses this herb; Malaysia and Thailand based on its environmental factors which influences its morphological growth, bioactive compounds, total phenolic content, antioxidant activity and antimicrobial properties on Pegaga.

Keywords: *Centella asiatica* (L.), total phenolic content, antioxidant activity, bioactive compounds, antimicrobial properties

SPEAKER YR 1.4

Siti Fatimah Jamaludin
Universiti Teknologi Malaysia

Application of Seawater as a Medium for Lignocellulolytic Enzymes Production by Marine Fungi using Oil Palm Empty Fruit Bunch in Solid State Fermentation

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The abundance of lignocellulosic biomass in Malaysia can be utilize by lignocellulolytic enzyme. Most of the medium used for enzymes production rely on the use of fresh water. In this study, seawater as a medium for lignocellulolytic enzyme production by marine fungi isolated from mangrove samples; oil palm empty fruit bunch (OPEFB) was used as substrate in solid state fermentation (SSF). The composition of seawater consisted of macro and micro nutrients such as, Calcium, Potassium, Magnesium and Sodium. Four marine fungi known as SSE.HTM, SSE.PUZ, SSE.PHP, and SSE.PUT were isolated from Tanjung Piai's sediment samples. The SSE.HTM fungi isolated from mangrove sediments with decayed wood (SSE) showed the largest halo-zone on CMC plate as compared to other fungi. The quantitative analysis of enzymes production showed SSE.PUZ from SSE produced the highest production of exoglucanase (5.43 U/g), beta-glucosidase (5.11 U/g), xylanase (54.93 U/g), and lignin peroxidase (472.11 U/g). Production of endoglucanase (16.63 U/g), laccase (61.67 U/g) and manganese peroxidase (31.56 U/g) were dominated by SSE.HTM and SSE.PHP, respectively. SSE.PUZ was selected for optimization of lignocellulolytic enzyme production based on different concentrations of seawater. The highest of lignocellulolytic enzyme was produced at 50% (v/v) concentration of seawater. The results of this study demonstrated that SSE.PUZ produced the highest lignocellulolytic enzyme in solid state fermentation (SSF).

Keywords: marine fungi; seawater; lignocellulolytic enzyme; solid state fermentation

SPEAKER YR 1.5

Wan Nurul Akmal Wan Murni

Universiti Teknologi Malaysia

Antioxidant Activity of Local Commercial Homemade Juice

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The present study was conducted to determine antioxidant activity of local commercial homemade juice that is made up from five natural products which are ginger, garlic, honey, lemon and apple cider vinegar. This study is conducted to each product's know its ability as free radical scavenging source. The juice sample and its control ingredients samples have been tested for their antioxidant activity based on 2,2-diphenyl-1-picryl-hydrazyl-hydrate (DPPH) free radical scavenging assay and ferric reducing antioxidant power (FRAP) assay. From both assays, the juice samples were comparable to the samples of its control ingredients. The radical scavenging activity (RSA) for the juice sample is 54.94 % which is the second highest after ginger (60.95 %). While, the FRAP value for the juice sample is 3.02 mM of Fe^{2+} and it is being average among all samples. It is concluded that the local commercial juice has high antioxidant activity and it can be considered to be a potential natural antioxidant drink to maintain healthy lifestyle and reduce the risks of various chronic diseases.

Keywords: Antioxidant activity, homemade juice, ginger, garlic, honey

SPEAKER YR 1.6

Nurul Atiqah Osman

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Effect of Palm Oil Mill Effluent Final Discharge on the Characteristics of Napier Grass

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Napier grass (*Pennisetum purpureum*) also known as "elephant grass" was first introduced in Malaysia in the 1920's from East Africa and it is now the most popular fodder grass for livestock. The uses of Napier grass as a phytoremediation plant to remediate industrial and agricultural wastewater is mostly well-known and widely applied. Napier grass has been proven to successfully treat palm oil mill effluent (POME) final discharge by constructed wetland system. POME final discharge consists of phosphorus and potassium which are vital element for plant. However, it is also containing metals that could be the inhibitor towards the growth of plant. Therefore, this study attempts to determine and evaluate the characteristic of Napier grass supplied with POME final discharge in a constructed wetland system and compare it to the Napier grass in a controlled study. Amongst the parameter observed after the phytoremediation were growth performance, nutrients' concentrations and heavy metals, present in various parts of the plants. The result revealed that the height increment of Napier grass in wetland system supplied with POME FD was 61.72% as compared to those grown in the wetland system supplied with rain water which was 14.42%. In addition, the number of leaves and tillers in treatment were 18 ± 1 and 134 ± 6, which are higher as compared to control, 4 ± 2 and 25 ± 6, respectively. It was also found that the heavy metals in all parts of the plant were in range of 0-4.36 mg/kg which are below the standard limit of the World Health Organization (WHO). These results indicated Napier grass used in a phytoremediation is safe for further use as an animal feed or as carbon source for biofuel production.

Keywords: Napier grass; POME final discharge; phytoremediation; Heavy metal

SPEAKER YR 1.7

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Treatment of POME Final Discharge Using Napier Grass In Wetland System

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Content: Palm oil mill effluent (POME) is the one of most difficult waste to manage since it is being generated in a large volume most of the time. Treated POME (final discharge) usually will be discharged to a nearby land or river since it is the easiest and cheapest method to disposal. However, it is common to find that POME final discharge quality does not meets the river water quality, resulted in unintended pollution towards the rivers. One of the many ways to overcome this problem is by treating the final discharge by feeding it into a constructed wetland (CW). CWs are notoriously famous worldwide in the treatment of various wastewater with phytoremediation was introduced in this treatment process. The mechanism of phytoremediation in a wetland system is, by degrading and removing contaminants from the environment, while at the same time, it can transform or immobilize toxic compounds located in soils, sediments, and more importantly in polluted ground water and wastewater. Napier grass plant shows very fast, rapid regrowth rates and strongly responds to nutrient supply. At the end of the study, this system produced an excellent quality water by reducing the level of COD by 50%, TSS by 86%, ammonia by 71%, colour by 78%. From this study, it can be concluded that the modified constructed wetland system can reduce the contamination from the final discharge, which finally will produce water that is as clean as the river water

Keywords: constructed wetland, Napier grass, POME, final discharge, phytoremediation

SPEAKER YR 1.8

Kajan Muneeswaran
University of Colombo

CADMA and Allele Specific qPCR Techniques Outperforms End-Point PCR Based SNP Genotyping Techniques

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Competitive amplification of differently melting amplicons (CADMA) is a Real-time quantitative polymerase chain reaction (qPCR) technique based on high resolution melt (HRM) analysis to identify different SNP genotypes which could also be determined using the Ct values in the allele specific qPCR (AS-qPCR). Amplification refractory mutation system (ARMS) PCR is an endpoint PCR based SNP genotyping technique which uses two allele specific primers at opposite directions and two gene specific primers placed at different distances to make it possible to distinguish the two allele specific PCR products by length. In our study, we have designed primers for both endpoint PCR and qPCR-based assays to identify a mutation (dbSNP ID: rs9939609) in the first intron of the FTO gene, which is expected to have an association with polycystic ovary syndrome (PCOS) and antipsychotic induced weight gain (AIWG). CADMA primers were designed manually and modified using the ARMS-PCR principle to introduce a mutation in the penultimate position. The ARMS-PCR primers were designed using soton.ac.uk server. HRM analysis and AS-qPCR were performed using HOT FIREPol® EvaGreen® Mixon a Bio-Rad CFX96 Touch qPCR and ARMS-PCR was performed using HOT FIREPol® Blend Master Mix on an ABI2720 thermal cycler. The genotype results of 100 identical samples from the three different assays compared with Taqman predesigned assay indicated that AS-qPCR results based on ΔCt clustering and CADMA melt curve clustering were completely in agreement. Therefore, it was concluded that CADMA and AS-qPCR assays are both time and cost efficient than endpoint PCR based methods.

Keywords: CADMA; HRM; qPCR; SNP; Genotyping

SPEAKER YR 2.1

Nathania Puspitasari
National Taiwan University of Science and Technology

Recombinant Hydrophobin HGFI Stimulated Enzymatic Hydrolysis of Polyethylene Terephthalate

Nathania Puspitasari and Cheng-Kang Lee*

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Poly(ethylene terephthalate) hydrolase (PETase) from *Ideonella sakaiensis* exhibits an ability to degrade poly(ethylene terephthalate) (PET), and is thus regarded as a potential tool to solve the issue of polyester plastic pollution. We showed that the rate of PETase-catalyzed PET hydrolysis could be enhanced in the presence of hydrophobin. In this work, a novel class I hydrophobin named HGFI from *Grifola frondosa* was expressed in *Escherichia coli*. The HGFI gene was cloned into pET-24a expression plasmid at the NdeI and SalI restriction sites and then transformed into *E. coli* SoluBL21 strain for the production of recombinant hydrophobin. Most of the recombinant HGFI was produced as insoluble protein, however, refolding and purification could be achieved using immobilized metal affinity chromatography (IMAC). SDS-PAGE analysis of the isolated HGFI showed the presence of 14 kDa polypeptide. Filament or fibril-like structures of hydrophobin HGFI were imaged using Atomic Force Microscopy (AFM) on mica surfaces. The surface tension of water was significantly decreased with the addition of HGFI. Recombinant PETase was also successfully expressed in *E. coli* as a soluble protein with molecular weight approximately 30 kDa. Both the recombinant and native hydrophobin HGFI could enhance the PET-hydrolysis in the presence of recombinant PETase. It is speculated that the wetting effect of HGFI acts on PET surface converts PET to become hydrophilic and leads PETase easier to contact and attack the surface. Here we also investigated whether the PET-hydrolyzing activity of recombinant PETase would be further enhanced by fusion to recombinant hydrophobin HGFI.

Keywords: Hydrophobin; PETase; recombinant; PET; biodegradation

SPEAKER YR 2.2

Mohd Azwan Jenol

Universiti Putra Malaysia

Enhanced Volatile Fatty Acid Production from Sago Hampas via Anaerobic Digestion by *Clostridium beijerinckii* SR1

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Malaysian sago industry has been known to be one of the top exporters of sago starch in the world. The concern towards the sago waste management has becoming the most important topic since the current practice is direct dispose into the nearby river. Sago hampas is a by-product produced during the extraction process and composes of 58% (dry basis) of starch content. It has the potential to use as a feedstock for the production of value-added products. The bioconversion of sago hampas into volatile fatty acids (VFAs) through anaerobic digestion by *Clostridium beijerinckii* SR1 was enhanced via one-factor-at-a-time (OFAT) approach. *C. beijerinckii* SR1 has successfully produced 6.71 g/L of total VFAs yielded 0.30 g/g. Through OFAT, the effect of substrates concentration, nitrogen concentration as well as the addition of inorganic nitrogen sources were investigated. Overall, the production of VFAs from sago hampas significantly enhanced by 14.6%, with the total VFAs of 7.69 g/L yielded 0.45 g/g.

Keywords: Sago hampas; volatile fatty acids (VFAs); VFA platform; anaerobic digestion

SPEAKER YR 2.3

Muhammad Redza Mohd Radzi

Universiti Teknologi Malaysia

Anticancer Activity of Carbon Nanotubes-Mediated Hyperthermia Treatment in Murine Breast Cancer Model

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Breast cancer is one of the most virulent types of cancers that contribute to high mortality worldwide. Hyperthermia (HT) therapy was introduced as one of the alternatives to treat breast cancer. However, HT caused poor specific heat distribution in tumor during treatment which lead to unintentional destruction of normal cells. Therefore, this study explores the integration effect of multiwalled-carbon nanotubes (MWCNT) in combination with hyperthermia for breast cancer therapy regime. MWCNT was recognized as promising candidate due to its thermal conductance which can provides specific heat distribution in tumor. In this study, breast cell was inoculated subcutaneously into right flank of female Balb/c mice. Tumors were intratumorally injected with MWCNT and subjected to local HT for 3 consecutive days. The tumor progression was monitored. In another experiment, mice were sacrificed after 24 hr post-treatment and tumors were harvested for pathological examination by H&E and immunohistochemical analysis for PCNA and Hsp70 expression. Results from this study demonstrated that mice from combined treatment displayed complete tumor eradication and significantly prolonged median survival (P<0.001). Furthermore, histological analysis of tissues from combined treatment showed that the tumor experienced cell necrosis. For Hsp70 expression, HT and combined treatment both showed expression of Hsp70 protein corresponding to hyperthermia. In addition, significant reduction of PCNA-positive cells was observed in treated group indicated that HT in combination with MWCNT treatment inhibited tumor cells proliferation. Altogether, results presented in this study suggested that MWCNT might have a potential as an anticancer therapeutic agent in future breast cancer treatment.

Keywords: Breast cancer; Hyperthermia; Carbon nanotubes

SPEAKER YR 2.4

Faridah Aminullah
Universiti Teknologi Malaysia

Biosynthesis of Silver Nanoparticles using *Persicaria Odorata* (L.) Sojak and Their Antibacterial Activity: A Preliminary Finding

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Green synthesis approach has gained increasing attention in silver nanoparticles (AgNPs) synthesis as an alternative route to existing approach which involves toxic chemicals. Recent studies showed that the utilization of plant extract as a reducing agent for the synthesis of AgNPs is more rapid and ecological. This present study aims to synthesis AgNPs using *Persicaria odorata* (L.) Sojak plant extract, characterize and evaluate its antibacterial activity. In this study, aqueous extract of *P. odorata* was allowed to interact with aqueous silver nitrate for 24 hours. The formation of AgNPs was confirmed by ultraviolet-visible (UV-vis) spectrophotometer and was further characterized by Fourier transform-infrared (FTIR), X-ray diffraction (XRD), and field-emission scanning electron microscopy (FESEM). The antibacterial study was conducted through disc diffusion technique to evaluate the antibacterial activity of AgNPs against skin-associated bacteria *Staphylococcus aureus* and Methicillin-Resistant *S. aureus* (MRSA). Results from the characterization analysis revealed UV-vis spectrum showed an absorption peak at around 440 nm. FTIR spectral profile and XRD analysis showed the presence of biomolecules responsible for the productions of AgNPs and the crystalline nature of the synthesized AgNPs. Through FESEM images, the spherical nature of the synthesized AgNPs was observed. These results confirmed that AgNPs have been successfully synthesized using aqueous leaves extract of *P. odorata* as the reducing agent. In addition, it was also demonstrated that AgNPs synthesized in this study showed some antibacterial activity against tested bacteria. This present study suggests that plant-mediated synthesized AgNPs possess antibacterial properties which can be applied in skin-associated bacterial infection.

Keywords: Silver nanoparticles; green synthesis; characterization, antibacterial

SPEAKER YR 2.5

Zetty Amirah Zulkifli
Universiti Teknologi Malaysia

Antioxidant protein profiling of *Moringa oleifera* petiole

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Moringa oleifera is a medicinal and multipurpose tree with defined functions for every part. However, the petiole is usually discarded by the consumers in search of its leaf and seed. Obviously, zero study on *M. oleifera* petiole could be found even though multiple studies on the leaf and seed were published. There are several studies on the antioxidant activity of the petiole's crude extract from other plant but none from the protein extract. Meanwhile, antioxidant protein is getting bigger attention from the scientist since it is claimed to have better specificity and affinity to protect our cells from damage. Thus, this study was established to unveil the antioxidant protein present in the petiole of *Moringa oleifera*. The protein from the petiole was extracted before its quality and quantity were determined via one dimensional polyacrylamide gel electrophoresis and Bradford assay. After in-solution digestion was performed on the protein sample, it was sent for Liquid chromatography-tandem mass spectrometry (LC-MS/MS) analysis. Finally, PEAKS Studio software was used to identify the antioxidant protein. Meeting our expectation, several antioxidant proteins were successfully identified in the sample including glutaredoxin, glutathione peroxidase, catalase, and superoxide dismutase. From the total protein, 5% of them were the antioxidants related protein. Hence, it can be concluded that Moringa petiole is one of the potent sources of antioxidant protein worth commercializing and should be investigated further to harness its special traits including the antioxidant activity.

Keywords: *Moringa oleifera*, petiole, protein, antioxidant

SPEAKER YR 2.6

Nurfadhila Nasya Ramlee
Universiti Teknologi Malaysia

Production of Biobutanol by *Clostridium beijerinckii* SR1 using Glucose in Seawater Medium

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Fluctuation of crude oil prices worldwide as well as environmental concern have facilitated the research on biofuels. To expand biofuel and feedstock production, large investments are needed as well as advancement in technology. In the process of biofuel production, abundant of fresh water are being used during preparation of fermentation media. Hence, substitution of fresh water to sea water based-media will be a great help. The analysis of sea water component shows sea water consist of macro and micro elements including Ca, K, Na, Mg and Sr which are required for bacterial growth and biobutanol production, thus reducing the need of adding additives to the fermentation media. ABE fermentation was conducted by *Clostridium beijerinckii* SR1 using different concentrations of seawater and distilled water acted as positive control. The highest butanol and total solvents production were observed when using 80% (v/v) seawater with 0.617 g/L and 2.698 g/L with maximum productivity 0.020 g/L/h and 0.064 g/L/h, respectively. The yield of biobutanol $Y_{P/S}$ and $Y_{P/X}$ were found to be 0.035 g/g and 0.588 g/g. The effect of different glucose concentrations was performed using 80% (v/v) seawater. The highest butanol production of 0.220 g/L was observed by using 20 g/L glucose while 30 g/L glucose showedthe highest total solvents production, 3.025 g/L. The yield of biobutanol $Y_{P/S}$ and $Y_{P/X}$ were 0.025 g/g and 2.715 g/g. The potential application of sea water as a medium for biobutanol production can be applied for replacement of fresh water during biorefinery processing.

Keywords: *Clostridium beijerinckii* SR1, Biobutanol, Seawater

SPEAKER YR 2.7

Muhammad Norhelmi Ahmad

Universiti Malaysia Sarawak

Novel Fermentable Sugar from Sago Frond Sap as Feedstock to Produce l-lactic Acid using *Lactococcus lactis* IO-1

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The utilization of sago frond is an elegant solution to solve discreditable of sago palm plantation due to long maturation period. Sago frond not only made up of abundant of lignocellulosic component but also sap that consist of fermentable sugar. Approximately 5 Kg of sago frond required to produce 1 L of the sap. Extraction of sago frond sap (SFSp) conducted by pressing the sago frond able to recover 6-7% free sugar consist of 65% glucose and 35% xylose. The ability of *Lactococcus lactis* IO-1 to utilize both glucose and xylose makes SFSp as an ideal substrate for the production of L-lactic acid. Meanwhile, there are 2% starch also recovered from SFSp by centrifugation and collected for the production of sugar via enzymatic hydrolysis in the separated procedure. SFSp can be kept in cold room at 4℃ for 10 days without reducing the integrity of the sap as substrate to produce lactic acid while concentrated SFSp can be stored at room temperature. The yield of lactic acid production from SFSp (as it is) is 0.58±0.05 g/g while diluted (0.5) SFSP is 0.53±0.05 g/g shows no significant different however the sugar consumption of SFSp and diluted SFSp shows large different which are 33.38% and 78.5% respectively. Apparently, SFSp is sustainable raw material to obtained exceptional fermentable sugar for the production of fermentation product such as organic acid and biofuel.

Keywords: sago frond, glucose, xylose, L-lactic acid.

SPEAKER YR 3.1

Abubakar Abdullahi Lawai

Universiti Putra Malaysia

Pyrolysis Degradation Behavior of Oil Palm Woody Biomass and Industrial Wood Chip using Thermogravimetric Analysis

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Knowledge of pyrolysis thermal behavior of biomass is a crucial first step towards proper design of thermal conversion systems. In this study, the physicochemical properties and pyrolysis kinetic parameters of oil palm frond, oil palm trunk and industrial woodchips were investigated. The physicochemical properties were determined using proximate analysis, CHNS analyzer and FTIR spectrophotometer, while pyrolysis experiment was carried out using thermogravimetric analyzer (TGA) under inert atmospheric condition at different heating rates. All the biomass materials contained high volatile matter at high organic surface functional groups. Three different models were used to simulate the TGA data and the simulation results showed good prediction capability. The activation energy, frequency exponential factor and reaction order were calculated from the models. The thermal stability of the biomass followed the order of industrial wood chip > oil palm trunk > oil palm frond indicating that oil palm frond is the least thermally stable biomass. The outcome of this study could be useful for a proper design of combustion system and production of carbonaceous products from the biomass materials.

Keywords: pyrolysis; thermogravimetry; kinetics; thermal stability; woody biomass;

SPEAKER YR 3.2

Leow Yew Seng
Universiti Putra Malaysia

Production of Biosurfactant using *Bacillus subtilis* Natto Fermentation

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Biosurfactants are microbial amphiphiles produced as primary metabolites by varieties of microorganisms. They are preferred over chemically derived surfactants owing to their intrinsic properties such as superior environmental compatibility, biodegradability, anti-inflammatory and antimicrobial activity, and higher tolerance towards extreme environmental conditions such as temperature, salinity and pH levels. However, commercial production of biosurfactants is still lacking. The main reason for this is due to low yields obtained from fermentation processes, which contributes to the overall high production costs making it not economical compared to chemical production route. In the present study, optimisation on fermentation conditions was conducted to enhance the yield of biosurfactant. Food grade probiotic strain *Bacillus subtilis* natto was used as a biosurfactant producer. *B. subtilis* natto fermentation was conducted by varying different parameters such as nitrogen source, vegetable oils, inoculum size, amino acids and pH of fermentation medium. Results showed higher yield of biosurfactant production from *B. subtilis* natto when the initial pH of fermentation medium was adjusted at pH 6.8, peptone as nitrogen source, low inoculum size (4% v/v) and addition of palm olein as a precursor in the fermentation medium.

Keywords: *B. subtilis* natto; biosurfactant production; optimisation; fermentation

SPEAKER YR 3.3

Nur Haida Syazana Zainol
Universiti Putra Malaysia

In vitro Responses of Plant Growth Factors on Growth of *Clinacanthus nutans* (Sabah Snake Grass)

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Clinacanthus nutans (Acanthaceae) or popularly known as Belalai Gajah or Sabah Snake Grass amongst Malaysians has gained attention due to its therapeutic properties. Literally, *C. nutans* is used as anti-venom, anti-cancer, anti-inflammatory and contain high antioxidants content. Conventional propagation of *C. nutans* is slowed and low proliferation rate. However, the market demand on raw materials of *C. nutans* is high. Hence, this study was conducted to propagate *C. nutans* through plant tissue culture technique. The experiment was conducted by inoculated the nodal segments of *C. nutans* on Murashige and Skoog medium (MS) supplemented with various plant growth regulators, basal medium strength and sucrose concentrations. The results showed that 12 µM BAP without addition of auxin at full strength MS basal medium and 30 g/L of sucrose exhibited the highest percentage of regeneration, number of shoots, length of shoot, number of leaves and leaves fresh weight. In conclusion, plant tissue culture technique substantially promoted the growth and production of *C. nutans* explant in a short time. As a result, the escalating demand for *C. nutans* raw materials can be met.

Keywords: *Clinacanthus nutans*; tissue culture; plant growth regulators; medium strength; sucrose

SPEAKER YR 3.4

Song Yu Qing
Universiti Teknologi Malaysia

Effect of Arsenate-Reducing Bacteria in Facilitating Arsenic Uptake by Kangkung (*Ipomoea aquatica* L.)

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Arsenic is a toxic metalloid that could be threatening to human and animal health. The metalloid is naturally present in the environment and the contamination is frequently occurred due to human activities. Phytoremediation is commonly applied to mitigate arsenic as this technique is environmental-friendly and inexpensive. In aerobic environment, arsenic is dominantly present in +5 oxidation state [As(V)]. Arsenate-reducing bacteria facilitate arsenic uptake process by reducing [As(V)] to arsenite [As(III)] (+5 to +3 in oxidation state) due to more proteins can be used to uptake [As(III)] from external medium compared to [As(V)]. Kangkung is a local cuisine and its ability in arsenic uptake was extensively studied. Small scale treatment was conducted to test the ability of *Microbacterium foliorum* strain SZ1 in facilitating the uptake of arsenic by kangkung. Seeds of kangkung were sowed and the plants were left to germinate until fifth leaves stage (approximately 2 weeks). 2 weeks old of germinated kangkung were transferred into 15g of arsenic contaminated soil with different concentrations (0μmol, 25μmol, 50μmol). Arsenate-reducing bacteria *M. foliorum* strain SZ1 was then inoculated into soil to enhance arsenic uptake by kangkung. The treatment was continued for 2 weeks. For results, plants with inoculated bacteria showed increased plant weight but decreased plant height and pH. Several optimizations for the treatment such as adjusting the concentration of arsenic and bacteria are suggested in order to promote efficiency of uptake and thus to have clearer results.

Keywords: Arsenate-reducing bacteria; Kangkung; Phytobial-remediation

SPEAKER YR 3.5

Nurul Atiqah Ahmad

Universiti Malaysia Perlis

Human Spiking Interaction towards the Binding Activity of Tat Protein on Nanocrystalline Diamond Based Electrolyte-Gate Field Effect Transistor

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The detection of biological molecules in human blood system is very crucial for the early screening of any possible health issue especially for the pandemic disease like HIV. The key for the success of advance stage detection of the disease is to know the interference of the human blood towards the binding activity of the detection mechanism. It is very critical to measure the sample target in human blood, hence the detection of target molecules in human serum is the way to identify the interference effect within the human blood as it can mimic the whole human blood system. Utilization of nanocrystalline diamond as a solid-state transducer in biomedical engineering field has generated many applications especially in meeting the medical health demand. Here, we reported the human serum effect towards nanocrystalline diamond-based electrolyte gate field effect transistor for recognition of Tat protein. The aim of this research was to develop a nanocrystalline diamond-based biosensing approach that can be adapted to clinical monitoring of HIV-1 diagnosis. The effect of human serum towards the binding activity of HIV-1 Tat protein on RNA aptamer were measured on nanocrystalline diamond electrolyte-gate field effect transistor (NCD-EGFET) device to examine the interaction behavior of Tat protein and RNA aptamer. The gate potential shifted in a negative direction when Tat protein binds with the RNA aptamer on NCD-EGFET channel surface. The changes in gate potential is observed at 30 mV when human serum binds on the RNA aptamer. A 125 mV changes in gate potential was presented when tat protein spiked in the human serum bound to the RNA aptamer. Although there was changes in the shifted voltage when tat protein is not spiked in the human serum, but the small potential appeared can be negligible. The analytical characteristics of NCD-EGFET biosensor in sensitivity and specificity have been studied in detail. The reliable usage of sample protein in human serum by NCD-EGFET was examined for the first time and provides the potential of nanocrystalline diamond bio-interfaces in medical health applications.

Keywords: Human serum; HIV-1 Tat; Aptamer; Nanocrystallinediamonds

SPEAKER YR 3.6

Nurul Haziqah Alias
Universiti Putra Malaysia

Fed-batch Saccharification of Sago Hampas into Fermentable Sugars for Biobutanol Production

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Current increase in energy demand and fossil fuel depletion crisis worldwide have diverted attention towards the utilization of renewable sources for bio-based fuels. Sago agricultural waste or better known as sago hampas is starchy, a lignocellulosic residue that is produced from sago starch processing industries. The high content of starch (58-60%) and lignocellulosic components (35.9%) in sago hampas could contribute to serious environmental problems. Therefore, sago hampas was used in this study as a substrate for saccharification to produce fermentable sugars. High carbohydrate content, a low percentage of lignin and no pretreatment process are required, making the sago hampas a promising feedstock for biobutanol production. This research highlights the potential of underutilized sago hampas in our country to be converted into sustainable biobutanol through acetone-butanol-ethanol (ABE) fermentation by *Clostridium* species. Most of the studies conducted previously only focused on batch saccharification where lower sugar concentrations were often obtained make it inadequate for biobutanol production. Therefore, high fermentable sugar concentration was obtained by implementing several strategies involving fed-batch saccharification alternately with batch saccharification. Optimization of the saccharification was conducted to enhance high fermentable sugars yield. The optimization study included were sago hampas feeding time, sago hampas loading, agitation speed and initial enzyme loading using Dextrozyme, amylase and Acremonium cellulase enzymes. The capability of amylase and cellulase enzymes at the lowest amount was proven to produce high fermentable sugars based on the fed-batch saccharification strategies conducted.

Keywords: Sago hampas; fed-batch; saccharification; fermentable sugar; biobutanol

SPEAKER YR 3.7

Nur Fatin Najihah Mat Husin
Universiti Teknologi Malaysia

Antibacterial Activity of *Juniperus virginiana* Essential Oil against Oral Bacteria

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Nowadays, chlorhexidine has been extensively used in treating dental problems. Although it is proven to significantly reduce plaque formation, chlorhexidine tends to cause adverse effects such as burning and disturbance in taste sensation, irritation on oral mucosa, and tooth staining. Many studies are now done to search for natural compounds that could overcome the side effects of chlorhexidine. In this study, the essential oil of *Juniperus virginiana* was evaluated for it antibacterial activity against selected oral pathogens, namely *Staphylococcus aureus, Streptococcus sobrinus* and *Streptococcus mutans*. The antibacterial activity of the essential oil was assessed via disc diffusion assay. Minimum inhibitory concentration (MIC) assay was then performed followed by antiadherence, and antibiofilm assays. It was observed that the essential oil of *J. virginiana* effectively inhibit the growth of selected oral bacteria. The MIC values against *S. aureus, S. sobrinus* and *S. mutans* were found to be 0.39%, 12.5% and 0.098% respectively. Antiadherence assay results reveal that this essential oil was found to significantly inhibit the bacterial adhesion of *S. aureus* and *S. mutans* by 35.2% ± 1.5% and 16.7% ± 2% respectively. *J. virginiana* essential oil also shows excellent antibiofilm activity towards all oral bacteria tested where the highest antibiofilm activity was over 85% for *S. aureus*. This study showed the potential effect of *J. virginiana* essential oil to be an alternative agent that may be useful for the treatment of dental diseases.

Keywords: Essential oil; Antibacteria; Antibiofilm; Antiadherence; Oral bacteria

SPEAKER YR 4.1

Muhammad Aidilfitri Mohamad Roslan

Universiti Putra Malaysia

Phenotypic Characterization of Plant-Beneficial Traits of *Enterobacter* sp. for Soil Bioinoculant Application

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To date, studies on plant-bacteria interactions have been expansively performed in order to provide a deeper insight into the beneficial effects towards plant growth and reduce synthetic fertilizer input for agriculture. Bacteria that is able to promote plant growth is termed as plant growth promoting bacteria (PGPB), comprises of the free-living, the symbionts, and endophytes. PGPB may benefit plant growth usually by either facilitating acquisition of soil nutrient or modulating level of phytohormone. In this study, evaluation of plant growth promoting activity was performed on bacterial isolates recovered from previous isolation work on oil palm empty fruit bunch (OPEFB) and chicken manure co-composting process. Three isolates which are *Enterobacter cloacae* strain 38, *Enterobacter hormaechei* strain 15a1 and *Enterobacter hormaechei* strain 40a (Accession number: MN294583; MN294584; MN294585 respectively) exhibited positive results for nitrogen (N_2) fixation, phosphate (P) and potassium (K) solubilisation and were subsequently examined for their ability to produce siderophore and phytohormone,indole-3-acetic acid (IAA).Based on those multi-trait assays, all three isolates exhibited positive indication of plant-beneficial traits although the capacity for every activity was dissimilar to each other. For instance, *E. hormaechei* 40a surpassed the other two strains for P solubilization of insoluble tricalcium phosphate, whereas *E. hormaechei* 15a1 was able to release the highest K from potassium aluminosilicate. On a different note, *E. cloacae* 38 produced the highest IAA exceeding those produced by *E. hormaechei* 15a1 and *E. hormaechei* 40a. Siderophore production by all those isolates was confirmed by the formation of orange halo zone around colonies on chrome azurol S(CAS) plate. These differences might indicate their exclusivity of potential and capacity as bioinoculant to promote plant growth and improve soil fertility.

Keywords: plant growth promoting bacteria (PGPB), biofertilizer, bioinoculant, *Enterobacter*, bacterial phytohormone

SPEAKER YR 4.2

Auwalu Hassan
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Simultaneous Metal Bioremoval by a Novel Fungus (*Daldinia korfii*) from Heavy Metals Contaminated Medium

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Over the last few years, a promising, inexpensive, and environmentally friendly technique for the removal of metal contaminants has emerged. Biosorption is a promising technology where biological systems are employed for the removal or recovery of metal contaminants from the polluted environments. This study was aimed to determine the heavy metal biosorption capacity of *Daldinia korfii* in a liquid medium. The fungus was identified by employing morphological and molecular techniques. The tolerance of the fungus was determined by using radial growth diameter method. Biosorption experiment was carried out on a rotary shaker under different conditions of metal concentrations (50, 150 and 450 mg/L), pH (4.5, 7, and 8), and contact time (0, 24, 48, 72, 96, and 120 hours). The tolerance indices recorded against the heavy metals ranged from 5.1 – 8. A maximum biosorption of 36.77mg/g (73%) was attained at 450mg/L, meanwhile the least was 0.54mg/g(33%) at 50mg/L. With regards to pH, the removal efficiencies ranged between 43 – 76% of p H 4.5 – 8. However, for contact time, an initial biosorption of 3 – 7mg/g was achieved within 24hours, beyond 24hours, a decline was observed. On the surface of metal treated fungi, tightly packed, deformed, shortened hyphae were observed using scanning electron microscopy. However, long ribbon-like hyphae which are broad and loosely packed were observed in the control. Fourier Transform Infrared Spectroscopy results revealed the presence of functional groups responsible for metal binding. *Daldinia korfii* can serve as a potential biosorption agent for the decontamination of metal pollution.

Keywords: Biosorption; *Daldinia korfii*; contaminated media; heavy metals; FTIR

SPEAKER YR 4.3

Mohammad Sobri Merais

Universiti Putra Malaysia, Bintulu Sarawak Campus

Preliminary Study of Isolation and Characterization of Bacteria from Organic Waste in Kampung Bako, Sarawak

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The composite molecules in wastes are decomposed by many bacteria, either it is soil borne, or air borne. The organisms are applicable in the production of bio-fertilizers. The isolated bacteria could be used as industrial microorganisms and for justification of pollution. Organic waste samples were collected from residentials of Kampung Bako, Kuching, Sarawak including waste from eatery stalls nearby and transported to the *Pusat Pengurusan Sisa Makanan & Sisa Kebun Domestik* in Kampung Bako, Kuching, Sarawak. The wastes were segregated accordingly and mixed with paddy husk collected from nearby rice mill. Sampling were done carefully on the first week of composting. This paper consists of gram staining test, both biotic and abiotic components with various physiochemical parameters such as pH, moisture, carbon content, and nitrogen. This study aimed to isolate most frequently active strains adapted to the organic waste physical-chemical conditions and having high biodegradation potential.

Keywords: Composting; Organic waste; Paddy husk; Bacteria; Nutrient agar

SPEAKER YR 4.4

Wan Muhamad Asrul Nizam Wan Abdullah

Universiti Putra Malaysia

Vacuolar Processing Enzymes are Required for Host Susceptibility in *Fusarium oxysporum* f. sp. *cubense* Tropical Race 4 Infection

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Fusarium wiltis a devastating disease in global banana production which caused by necrotrophic fungal pathogen known as *Fusarium oxysporum* f. sp. *cubense* tropical race 4 (*Foc*TR4). The infection process of *Foc*TR4involves activation of programmed cell death (PCD) in the host plant. In this study, seven *Musa acuminatavacuolar processing enzyme (MaVPE1-MaVPE7)* genes were successfully identified through systemic *in-silico* analysis of DH-Pahang (AA group) banana genome. Phylogenetic analysis categorized these MaVPE*s* into the seed and vegetative types, which were corroborated with their tissue specific expression. Majority of the *MaVPE*s expression were upregulated in the susceptible cultivar (*M. acuminata* cv. Berangan) upon *Foc*TR4 infection as compared to the resistant cultivar (*M. acuminata* cv. Jari Buaya). Similarly, upon *Foc*TR4 infection, high caspase-1 activity was detected in susceptible cultivar while low-level of caspase-1 activity was recorded in resistant cultivar. Inhibition of MaVPEs activity via caspase-1 inhibitor in susceptible cultivar reduced tonoplast rupture, decreased lesion formation, and enhanced stress tolerance against *Foc*TR4 infection. Additionally, *Arabidopsis VPE*-null mutant exhibited higher tolerance to *Foc*TR4 infection, indicated by reduced sporulation rate, low-level of H_2O_2 content, and high-level of cell viability. Comparative proteomic profiling analysis revealed an increased in the abundance of cysteine proteinase in the inoculated susceptible cultivar as opposed to cysteine proteinase inhibitors in the resistant cultivar. Taken together, our results showed that *Foc*TR4 utilised the increased of *VPE* activity to mediate activation of PCD in compatible plant interaction, which facilitated its colonization on the host. We concluded that VPE serves crucial roles in modulating susceptibility response in *Foc*TR4-infected banana.

Keywords: Biotic stress; *Fusarium oxysporum* f. sp. *cubense* tropical race 4; *Musa acuminata;* Programmed cell death; Vacuolar processing enzymes

SPEAKER YR 4.5

Nur Akma Razali
Universiti Teknologi Malaysia

Inhibitory Effect of Algae Based Product Against the Bacteria and Fungi Growth

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Pathogenic fungi and bacteria cause plant disease that will reduce the quality and quantity of food production across the world. One of the alternative ways to combat the plant disease is the application of algae-based product which can act as a biofertilizer and green fungicide will promote the plant growth and thus help to increase the crop protection. This project aimed at discovering potential antifungal from algae-based product which possess useful antimicrobial characteristics and also at elucidating their bioactive compounds with inhibitory activity against pathogenic fungi and bacteria. The objective of this work is to determine the effects of different concentration of algae-based product on the growth of sixteen strains of bacteria and fourteen strains of fungi using Disk Diffusion Technique (DDT) based on the holozone formation around the microbial growth. The diameter of holozone and the size of growth was measured for bacteria and fungi respectively. This study found that algae-based product doses not show any inhibition effects on *Mycrorhizae* sp. even at highest dosage (500 g/L). However, the algae-based product significantly inhibited the growth of *Trichoderma sp* at 250 g/L dosage. There were five strains of bacteria known as *Pseudomonas* sp., A9, M6, H2 and H5 were able to be inhibited at the lowest concentration of 150 g/L with the smallest diameter of holozone as 1.2cm. The result of inhibition demonstrates that algae-based product could play a vital role as antimicrobial agents against the pathogenic fungi and bacteria.

Keywords: Algae based product; biofertilizer, pathogenic fungi, inhibition

SPEAKER YR 4.6

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Development of Modified Graphene Nanoplatlets Biosensor on Disposable Screen-Printed Electrodes for Electrochemical Detection Of EGFR, Leading to Lung Cancer

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This work demonstrates the development of a carbon screen-printed electrode (SPCE) based biosensor modified with graphene nanoplatelets (GnP) and surface functionalization using aminopropyltriethoxysilane (APTES). The developed biosensor was utilized for determination of epidermal growth factor receptor (EGFR) as cancer biomarkers link to a lung cancer. Since every atom in GnP flake is a surface atom, molecular interaction and electron transport through graphene is highly sensitive to adsorb molecules, the C-GnP biosensor were prepared by drop casted APTES onto modified C-GnP. The APTES works as linkers will facilitates the immobilization of biomolecules onto modified C-GnP surface via self-assembly method and then the target proteins (EGFR) were covalently attached to the modified C-GnP SPCE. Cyclic voltammetry and impedance spectroscopy were employed as measurements for analyses of surface changes in the engineered biosensor electrodes. Parameter such incubation time of APTES were optimized to reduce high background effect. Incubation at 24 hours provide an optimum attachment to the modified C-GnP SPCE at peak separation of 101 mV and R_{CT} of 173.014 ± 80.01Ω, respectively. Further characterization was employed by Raman and SEM analysis for structural study of the surface APTES/ C-GnP SPCE. To produce reliable electrochemical signals, immobilizing anti-human EGFR antibody (Anti-EGFR Ab) on bovine serum albumin (BSA) on C-GnP electrode were used to eliminate nonspecific adsorption for detection target biomarkers. Electrochemical studies show that an increased surface concentration of redox moieties onto Anti-EGFR Ab/APTES/ C-GnP SPCE immuno-electrode leads to high electron transport and improved sensing performance. Moreover, the proposed biosensor was successfully used for sensitive, reproducible, and specific detection of EGFR. Due to the SPE nature of the developed biosensor, we envision that this sensing tool has capability of being integrated with lab-on-a-chip (LOC) and microfluidics analysis systems.

Keywords: Graphene Nanoplatlet; Single printed carbon electrode; functionalization; APTES; Diotization

SPEAKER YR 4.7

Nurfatihah Mohd Shariff
Universiti Teknologi Malaysia

Development of Antibacterial Electrospun Polyvinyl-Alcohol/Multi-Walled Carbon Nanotubes/Curcumin (PVA/MWCNT/CUR) Nanofiber

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Chronic wounds showed slow and incomplete healing process, which in turn exposed patients to a high risk of infection. Electrospun nanofibers containing polyvinyl alcohol (PVA), multi-walled carbon nanotubes (MWCNT) and Curcumin (Cur) was explored in this study for its potential in antibacterial wound dressing. Firstly, blending components for electrospinning were optimized prior to attachment with MWCNT and Curcumin. The PVA was mixed with distilled water and solvents DMSO and ethanol at varying conditions. Next, the MWCNT was oxidized using 3:1 H_2SO_4/HNO_3 mixture to produce functional groups for attachment with PVA and Curcumin. The fiber formation and its content were characterized using Scanning Electron Microscope (SEM) and Fourier Transform Infrared (FTIR) spectroscopy. The PVA/ox-MWCNT/Cur electrospun nanofibers were then tested for antibacterial efficiency using disc diffusion method against *Staphylococcus aureus* and *Escherichia coli.* From the results, 20% DMSO was proven suitable for blending to produce nanofiber mats. The ox-MWCNT was successfully oxidized, showed by the presence of –OH (3407 cm^{-1}) and – COOH (1732 cm^{-1}) in the FTIR spectrum. Electrospinning of 10% (w/v) PVA, 2 wt% ox-MWCNT and 5-10% Curcumin in 20% DMSO has successfully fabricated a smooth and uniform PVA/MWCNT/Cur mats in the SEM observation. The diameter of nanofiber increases from 203-634 nm when Curcumin is added up to 50 wt %. For antibacterial assay, PVA/MWCNT/Cur 5-10 wt. % mat displayed better efficacy against *S. aureus*, and that *E. coli* has possible bacteriostatic effect. Overall, the PVA/MWCNT/Cur nanofiber mats showed potent antibacterial effect, which shed lights into its relevance in wound dressing application.

Keywords: Nanofibers, PVA, MWCNT, Curcumin, Antibacterial

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POSTER PRESENTER 1.1

Yi-Sheng Lin
Food Industry Research and Development Institute, Taiwan

Influence of Freeze-drying Conditions on the Survival Rate of *Lactobacteria*

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The function of the *lactobacteria* product is mainly to adjust the human intestinal bacteria flora. Therefore, it is necessary for such products to maintain the bacteria alive. Freeze-drying is one of the most popular drying methods for various applications of foods, traditional Chinese medicines and injection drugs. For heat sensitive materials such as enzymes and bacteria, it has the advantages of maintaining protein activity and avoiding the damage of bacteria caused by high temperature processing. In this test, the freeze-drying conditions are adjusted after screening the protective agents by the low temperature process. This will explore the effect of adjusting the freeze-drying conditions on the viable count of *lactobacteria* products and conduct a stability test to confirm the change in the number of *lactobacteria* within 6 months.

Keywords: Freeze-drying; *lactobacteria*; survival rate

POSTER PRESENTER 1.2

Assoc Prof Dr Mahanem Mat Noor
Universiti Kebangsaan Malaysia

Evaluation of Anti-hyperglycemic and Androgenic Properties of *Ficus carica* Extract in Diabetic-induced Male Rats

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Ficus carica (FC) is a plant that has been used as traditional medicine. It has the potential to treat diabetes mellitus and reproductive disorders due to the activities of its bioactive compounds. The objective of this study was to determine the anti-hyperglycemic and androgenic properties of FC in diabetic-induced male rats. A total of 20 male rats were divided into four groups; normal control without diabetes induction, negative control (diabetes without treatment), positive control (diabetes with metformin 300 mg/kg), and FC leaves aqueous extract (400 mg/kg) group. After 21 days of treatment, the fasting blood glucose (FBG) level in FC treated group showed a significant decrease ($p< 0.05$) compared to the negative control group. Treatment with FC also exhibited a significant increase ($p< 0.05$) in the concentration of testosterone and libido performance compared to the negative control group. To conclude, this study clearly demonstrated that FC extract has a good potential as anti-hyperglycemic agent, as well as a testosterone and libido enhancer in diabetic induced male rats.

Keywords: *Ficus carica,* anti-hyperglycemic activity, androgenic properties, diabetes mellitus

POSTER PRESENTER 1.3

Nadhrah Annuar
International Islamic University Malaysia

Potential Biosurfactant Producer and Bioemulsifier Isolated from Petroleum Sludge

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Biosurfactants are heterogeneous group of surface-active agents produced by microorganisms. Biosurfactants can be used as the alternatives to chemically-made surfactants due to their advantages such as biodegradability, low toxicity and environmental-friendly. In this study, hydrocarbon-degrading bacteria were isolated from petroleum sludge and the isolates were screened for biosurfactant production and biodegradation capability. All the bacterial isolates were grown in minimal media, Bushnell Haas broth supplemented with 1% (v/v) crude oil as carbon source. All isolates were identified as *Achromobacter* sp., *Pseudomonas* sp. and *Citrobacter* sp. by using 16S rDNA gene sequencing. The biosurfactants activity were determined by emulsification index (E_{24}) and surface tension measurement. The range of emulsification index produced by all isolates were between 50.83% to 72.81% and the range of surface tension measurements for all isolates that exhibited were between 45.67 mN/m to 18.92 mN/m. In this study, *Pseudomonas sp.* P15 was selected as the highly potential biosurfactant producer due to its ability to reduce surface tension up to 18.92 mN/m with high emulsification activity (67.41%). Therefore, our study proposed that *Pseudomonas sp.* P15 has the ability to be used as bioemulsifier and biosurfactant producer.

Keywords: Biosurfactant, biosurfactant-producing bacteria, petroleum sludge, surface tension, bioemulsifier

POSTER PRESENTER 1.4

Dr Nur Eliyanti Ali Othman
Malaysian Palm Oil Board

The Effect of Sodium Hydroxide Concentration on Carboxymethyl Cellulose Properties

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Carboxymethyl cellulose (CMC) is a versatile polymer derived from cellulose, most common natural polymer. The source of cellulose can range from woods, cottons to even agriculture waste. CMC is important as its water soluble, where have been used in food industry, pharmaceutical, detergent, drugs, cosmetics, textile, paper and as well as oil drilling operation. α-Cellulose extracted from oil palm empty fruit bunch (OPEFB) was used as a raw material for the production of different grades of carboxymethyl cellulose (CMC). The objective in producing different grades of CMC is to diversify the applications in varieties products as mention earlier. The important parameter for the preparation of different quality and the grade of CMC is concentration of sodium hydroxide (NaOH) used during mercerization process. Presence of NaOH will enhance the reactivity of cellulose towards chemical reaction with monochloroacetic acid (MCAA). Preparation of CMC from cellulose was carried out by an etherification process, using different concentration of NaOH (25-40% v/v) and monochloroacetic acid (MCAA), with isopropanol as the supporting medium. The properties of resulting CMC were determined according to ASTM D 1439-03. From results, the content of CMC moisture ranged from 8.27% to 13.45% while the purity of all CMC produced was 90% and above. In addition, the chemical structure of resulting CMC was found comparable to standard CMC based on FTIR spectra. Different concentration of NaOH tended to produce different CMC characteristics and properties. This palm-based CMC has huge potential for future green-chemical demand since it is being produced from renewable resource and it is sustainable.

Keywords: carboxymethyl cellulose; oil palm empty fruit bunch

POSTER PRESENTER 1.5

Nurhasliza Zolkefli
Universiti Putra Malaysia

Potential Use of *Alcaligenaceae* and *Chromatiaceae* as Bioindicators for the Biomonitoring of POME Final Discharge Receiving Rivers

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Bioindicators are prominently favorable in addressing the specific cause of aquatic pollution. The pollution assessment using bioindicator is currently being developed for monitoring the POME final discharge contamination in the river whereby the *Alcaligenaceae* and *Chromatiaeae* have been selected as the potential bioindicators. Inevitably, it is necessary to assess their reliability to act as specific bioindicators which was achieved by comparing their presence in rivers polluted by POME final discharge with other rivers polluted by different sources other than POME final discharge. The compositions of the bacterial communities obtained from Illumina MiSeq metagenome sequencing were compared between the unpolluted upstream river (control), polluted rivers due to POME final discharge and the other polluted rivers due to mining, chemical and automotive industries. The viability and the ratios of high nucleic acid (HNA) and low nucleic acid (LNA) of bacterial cells were also compared by using double staining assay based on flow cytometry. Remarkably, the *Alcaligenaceae* and *Chromatiaceae* were found only in POME final discharge polluted rivers but not detected in the other polluted rivers. Higher bacterial viabilities were also observed in the polluted rivers due to POME final discharge as compared to others which suggested that the POME final discharge might become the source of nutrients to enhance the growth of the originally dormant bacteria in the receiving rivers. Due to their unique presence in only POME final discharge polluted rivers, they could function as the specific and reliable bioindicators and thus relevant for the establishment of a complementary monitoring system for POME discharges.

Keywords: POME final discharge; bioindicator; bacterial community; Illumina MiSeq; river pollution

POSTER PRESENTER 1.6

Noor Shaidatul Lyana Mohamad Zainal
Universiti Putra Malaysia

Effect of Temperature on the Survivability of the Pollution Bioindicators, *Chromatiaceae* and *Alcaligenaceae*

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Current environmental monitoring tools have adapted bacterial community to specifically indicate the cause of contamination in the receiving waterway, particularly due to their sensitivity towards the environmental changes. Based on previous study, *Chromatiaceae* and *Alcaligenaceae* have been proposed as bioindicators to specifically indicate pollution of river due to the palm oil mill effluent (POME) final discharge. However, the reliability of both bioindicators towards the changes in temperature has yet to be proven. This is important as Malaysia experiences changes of temperature due to the tropical climate throughout the year. Hence, this study aimed to assess bacterial community survivability as the temperature changed, specifically towards *Chromatiaceae* and *Alcaligenaceae*. The samples were collected from the later stages of POME treatment; facultative pond and algae pond, as well as from the final discharge. The samples were treated with different sets of temperature to reflect the tropical climate in Malaysia. After 40 hours of incubation period, the physicochemical properties were analyzed and bacterial communities were assessed using nucleic acid double staining assay based on flow cytometry and high-throughput MiSeq, with untreated samples as control. The alterations of temperature caused the bacterial community to shift following the changes in physicochemical properties. However, both bioindicators remained present in the samples despite the changes in temperature, which confirm the reliability of them as bioindicators to specifically indicate the river water pollution due to POME final discharge.

Keywords: palm oil mill effluent; final discharge; bacterial community; bioindicator; temperature; MiSeq

POSTER PRESENTER 1.7

Kavithraashree A/P Arumugam
Universiti Putra Malaysia

Screening of Microalgae Strains Capable to Induce Calcium Carbonate Precipitation as a Potential Source of Biomineral

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Microalgae are cultivated to produce myriads of beneficial bioproducts. As a bio-factory, they are capable to produce biominerals such as calcium carbonate ($CaCO_3$), offering a new green and sustainable strategy for the production of biocement. Naturally, several species of microalgae are able to induce $CaCO_3$ precipitation since photosynthesis increases the availability of carbonate ion (CO_3^{2-}).CO_2 are consumed and permanently remove as a solid of various polymorphs upon achieving suitable conditions for precipitation. Microalgal cell wall shall be supersaturated with $CaCO_3$ precipitates by up-taking of calcium ions and releasing its by-product. This study assesses eight microalgae strains forbio-mineralization capability in a medium containing 12 mM of calcium chloride dihydrate and 0, 0.18, 1.25, 2.5, 3.75 and 5 mM of sodium bicarbonate ($NaHCO_3$) by analysing pH, cell growth, concentrations of calcium and bicarbonate ions. Among the strains, *Synechocystis* sp. ATCC 27178 cultured in 5 mM of $NaHCO_3$ showed the highest precipitation rate (0.8mM/day) followed by *Chlorella* sp. (0.4 mM/day) and *Synechococcus* sp. ATCC 27145 (0.23 mM/day), respectively. $CaCO_3$ crystals morphology from the three strains were analyzed through SEM-EDX and polymorph was identified as calcite. The potential microalgae strains were further investigated for the availability of urease and carbonic anhydrase which provide extra carbonate ions to enhance the calcification process. Results from the analysis are correlated with the significant physicochemical parameters affecting algal growth as well as $CaCO_3$precipitation which will be translated into kinetic models.

Keywords: Calcium carbonate, Photosynthetic Microalgae, Biocement, Urease, Carbonic Anhydrase

POSTER PRESENTER 1.8

Nurshafika Abd Khalid
Universiti Teknologi Malaysia

16S rRNA Metagenome of Palm Oil Mill Effluent and Compost as Inoculum for Biocomposting of Oil Palm Empty Fruit Bunch

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Oil palm is one of the largest crops in this tropical country. The production of palm oil generates large quantities of wastes especially oil palm empty fruit bunch (OPEFB) and palm oil mill effluent (POME), thus created environmental issues for palm oil mill industry in Malaysia. At present, OPEFB is mainly utilized for compost production with the addition of anaerobic sludge POME. This study was conducted to analyze the diversity of microbes from POME and matured compost produced by an oil palm mill in Johor using metagenomics approach. This study also investigates the degradation of OPEFB using different medium and inoculum under solid state fermentation for compost production. Five models of solid-state fermentation using different media and inoculum have been analyzed. All four media used were Mandel's basal medium, non-sterile crude anaerobic sludge POME, non-sterile supernatant anaerobic sludge POME, and 100% filtered seawater. While, 15% anaerobic sludge POME and 15% mature compost were used asinoculum. Here, we report that *Syntrophomonas* sp. (5% of total gene sequences) and *Coprococcus* sp. (3% of total gene sequences) were the most abundant bacterial genus in anaerobic sludge POME and mature compost, respectively. The degradation of OPEFB was analyzed based on the weight loss of the fiber, which was 5-20% of the weight loss after 30 days of fermentation. Overall, fermentation model with mature compost and anaerobic sludge POME as inoculum and media was considered as the most efficient condition for composting system since it is able to reduce the OPEFB weight to 20% for only 30 days. In conclusion, this study can improve the utilization of OPEFB and anaerobic sludge POME to produce compost by improving the biodegradation efficiency of OPEFB.

Keywords: Metagenomics; Biocomposting; Oil palm empty fruit bunch; Palm oil mill effluent; Solid state fermentation

POSTER PRESENTER 1.9

Dr Kwan Yee Min
Universiti Putra Malaysia, Bintulu Sarawak Campus

Morphological and Molecular Characterization of *Fusarium solani* Associated with Black Pepper (*Piper nigrum*) Slow Decline Disease in Sarawak

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Slow decline disease is one of the most destructive diseases of black pepper (*Piper nigrum*). This study aimed at the morphological and molecular characterization of pathogenic *Fusarium solani* isolated from major black pepper growing areas in Sarawak. Thirty-one isolates of *F. solani* were identified and characterized based on morphological characteristics, and the internal transcribed spacer (ITS) rDNA region. The mycelia of *F. solani* appeared white to pale yellow with yellowish to orange-brown reverse pigmentation on Potato Dextrose Agar (PDA). The fungal isolates produced three types of spores: macroconidia, microconidia and chlamydospores. Macroconidia are straight to slightly curved, thin walled with three-to-five septate, usually measured at 36.14±6.54 µm x 4.83±0.69 µm. Microconidia are oval or ellipsoid with zero to two septa, usually measured at 16.13±2.29 µm x 3.96±0.29 µm. The amplification of ITS rDNA region from the isolates has resulted in amplification of approximately 600 bp nucleotides. Phylogenetic tree constructed based on the ITS rDNA sequences proposed two major clades and three single-membered clades. Isolates distributed in the two major clades were not related to geographical regions. A single-nucleotide variation was found to be clade-specific, with a nucleotide alteration (G/A) occurring at position +290. *F. solani* isolates exhibited high morphological and genetic diversity. The information obtained here is important for disease management and breeding of resistant black pepper varieties.

Keywords: Yellowing disease, pathogenicity, ascomycota, molecular phylogeny

POSTER PRESENTER 1.10

Dr Siti Pauliena Mohd Bohari
Universiti Teknologi Malaysia

Wound - Healing Activity of *Chromolaena Odorata* On Human Dermal Fibroblast

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Chromolaena odorata or locally known as pokok kapal terbang in Malaysia has been used extensively as a traditional remedy for wound healing and other diseases. To the best of our knowledge, there are limited scientific studies to support its wound healing activities. In this study, the wound healing activity of methanol extract of *C. odorata* leaves was investigated *in vitro*. The 80% methanolic extract of *C. odorata* leaves were obtained under reduced pressure in a rotary vacuum evaporator. The cytotoxicity and wound-healing activity of *C. odorata* leaves extract towards human skin fibroblast (HSF1184) was determined by using MTT and scratch assays. The cytotoxic effects (IC50) of *C. odorata* leaves extract on human skin fibroblast cells was 100.6 µg/ml. Furthermore, the 20 ug/ml *C. odorata* leaves extract had enhanced cellular migration and wound closure by 30.9% compared to 15.5% of the control group after 6h of incubation. The induced cells scratch was utterly healed (100% closure) after 24h with *C. odorata* leaves extract while the control group healed by only 79.9%. Based on the results, *C. odorata* leaves extract plays a role in improving the wound healing activity with low toxicity on fibroblast cells in vitro. This study enlightens the potential of this plant to be used for the wound healing treatment, and further study needs to be done to elaborate its proper mechanism.

Keywords: *Chromolaena odorata,* cytotoxicity, wound-healing, scratch assay, methanolic extract

POSTER PRESENTER 1.11

Dr Fazliana Abdul Hamid

Malaysian Palm Oil Board

The Influence of Bio-active Component in Pyroligneous Acid (PA) on the Fungal Treatment of Oil Palm Trunk (OPT)

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The pyroligneous acid (PA) is a by-product of charcoal production from palm kernel shell (PKS). In this study, PA obtained from the process was evaluated for antifungal activity and antifungal assay. Four types of wood vinegar were produced at four different pyrolysis temperatures, i.e. at 500,600,700 and 800^{0}C. The properties, chemical composition and functional groups of PA were evaluated using Fourier transform infrared (FTIR) and gas chromatography- mass spectroscopy (GCMS). A PDA dilution method was employed to assay antifungal activity of the vinegars with a white-rot fungus *Trametes versicolor* and a brown-rot fungus *Fomitopsis palustris.* This antifungal activity can be attributed to the presence of phenols and its major derivatives as suggested from the *GC-MS* and *FTIR* analysis. The effectiveness of PA against white rot and brown rot fungus were tested on small specimens of the oil palm trunk (OPT) by immersing in the solution for 24 hours at 25 °C, as stipulated in ASTM D-4455 standards. The non-treated specimens were used as reference standard. From observations, the OPT-PA treated specimen tended to prevent the growth of white rot and brown rot fungus which are indicating the effectiveness of PA as bio-preservative. Moreover, the presence of phenolic, carbonyls and organic acids component contributed to the increase in controlling the growth of fungal. Thus, this study successfully demonstrated the potential use of PA obtained from lignocelluosic biomass acts as an antimicrobial agent.

Keywords: oil palm trunk, pyroligneous acid, palm kernel shell (PKS), antimicrobial agent

POSTER PRESENTER 1.12

Lim Mingyuan
Universiti Putra Malaysia

Evaluation of *Jatropha curcas* Growth on Bauxite Mine Soil

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Bauxite mining in Kuantan, Malaysia has plagued FELDA Bukit Goh with heavy metal contamination and ecology disruption. Phytoremediation has emerged as an alternative solution to conventional methods. The aim of this study was to evaluate the growth performance of *Jatropha curcas* in the bauxite mine soil as a preliminary investigation into its phytoremediation potential. Topsoil and subsoil were evaluated for their physicochemical properties. *Jatropha curcas* were then grown in topsoil and subsoil for 3 months under greenhouse condition. The soils as well as the plants were analyzed for their physicochemical properties afterwards. Subsoil was found to contain very low C, N and K content initially. Soil pH was considerably consistent ranging from 4.69 to 5.84 whereas soil electrical conductivity (EC) increased steadily throughout the experiment. Al was found to be the most concentrated heavy metal in both topsoil and subsoil, among the rest, with values as high as 2613.47 mg/kg and 1458.00 mg/kg, respectively. As opposed to the topsoil, subsoil generally showed an increase in soil microbial count. The highest number of leaves, plant height, basal diameter and seed yield were also documented in plants growing on subsoil. Soil K concentration exhibited a notable accumulation where it recorded a 1.90-fold and 20.65-fold increment in topsoil and subsoil, respectively after 90 days of cultivation. In short, *Jatropha curcas* showed potential in being able to grow well in bauxite mine soil rather than the disturbed topsoil. Further studies on the heavy metal uptake of *Jatropha curcas* in bauxite mine soil is recommended.

Keywords: *Jatropha curcas*; growth performance; bauxite mine soil; heavy metal contamination; phytoremediation

POSTER PRESENTER 1.13

Dr Pauline Liew Woan Ying
Malaysian Nuclear Agency

Replacement of Calcium Carbonate by Sodium Bicarbonate for *Azotobacter vinelandii* PHB Production

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The DSMZ-*Azotobacter* medium was commonly used to cultivate *Azotobacter* sp. contains high concentration of $CaCO_3$ which is non-soluble. Both media were also used for *A. vinelandii* polyhydroxybutyrate (PHB) production. The large amount of $CaCO_3$ white precipitate not only caused overestimation of the bacterial cell dry weight, it can deter subsequent analysis of the bacterial culture. In this study, the non-soluble $CaCO_3$ in the DSMZ-*Azotobacter* medium was replaced with 1.05 – 4.2 g L^{-1} $NaHCO_3$. All media contained 20 g L^{-1} sucrose. From the results, low concentration of 1.05 g L^{-1} $NaHCO_3$ produced comparable viable cell count as the DSMZ-*Azotobacter* medium composition. Despite slightly lower PHB concentration, the modified medium containing 1.05 g L^{-1} $NaHCO_3$ showed prolonged PHB production. The $NaHCO_3$ concentrations ≥ 2.1 g L^{-1} were inhibitory to *A. vinelandii* growth.

Keywords: *Azotobacter vinelandii*; $CaCO_3$; $NaHCO_3$; PHB

POSTER PRESENTER 1.14

Dr Jong Bor Chyan
Malaysian Nuclear Agency

Survival Patterns of Indigenous Bacterial Strains by Gamma Irradiation

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Mutagenesis using nuclear technology is one of the tools to obtain mutants of interest. The use of ionizing radiation (gamma rays or ion beams) has been carried out in microbes for decades. In this study, two indigenous bacterial strains of Gram-positive and Gram-negative each were studied for their survival patterns using gamma radiation. These two bacterial strains were identified by 16S rRNA gene sequencing as *Bacillus megaterium* and *Burkholderia arboris*, respectively. Both bacterial strains were subjected to gamma irradiation using the in-house Biobeam GM 8000 Irradiator at the Gamma Cell Acute Irradiation Facility, Malaysian Nuclear Agency. Cs-137 is the gamma source commissioned in Biobeam GM 8000 Irradiator. The growth curves of these two bacterial strains were determined. Exponential phase of the bacterial cultures was used in the survival experiments. These two bacterial cultures were subjected to gamma irradiation up to 1500 Gy. Based on the survival curve, the LD_{50} for the tested strains of *Bacillus* and *Burkholderia* were determined at dose 840 Gy and 50 Gy, respectively. The survival patterns concluded that the Gram-positive *Bacillus megaterium* is more tolerant or resistant to the gamma rays compared to the Gram-negative *Burkholderia arboris*.

Keywords: Bacteria; Nuclear irradiation; Gamma rays; Cs-137; LD_{50}

POSTER PRESENTER 1.15

Hing Jan Nie
Malaysian Nuclear Agency

Indirect Effect in gamma Irradiation of *Bacillus* sp. and *Escherichia coli*

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Bacteria strain improvement is essential to various industries such as in food, enzyme, medicine and agriculture. Mutagenesis through gamma irradiation is a method to produce new and better strains for benefit of industries. Malaysian Nuclear Agency Gamma Cell Acute Irradiation Facility with Cs-137 as gamma source provides acute gamma irradiation services for this purpose. The interaction between radiation and water molecules produces free radicals. The free radicals cause indirect damage of gamma radiation to bacteria cells. As such, the presence and amount of water will affect cell survival. This study aims to determine the effect of different volumes and suspension solutions during irradiation of *Bacillus* sp. and *Escherichia coli.* Cell cultures were suspended in distilled water, saline solution and nutrient broth in increasing volumes of 0.3 mL to 1.2 mL. Cultures were irradiated from 0 till 1.5 kGy in Gamma Cell. Survival curves and lethal doses (LD_{90}, LD_{50}) were obtained and compared. Dose responses were concluded to be specific to each species.

Keywords: gamma cell; mutagenesis; survival curve; LD_{90}; LD_{50}

POSTER PRESENTER 1.16

Nurhani Fatihah Jariah
Universiti Putra Malaysia

Purification of Biodiesel from Grease Trap Waste Using Biomass Derived Adsorbents

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Recently, the global energy demand is increasing due to the fast industrialization and population growth. Furthermore, the main energy resources like gas, oil and coal are decreasing from day to day. Biodiesel has attracted numerous researchers worldwide because it is clean, safe and non-hazardous due to its carbon neutral fuel. Therefore, it was considered as one of the best alternative fuels that could reduce both energy and environmental deterioration. Biodiesel is derived from the transesterification reaction of triglycerides with alcohol in the presence of catalyst and feedstock. With high lipid content, grease trap waste appears to be a cost-effective feedstock for biodiesel production. However, it is important to purify the biodiesel as it contains impurities which will affect the combustion of the biodiesel. Therefore, the aims of this study are to determine the optimized condition for biodiesel production from grease trap waste and to identify the effectiveness of biochar derived from oil palm biomass to purify biodiesel and glycerol. In this study, grease trap waste will be used as feedstock for the biodiesel production and further purification to remove impurities will be achieved by using activated carbon derived from oil palm biomass. The purified biodiesel will be analysed for the methanol content, free fatty acid content, water content, free glycerine content, and potassium content in fulfilling the European Biodiesel Standards (EN14214). It is expected that the feedstock from grease trap waste can produce high yield biodiesel and the biomass derived adsorbents will be able to purify the biodiesel and glycerol to meet standard quality EN14214.

Keywords: biodiesel; grease trap waste; glycerol; bio-adsorbents; oil palm biomass.

POSTER PRESENTER 1.17

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Institute for Medical Research, Malaysia

Isobolographic Analysis of HIM: *cis*-UCA: *trans*-UCA Combinations on the RAW 264.7 Macrophages Cell Proliferation

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During Scombroid Fish Poisoning (SFP), high concentration of histamine (HIM) in food was found to exert the allergy-like symptoms (linked to inflammation), while urocanic acid (UCA) isomers were suggested to exert symptoms when HIM was at low concentrations. In this study, the principle of drug combination theory by Chou-Talalay was applied to food compounds HIM, *cis*-UCA and *trans*-UCA. The effects from the combinations which are defined in three combination index (CI) categories, i.e., additive effect (CI=1), synergism (CI<1) or antagonism (CI>1), were determined for combinations of HIM: *cis*-UCA and HIM: *trans*-UCA.HIM, *cis*-UCA and *trans*-UCA were exposed (individually & in combinations) to RAW 264.7 macrophages at 37°C with 5% CO_2 for 24 hr. Lipopolysaccharide/interferon-γ was used as positive control and L-NAME was used as negative control for inflammation. Assay for cell viability was performed and isobolographic analysis was determined using CompuSyn® software. Interactions either additive, synergistic or antagonistic was then determined through isobologram projections. It was found that HIM: *cis*-UCA combination possessed synergism effects with combination index (CI)<1. However, HIM: *trans*-UCA combination possessed antagonism effects (CI>1), with projection of data outside the graph range. The results suggested different effects between *cis*-UCA and *trans*-UCA when combined with HIM. Even though *cis*-UCA was present in small amount, it enhanced the effect of cytotoxicity of HIM to the cells. *Trans*-UCA which was present in high amount showed decreased effects when combined with HIM. Isobolographic analysis had successfully determined the synergism or antagonism effects of HIM with the presence of UCA isomers implicated in SFP.

POSTER PRESENTER 1.18

Adriana Connie Lee
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Characterization and Identification of Nanocellulose-Producing Bacteria

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Production of bacterial nanocellulose (BNC) is becoming increasingly popular and has high demand owing to its environmentally friendly properties. Bacterial nanocellulose (BNC) is a polymer synthesized by acetic acid bacteria (AAB) notably *Acetobacter xylinus*, has been given a great attention due to its high potency for various applications such as in the textile industry, non-woven cloth, paper, food, pharmaceuticals, waste treatment, broadcasting, mining and refineries. It may outperform the currently used celluloses in the food industry as it is characterized by a native nanofibrillar structure. The bacteria, *A. xylinusis* a type of acetic acid bacteria that produces cellulose as nano/microfibrils with favorable physical properties and it also capable of oxidizing glucose to gluconic acid and organic acid simultaneously. There are also several acetic acid bacteria that could produce BNC, thus, seven BNC producing bacteria strains were isolated to further identification and characterization. The ability to produce BNC will further analyzed for future usage.

Keywords: bacterial nanocellulose, acetic acid bacteria, *Acetobacter xylinus*

POSTER PRESENTER 1.19

Nurul Sabrena Hanafi
Universiti Putra Malaysia

Feasibility Study of *Calophyllum inophyllum* L. Seed Oil as Biolubricant

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Perceived as potential substitutes to petroleum-based lubricant, biolubricants gave significant role in defeating negative factor of mineral oil such as non-biodegradable and toxic. Currently, most of the world biolubricant is produced from edible oil which is easily available on large scale from the agricultural industry. However, continuous and large-scale production of biolubricant from edible vegetable oil without proper planning may cause negative impact to the world, such as depletion of food supply leading to economic imbalance. A possible solution to overcome this problem is to use non-edible vegetable oil. Thus, the feasibility study of biolubricant production using *Calophyllum inophyllum* L. seed oil will be perform. This dedicated crops with high oil's content which found abundantly in Indonesia have attract the attention to utilize it into biolubricant. This study is focusing on the resemblance of physicochemical properties between *C. inophyllum* L. seed oil and conventional lubricant in terms of pour point, flash point, kinematic viscosity, viscosity index and thermal oxidative stability. It is expected that the *C. inophyllum* L. biolubricant shown similar physicochemical properties as petroleum-based biolubricant.

Keywords: *Calophyllum inophyllum* L. seed oil; physicochemical properties; biolubricant

POSTER PRESENTER 1.20

Azlina Mohd Danial
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Antifungal Activity of Lactic Acid Bacteria Isolated from Malaysian Fermented Foods Against *Trichophyton rubrum*

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Malaysian fermented foods are considered healthy as they contain antimicrobial compounds such as organic acid which is naturally produced by lactic acid bacteria (LABs).The objective of this study was to examine these useful LAB strains (*L. plantarum* strain MCC 2156, *L. plantarum* strain HT-W104-B1, *P. acidilactici* 1498 and *P. pentosaceus* 1426) isolated from Malaysian fermented foods for potentially useful metabolites for the control of medically important fungal pathogen (*Trichophyton rubrum*) which cause skin disease. Overall, the reduction of *T. rubrum* colony area was significant ($p<0.05$) when compared to the control using dual culture assay. Pp 1426, Pa 1498, Lp HT-W104-B1 and Lp MCC 2156 reduced the T. rubrum colony area by 99%, 98%, 96% and 89%, respectively. More detailed studies using cell free supernatant (CFS) showed that Lp HT-W104-B1 alone contributed to the highest antifungal activity against *T. rubrum* compared with the other three strains examined, alone or in co-culture. The antifungal activity of Lp HT-W104-B1 CFS was first observed after 8 h during log growth phase and maximal at 48 h when the cell number reached approximately 10^{10} CFU/mL and at pH 3.2. The productions of lactic and acetic acids increased significantly ($p<0.05$) after 8 h and 12 h, respectively and maximal at 48 h. This study has shown the protective effect of *L. plantarum* strain HT-W104-B1 against *T. rubrum* which could be a good candidate for controlling skin diseases caused by *T. rubrum.*

Keywords: Lactic acid bacteria, fungal pathogen, antifungal activity

POSTER PRESENTER 1.21

Dr Adibah Yahya
Universiti Teknologi Malaysia

Cysteine and Methionine Production by Proteolytic Bacteria from Chicken Waste

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The continuous growth of poultry industry in Malaysia has resulted in a significant increase of waste by products generation that has could be potentially used as renewable resource for the production of value-added products. However, these wastes were not efficiently utilized due to the lack of innovation and scientific research. Thus, this research focused in utilizing the indigenous proteolytic bacteria from chicken viscera to produce cysteine and methionine as supplement in cat food production. Twenty-nine pure bacteria strains were isolated and three potential proteolytic strains coded H1, L4 and L6 were selected based on halo zone formation and protease activity. Protein production was studied in culture with single and mix culture at varying temperatures and initial pH. The highest protein concentration was obtained in culture with co-culture H1/L6 (12.025 mg/mL). Amino acid analysis was carried out to confirm the production of cysteine and methionine which served as the essential precursors to enhance chicken flavor. Product from co-cultures H1L6 produced high amount of methionine at 56 °C which is 29.130 mg/mL whereby the highest production of cysteine (1.760 mg/mL) was obtained in the culture with strain L6 at 56°C. In conclusion, the highest production of cysteine and methionine was successfully obtained by using strain L6 and co-culture H1/L6, respectively at fermentation temperature of 56 °C. The end products containing both cysteine and methionine can be extracted and further use in pet food production particularly for cats. With thorough optimization, this research will be highly beneficial to the rapidly-growing pet food industry in Malaysia.

Keywords: Chicken viscera; Methionine; Cysteine; Proteolytic bacteria

POSTER PRESENTER 1.22

Dr Mohd Shamzi Mohamed
Universiti Putra Malaysia

Medium Selection for Phycocyanin Production by Microalgae from Local Collection and Evaluation of Different Extraction Methods

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Phycocyanin (PC) is the major component of the phycobiliprotein family produced by microalgae. It has antioxidant, anti-inflammatory, hepatoprotective, and radical scavenging properties. This study compiled the identification of microalgae from local collection that produces higher phycocyanin and determination of the suitable extraction method that extracted the highest yield of phycocyanin. Four microalgae from local collection were assessed for phycocyanin production in their suitable aquaculture growth medium. Each maximum value of phycocyanin was achieved at 15th day of cultivation. This comparative study shows that the most efficient strain for the production of phycocyanin corresponded to Spirulina platensis which yielded the maximum value of phycocyanin 5.34 mg·g^{-1}. Besides, six different extraction methods were tested for higher phycocyanin extraction. The effectiveness of six extraction methods (freeze–thaw method, bead shaking, sonication, lysozyme digestion, weak acid as well as strong acid treatment) were compared using Spirulina platensis. Among physical extraction methods, the highest total phycocyanin content (8.595 mg·g^{-1}) was extracted from pre-soaked biomass using4 minutes sonication with 40% amplitude and 1 cycle. For chemical and enzymatic methods, the maximum phycocyanin yield obtained was 4.703 mg·g^{-1} when treated with 6 mg·mL^{-1} of lysozyme. The combination of both methods produced 10.45 mg·g^{-1} of phycocyanin which was 95% of increase in extraction yield of phycocyanin, as compared to baseline treatment (2 minutes sonication with 40% amplitude and 1 cycle alone).

Keywords: Aquaculture Growth Medium, Phycocyanin, Chemical Extraction, Physical Extraction, Spirulina platensis

POSTER PRESENTER 2.1

Nur Aima Hafiza Shazali
Universiti Putra Malaysia

Characterization and Cellular Internalization of Spherical Cellulose Nanocrystal into Normal and Cancerous Fibroblasts

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Cellulose nanocrystal (CNC) is generally accepted to be less to non-cytotoxic to cells. However, in tailoring a potential drug nanocarrier, a detailed assessment on its risk and safeness should still be carried out. This is because, different sources and processing conditions would result in CNC with different chemical/physical properties, which in turn would alter its biological behaviors towards cells. Therefore, this study aimed to isolate CNCfrom commercialized cellulose nanofiber (CNF) through sulphuric acid hydrolysis and explore its safeness as potential anti-cancer drug nanocarrier. Successful extraction of CNC was confirmed through field emission scanning electron microscope (FESEM) and attenuated total reflection Fourier transmission infrared (ATR-FTIR) spectrometry analysis. For subsequent cellular uptake study, the spherical CNC was covalently tagged with fluorescein isothiocyanate (FITC), resulting in negative charged FITC-CNC nanosphere with a polydispersity index of 0.371. MTT assay revealed low degree cytotoxicity for both CNC and FITC-CNC against C6 rat glioma and NIH3T3 normal fibroblasts up to 50 μg/mL. FITC conjugation had no contribution to the particle's toxicity. Through confocal laser scanning microscope (CLSM), synthesized FITC-CNC manifested negligible cellular accumulation, indicating a poor non-selective adsorptive endocytosis into cancerous and non-cancerous fibroblasts. The present study also confuted the ascendancy of spherical shape in fating the cellular uptake of FITC-CNC nanosphere through endocytosis as previously described. Overall, an untargeted CNC-based nanosphere with less cytotoxicity that posed poor selectivity against normal and cancerous cells has been successfully synthesized. It can be considered safe and suitable to be developed into targeted drug nanocarrier for anti-cancer treatment.

Keywords: cellulose nanocrystals; cytotoxicity; internalization; shape; endocytosis

POSTER PRESENTER 2.2

Assoc Prof Dr Mohd Rafein Zakaria

Universiti Putra Malaysia

Valorization of Biodiesel Side Stream Waste Glycerol for Rhamnolipids Production by *Pseudomonas aeruginosa* RS6

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Biodiesel side stream waste glycerol was identified as a suitable cheap carbon source for rhamnolipids production. The present study aims to obtain optimal fermentation conditions to produce rhamnolipids by Pseudomonas aeruginosaRS6 using waste glycerol as a substrate. The effect of temperature, initial medium pH, waste glycerol concentration, nitrogen sources, and nitrogen concentrations on the production of rhamnolipids was studied in shake flask batch experimental conditions. Maximum rhamnolipids production, 2.73 g/L was obtained when P. aeruginosa RS6 was grown in basal salt medium supplemented with 1% waste glycerol and 0.2 M sodium nitrate at 35°C and pH 6.5. At optimal fermentation conditions, the emulsification index (E_{24}) values on cooking oil, diesel oil, benzene, olive oil, petroleum, and kerosene were above 50%. Surface tension reduction from 72.13 mN/m to 29.4 - 30.4 mN/m obtained was better than the surface activity of some chemical-based surfactant. The present studies also showed that the tested rhamnolipids possessed antimicrobial activity against Gram-positive and Gram-negative bacteria with values ranging from 37%-77% of growth inhibition when 1 mg/mL of rhamnolipids were used. Concentrations of rhamnolipids below 1500 µg/mL also did not induce phytotoxicity effects to the tested seeds (Vigna radiata) compared to the chemical-based- surfactant, SDS. Furthermore, rhamnolipids tested on zebrafish (Danio rerio) embryos exhibited low acute toxicity with an LC_{50} value of 72.97 µg/mL at 48 h of exposure. FT-IR and LC-MS analyses have confirmed that the biosurfactant produced by P. aeruginosa from biodiesel side stream waste glycerol as rhamnolipids.

Keywords: Waste glycerol, biosurfactant, rhamnolipid, optimization, *Pseudomonas aeruginosa.*

POSTER PRESENTER 2.3

Assoc Prof Dr Nor Aini Abdul Rahman

Universiti Putra Malaysia

Tricalcium Phosphate Solubilization and Nitrogen Fixation by a Newly Isolated Bacterium from Food Waste

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Nitrogen and phosphorus are essential for the growth of agricultural plants. These elements are found in soil and can be fixed or solubilize by bacteria. Among 15 bacterial isolates, five isolates showed phosphate-solubilizing capability potential and nine isolates showed nitrogen fixation capability. The morphology of the cells is Gram-negative, branching, concave, opaque and coccobacillus. Out of 15 isolates, three isolates were selected, which were; 15(a)1, 40(a) and 38. Strain 40(a) showed the most efficient phosphate-solubilizing and nitrogen-fixing characteristics by producing the highest value of solubilized phosphate (19.11 µg mL^{-1}) and reduced initial pH 7.00 to pH 4.95. The strain produced the highest nitrogen fixing activity (14.00 mg N/g) with 1.40% of nitrogen in bacterial suspension. The sequencing results of 16S rRNA gene of isolate revealed that 40a is closely related to *Enterobacter hormaechei* subsp. *xiangfangensis* strain 10-17 (NR_126208.1) with similarity of 99.93%. *Enterobacter* genera are usually found as biological phosphate-solubilizing and nitrogen fixation bacteria from the discovery of earlier studies. Thus, these isolates have the potential in agricultural sector as bio-fertilizer to enhance the growth and production yield of crops and plants by solubilizing phosphates and fixing nitrogen.

Keywords: phosphate solubilizing bacteria (PSB), biofertilizer, nitrogen fixation, *Enterobacter hormaechei*

POSTER PRESENTER 2.4

Dr Jessica Jeyanthi James Antony
Universiti Putra Malaysia Bintulu Sarawak Campus

Micropropagation of Banana (*Musa* sp.) *Musa acuminata* × *balbisiana* Pisang Kepok

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Musa acuminate x *balbisiana* are usually processed into boiled, steamed, fried bananas or banana chips. Inability for *Musa acuminata* × *balbisianato* propagate in a short period of which cause plantlet formation takes a long time to grow. Hence, micropropagation via meristem cultures solves its high demand needs. The purposes of this project are to obtain optimum explant size and media components to determine its effect on growth index and shoots formations with good quality of plantlets. The most optimal growth of in vitro of banana were observed by optimizing the concentration of disinfectant used to surface sterilize (70%, 80%, 90% and 100% Clorox), the sizes of explant cultured (1 - 2 and 3 - 5mm), the content in the medium such as MS strength (½ MS, 1 MS and 2 MS), carbon source concentration (15, 30 and 45 g/L) of sucrose content,(0 mg/L, 1 mg/L, 2 mg/L and 3 mg/L) which are cytokinin, 6-Benzylaminopurine (BAP) and (0 mg/L, 1 mg/L, 1.5 mg/Land 2 mg/L) for auxin, Indole-3-Butyric acid (IBA), activated charcoal (0 mg/L, 1 mg/L, 2 mg/L and 3 mg/L) and their combinations. Results indicated that, optimal shoot proliferation rates were achieved from 3-5 mm of meristem bud that was surface sterilized using 100% of Clorox cultured on ½ MS medium supplemented with 30 mg/L sucrose, 3 mg/L BAP, 1 mg/L IBA and 1 mg/L AC. This resulted in an average of optimal 4.61 growth index and 100% shoot development.

Keywords: *Musa acuminate* x *balbisiana*, micropropagation, tissue culture

POSTER PRESENTER 2.5

Nurhidayah Ramlee
Universiti Putra Malaysia

Potential of *Bacillus licheniformis* 2D55 and *Colletotrichum gloeosporioides* Isolate 65CA/L in Biodegradation of Food Waste

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Abstract: The extensive utilization of microorganisms namely fungi and bacteria for treating organic wastes has been attributed to their efficiency in accelerating the biodegradation process. The aim of this research was to evaluate the potential biodegradation of food waste employing hydrolytic enzymes producing bacteria. These two strains were selected based on its enzymatic activities and stability at a wide range of temperature compared to the other strains. *Bacillus licheniformis* 2D55 and *Colletotrichum gloeosporioides* isolate 65CA/L showed high hydrolytic capacities. *Bacillus licheniformis* 2D55 produced various hydrolytic enzymes (lipase, protease, cellulase and amylase), while *Colletotrichum gloeosporioides* isolate 65CA/L showed capability for the production of protease and lipase enzymes. Food waste was used as substrate and inoculated with the strains in erlenmeyer flask in solid state fermentation (SSF). Various parameters such as moisture content, pH, temperature and microbial count were determined during the SSF for 10 days incubation. The results showed that the strains gave higher percentage of degradation compared to the control (without inoculation of microorganism). Further studies will be carried out to utilize the selected microbes for the enhancement of food waste composting.

Keywords: Microorganisms; Food waste; Biodegradation; Solid state fermentation

POSTER PRESENTER 2.6

Dang Lelamurni Abd. Razak
Malaysian Agricultural Research & Development Institute (MARDI)

Preliminary Evaluation of Anti-pigmentation Property of *Schizophyllum commune* (Cendawan Kukur) Extracts

Dang Lelamurni Abd. Razak[a], Nurul Yuziana Mohd Yusof[b], Anisah Jamaluddin[a], Nur Yuhasliza Abd. Rashid[a], Amsal Abd. Ghani[a] and Musaalbakri Abdul Manan[a]

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Schizophyllum commune or Cendawan Kukur is one of the popular locally-cultivated mushrooms but is currently underutilized. This mushroom contains many types of compounds that possess beneficial properties for skin health. Therefore, local S. commune has a great potential to be developed into health and wellness products – particularly cosmeceuticals. The present study was conducted with the objective to assess the cosmeceutical potential of S. commune extracts. Two types of water extracts – namely K4C and K30C were subjected to anti-tyrosinase activity assay as indicator for anti-pigmentation property, as well as antioxidant assays such as DPPH, FRAP and superoxide anion. The results showed that both extracts exhibited more than 80% tyrosinase inhibition activity and high antioxidant activities. Both extracts, in 5, 10, 50, 100 and 500 µg/mL concentrations were then tested in-vitro for their cytotoxicity effect against human skin cells. All tested concentrations of K4C extract as well as K30C extract at 10 and 50 µg/mL showed proliferative effect towards human fibroblast primary cell culture. K4C extract at 5 and 50 µg/mL as well as K30C extract at 5 and 10 µg/mL showed no toxicity effect to melanoma cells. Both extracts were assessed for anti-melanogenic effect in the melanoma cells at the concentrations of 5, 10 and 100 µg/mL and the results revealed that all concentrations of K30C extract showed positive inhibition of melanin production. Collectively, data shown in this study suggest that the extracts from S. commune have the potential to be used as anti-pigmentation and antioxidant agent in cosmeceutical products.

Keywords: Cendawan Kukur; *Schizophyllum commune*; anti-pigmentation; cytotoxicity

POSTER PRESENTER 2.7

Dr Azlina Mansor
Malaysian Agricultural Research & Development Institute (MARDI)

Optimised Fermentation Parameters for Enhanced Tannase Production using Combination of Agri-Industrial By-Products via Solid State Fermentation of *Aspergillus niger* PN1

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Tannase is an industrially important enzyme with numerous applications in the food, feed, beverage and pharmaceutical industries. However, its large-scale industrial application is still limited due its high production cost. Thus, has led to increased search for abundantly available and low-cost substrates, such as agricultural by-products as solid state fermentation (SSF) substrate. The use of cheaper carbon sources and efficient producing strains are promising strategies for economical tannase production. In our study, two novel agri by-products, namely rice bran and spent coffee ground have been selected as the best substrates' combination for the production of tannase under solid state fermentation using Aspergillus niger PN1. Optimization of fermentation parameters such as incubation time, initial pH, initial moisture content, concentration of spent coffee as inducer and types of vessels used were conducted to improve tannase activity using one variable at a time approach. Results obtained showed that maximum tannase activity (166.25 U/g) was attained under SSF using rice bran, with optimum values of 49% moisture content, pH 6.5, 1x10^8 of spore count (inoculum size), addition of 4% of spent coffee ground as inducer and using shake flask has increased tannase activity by 27%. Improved bioprocessing approach for tannase production by *Aspergillus niger* PN1 via solid-state fermentation using rice bran and spent coffee as substrates served as good alternative to add value and valorise agro-industrial by-products besides solving the environmental problem caused by improper disposal and subsequently reduced the cost of enzyme production.

Keywords: Agri-industrial by-products, optimization, rice bran, solid state fermentation, tannase

POSTER PRESENTER 2.8

Amsal Abd. Ghani
Malaysian Agricultural Research & Development Institute (MARDI)

Effects of Different Heat Sterilization Treatments on the Cosmeceutical Properties, Antioxidant Activities and Related Bioactive Compounds Production in Fermented Rice Bran Extract

Amsal Abd. Ghani, Anisah Jamaluddin, Nur Yuhasliza Abd. Rashid, Dang Lelamurni Abd. Razak, Azlina Mansor and Musaalbakri Abd. Manan

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Fermented rice bran with cosmeceutical properties has been produced with selected Aspergillus species through solid state fermentation under optimized conditions. However, spore inactivation through physical treatment such as heat is necessary for ensuring the safety and sterility of the fermented extract without affecting of its qualities. In this study, we investigated the effects of different heat treatments on the cosmeceutical properties (anti-pigmentation and anti-wrinkle), antioxidant properties, total phenolic contents, total flavonoid contents and also production of phenolic acids and kojic acid in the fermented extract. Results showed that generally all the treatments (dry heating using oven, autoclaving, and pasteurizing) have increased the tyrosinase inhibition activity (anti-pigmentation), total phenolic content, total flavonoid content, kojic acid production and enhanced the ferric reducing activity of the extract, but only autoclaving for 15 minutes could inactivate the spore in the extract. However, autoclaving at 10 and 15 minutes has decreased the elastase inhibition activity (anti-wrinkle) and the production of ferulic acid. In conclusion, autoclaving treatment was good to inactivate spore and enhance the cosmeceutical qualities, but it also has adverse impact on the anti-wrinkle property of the extract. These data will add scientific values on assuring the safety of the fermented rice bran extract as a natural-based substance for cosmetic product.

Keywords: rice bran; solid state fermentation; cosmeceuticals; tyrosinase; sterilization

POSTER PRESENTER 2.9

Dr Hamidun Bunawan
Universiti Kebangsaan Malaysia

Discovery of Domoic Acid Cluster Genes in *Nitzschia Navis-Varingica*

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The toxigenic euryhaline diatom *Nitzschia navis-varingica* is widely distributed in Malaysia. N. *navis varingica* strain P2CC7 was isolated and confirmed morphologically, molecularly and its ability to produce the neurotoxin domoic acid. Strain P2CC7 showed concentration of domoic acid of 4.1 x 10^4 pg/mL during exponential phase and increased to 1.1 x 10^5 pg/mL during its stationary phase. Total RNA for P2CC7 was extracted for transcriptomic analysis to elucidate the presence of biosynthesis pathway of neurotoxin domoic acid. Transcriptome data consist of 207,685 assembled transcripts for P2CC7. Four genes responsible for DA biosynthesis were identified, dabA (terpene cyclase), dabB (hypothetical protein), dabC (α-ketoglutarate-dependent dioxygenase) and dabD (CYP450). 77 homologs of consist of all domoic acid synthesis genes have been identified in P2CC7. To the best of our knowledge, this is the first discovery of DA biosynthetic pathway in *N. navis-varingica*. Knowledge of the genes involved in domoic acid production in *N. navis-varingica* will allow for genetic monitoring of algal blooms and aid in identifying conditions that trigger toxin production.

Keywords: Diatom; RNA sequencing; Domoic Acid; Transcriptomics

POSTER PRESENTER 2.10

Nor Shafinaz Azman
Universiti Putra Malaysia, Bintulu Sarawak Campus

Production of Biodiesel from Waste Cooking Oil

Nor Shafinaz Azman

Universiti Putra Malaysia, Bintulu Sarawak Campus

Public awareness and efforts by researchers in addressing issues of non-renewable energy sustainability has given a positive impact for modern generation looking for alternative, production of Biodiesel in pilot scale via transesterification has been reported increasing by year however the application and efficiency towards industrial scale result is not really encouraging and less realistic to be done. Waste Cooking Oil (WCO) can be used as green fuel source which has potential to be used in engine diesel such as motor vehicles and machinery. This project emphasized on the potential of waste cooking oil collected from Bintulu residential area in the production of Biodiesel via transesterification process carried out where ester compound is converted by an alcohol in the alkyl group. The factors affecting the process parameters were investigated on their alcohol to oil ratio, Reaction temperature, and catalyst scope in both of its qualitative and quantitative aspect. The prepared catalyst was characterized using several characterization techniques such as X-ray Diffraction (XRD), Thermalgravimetry (TGA) and Field Emissions Scanning Electron Microscopy (FESEM). The liquid products were analyzed using Gas Chromatography-Mass Spectrometer (GC-MS) and Gas Chromatography-Flame Ionization Detector (GC-FID) in order to measure the yield of straight chain hydrocarbon fractions in the range (C_8-C_{20}) or vice versa. The result shows the highest hydrocarbon fraction produces within range of n-(C_8-C_{20}) is 80%-93%.

POSTER PRESENTER 2.11

Nurul Husna Che Hamzah
Universiti Putra Malaysia, Bintulu Sarawak Campus

Potential of *Jatropha* as Biodiesel Feedstock in Malaysia

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The declining of fossil fuel sources with the growing energy demands have promoted the search for new alternative fuels that can be obtained from renewable energy resources. Renewable energy resources such as biodiesel has emerged as substitution fuel due to the fluctuating stock of fossil fuel while overcoming the environmental degradation. The emission of harmful gases especially from the use of diesel and petrol in transportation greatly affected the human health. The Earth also has become more exposed to the global warming phenomena which will further increase the probability of natural disaster. Therefore, biodiesel comes as a solution for human well-being. Biodiesel is mainly extracted from the agro-based products and has properties very close to that of petroleum diesel. Besides, biodiesel is biodegradable, non-toxic and highly efficient to reduce the petroleum diesel use. *Jatropha curcas* is a non-edible oil-bearing crop, thus its utilization will have no impact on available food production. It has a high-seed yield that continues to be produced for 30–40 years and the crop yield is about 2 tonnes per hectare. It is also is resistant to pests, can be grown on poor and arid soil. There is a finding which stated that 50% blend of *Jatropha curcas* oil can be used in diesel engines with no major operational difficulties. Oil content in the *Jatropha curcas* seeds is around 30–40%. Besides biodiesel, the oil of *Jatropha curcas* is highly suitable to be used directly to power suitably adapted diesel engines. It can be used as a source of light in remote areas as well as heating source for cooking. It can also be intercropped with other crops such as corn because it can act as fertilizer to other crops. This paper concluded that biodiesel production from Jatropha is eco-friendly and encouraged many social and economic development for Malaysia and can play an undoubtedly significant role to fulfill the energy demand in Malaysia.

POSTER PRESENTER 2.12

Dr Nurashikin Ihsan
Universiti Teknologi Malaysia

Evolution Adaptive Study of *Bacillus cereus* and *Bacillus subtilis* in Submerged Biodegradation System of Oil Palm Empty Fruit Bunches

Ivory Melissa Johnes and Nurashikin Ihsan

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Palm oil industry in Malaysia has been growing over the years which simultaneously generate oil palm waste in abundance. Oil palm wastes such as oil palm empty fruit bunch, palm kernel shell, mesocarp fiber, oil palm trunks, oil palm leaves and oil palm fronds are examples of lignocellulosic biomass. This lignocellulosic biomass contains high cellulose, hemicellulose and lignin thus become a promising candidate to produce biofuel. It is abundant in nature and cost-effective as one of renewable resources. Lignocellulolytic microorganism which can produce enzymes such as cellulases, xylanases and ligninases plays an important role to degrade the lignocellulose into sugar and biofuel. To produce biofuel efficiently, evolution adaptive technique can be used to increase the production of lignocellulolytic enzymes. This work aims to investigate the effectiveness of evolution adaptive method in improving the production of lignocellulose degrading enzymes by using oil palm empty fruit bunch as substrate. After 8 times of continuous sub-culture, adapted *Bacillus cereus* and *Bacillus subtilis* were able to increase the production of enzymes. *Bacillus cereus* was able to increase the yield of exoglucanase and xylanase with 4.5 and 7.4-fold higher respectively compared to the enzyme production before adaptation. Meanwhile, *Bacillus subtilis* strain shows high exoglucanase (124.40×10^{-3} U/mL) and xylanase (527.16×10^{-3} U/mL) activities which is 3.5-fold and 20.4-fold higher compared to the enzyme production before adaptation. The finding indicates that evolution adaptive technique can be used as a cost-effective method to improve lignocellulolytic enzymes yield and activities.

Keywords: evolution adaptive, *Bacillus subtilis*, *Bacillus cereus*, biodegradation, lignocellulose

POSTER PRESENTER 2.13

Dr Nurzila Ab Latif
Universiti Teknologi Malaysia

Characterization of the High and Low Producer of Chinese Hamster Ovary Cells in an Industrial Available Chemically Define Medium

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The increasing usage of monoclonal antibodies (mAbs), often expressed in Chinese Hamster Ovary (CHO) cells, for human therapy, has led to a focus on rational approaches to speed up the development of cost-effective and highly productive cell lines. Understanding the process physiology of industrial CHO cell lines is important to making significant progress in cell line and culture development. In this study, which was underpinned by the supply of several industrial CHO cell lines by an industrial collaborator (Lonza Biologics, UK) and newly developed industrial CHO media by another industry partner (Thermo Fisher Life Sciences, UK), the effects of several process variables including different clones of cells, passage number and culture medium on cell line physiology were investigated. GS-CHO 42 cell lines a high monoclonal antibody producer with low passage number were observed to give better results compared to a less productive cell lines and higher passage numbers. In addition, three commercially available, chemically defined CHO cell culture media (CD-CHO, CD-OPTICHO and Dynamis) were evaluated in batch culture using the GS-CHO 42 cell line passage number 4. Cell culture in shake flasks and bioreactors showed clear effects of culture system on process physiology. Amongst the three media tested, CD-CHO medium was found to be the best culture medium for GS-CHO 42 passage number 4 based upon the cell density, viability and IgG titre produced.

Keywords: Chinese hamster ovary (CHO); Cell culture medium; Antibody production; Batch culture

POSTER PRESENTER 2.14

Dr Ezyana Kamal Bahrin
Universiti Putra Malaysia

Schizophyllum sp. as Delignifying Agent in Biological Pretreatment of Lignocellulosic Biomass

Enis Natasha Noor Arbaain[a], Ezyana Kamal Bahrin[a,b,*], Mohamad Faizal Ibrahim[a,b,] and Suraini Abd-Aziz[a]

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Lignocellulose biomass can be utilized to its full potential for various bioproducts as an alternative low-cost feedstock. The conversion process including biomass pretreatment, hydrolysis and fermentation is developed to convert the lignocellulosic biomass into value-added bioproducts and biofuel. Lignocellulosic comprised of three major heteropolymers of lignin, cellulose and hemicellulose. Lignin is identified as the major barrier in the biomass pretreatment step. Generally, lignocellulosic biomass pretreatment is classified into four main categories based on the pretreatment method; chemical, physical, physicochemical and biological. In order to remove lignin and increase cellulose accessibility of the lignocellulosic biomass, physicochemical pretreatment is commonly used in the lignocellulosic conversion. However, the physicochemical pretreatment requires high energy input and a proper chemical waste management. Alternatively, biological pretreatment of lignocellulosic biomass using white rot fungus, *Schizophyllum* sp. is considered a more environmentally friendly process and requires low energy requirement compared to other pretreatments. The core enzymes that help to modify lignin component are an essential component in the biological system to degrade lignin. Therefore, an understanding on the enzymatic degradation of the lignin in biological pretreatment is the vital key towards chemical-free biomass pretreatment.

Keywords: lignin, biological pretreatment, lignocellulosic biomass, *Schizophyllum* sp.

POSTER PRESENTER 2.15

Nadhirah SH Salleh
Universiti Putra Malaysia

Identification of Phosphate and Potassium Solubilizing Fungi as Potential Biofertilizer

Nadhirah Salleh Bareduan[a], Nor'Aini Abdul Rahman[a*] and Murni Halim[a]

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Commercial fertilizer has been used widely in the agriculture field to overcome phosphorus (P) and potassium (K) deficiency in which lack of both of these macronutrients could affect the growth of crops. This is because P and K are essential macronutrients that largely contributing to plant maturity and growth after Nitrogen (N). However, the excessive usage of commercial fertilizer slowly gives a negative impact on the environment such as groundwater pollution, waterway eutrophication, reducing soil fertility and the left toxic residues in the soil. Hence, this study was carried out to isolate fungi that capable to solubilize P and K in the soil so that it can be utilized by plants, thus enhancing plant growth and crops yield. Out of 44 isolates, 8 isolates showed positives for phosphate and potassium solubilization on the agar plate. Further analysis was carried out to determine the phosphate and potassium solubilization ability quantitatively. Therefore, one strain was selected and identified as it showed the highest solubilization ability for both nutrients among the other strains. The fungal strain can be identified as potential biofertilizer and further studies are needed to utilize these fungi in agriculture sector.

Keywords: Phosphate-solubilizing fungi (PSF), Potassium-solubilizing fungi (KSF), biofertilizer, microorganisms

POSTER PRESENTER 2.16

Sam Shu-Cuen
Universiti Putra Malaysia

Production of Keratinase by *Pseudomonas* sp. LM19 in the Presence of Biosurfactant

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The increase in demand for chicken meat products for human consumption has caused the accumulation of feather waste. Many approaches had been applied through biological treatment to degrade and convert the chicken feather for useful end products. However, the feather degradation by biological methods are still unsatisfactory due to low keratinase activity. Pseudomonas sp. has been reported to be able to produce various products including keratinase and biosurfactant. Carbon source is one of the main components that affect the fermentation process. Thus, in this research the keratinase production by Pseudomonas sp. using media supplemented with different carbon sources was evaluated. The feathers were first cleaned and dried prior to the fermentation using three sets of carbon sources i.e : feather alone, glycerol alone and combination of feather and glycerol. Among the three sets of carbon sources, keratinase was produced by Pseudomonas sp. growing in the media containing feather alone and feather with glycerol. The highest keratinase activity of 4.2 U/mL was observed in the culture medium containing feather (1 g/L) with glycerol (0.5% v/v). On the other hand, biosurfactant was produced in the media containing glycerol alone and feather with glycerol as indicated by the emulsification index. In conclusion, higher keratinase production was observed in the culture medium containing both feather and glycerol. The effect of biosurfactant on keratinase production by Pseudomonas sp. is worth to be further studied in order to enhance the keratinase production.

POSTER PRESENTER 2.17

Nazrul Hisham Nazaruddin
Malaysian Agricultural Research & Development Institute (MARDI)

Overexpression of OsTLP in Transgenic Rice cv. MR 219 Confers Enhanced Resistance against *Rhizoctonia solani*

Nazrul Hisham, N.[a], Rogayah, S.[a], Amin Asyraf, T.[a], Nora'ini, A.[a], Zaifulfarizal, Z.[a], Siti Norsuha, M.[b], Mohamad Ariff Asrofp, R.[b] and Rohaiza, A.R.[a]

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Rice thaumatin-like protein (OsTLP), belong to pathogenesis-related protein-5 (PR-5) family of defence-related PR proteins, has been associated with the plant disease resistance against sheath blight pathogen, *Rhizoctonia solani*, due to its antifungal activity. Our previous study on the expression of several PR genes in a sheath blight tolerant and susceptible varieties, Oryza sativa cv. Tetep and IR64, respectively, indicated that OsTLP was highly expressed in Tetep, and yet, it was absent in IR64. Likewise, in Malaysian indica rice cv. MR 219, we found that this specific OsTLP was absent as well. Therefore, it was hypothesized that the introduction of this gene into an economically-important and susceptible rice variety, MR 219, could increase the resistance against the disease. OsTLP was then isolated from *O. sativa* cv. Tetep *and* constructed into a gene cassette in a sense orientation and derived by a constitutive promoter, CaMV 35S. Subsequently, it was inserted to the binary vector, pCAMBIA 1305.2 and Agrobacterium-mediated transformation was performed on the embryogenic callus of MR 219. Following regeneration into whole plant, T_1 seeds from the positive transformants were collected and grown in the Transgenic Glasshouse, MARDI Serdang. When the plant reached 45-day-old, artificial infection with *R. solani* was conducted on 12 transgenic lines with four replicates each to assess the disease incidence and severity. Based on the Standard Evaluation System (SES) for Rice, one transgenic line, PR5-L6, showed relative lesion height of 18.82% after 75 days of infection, which indicated an enhanced resistance against the pathogenic fungus. T_2 seeds of potential transgenic lines were collected for subsequent screening and gene stability analysis.

Keywords: Thaumatin-like protein; Sheath blight; Agrobacterium-mediated transformation

POSTER PRESENTER 2.18

Mohamad Zulhisyam Rashid
Universiti Malaysia Sarawak

Sago Effluent for Fermentable Sugar Production

Dyg Salwani Awg Adeni[a] and Mohamad Zulhisyam Rashid[a]

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Large amount of sago effluent is discharged into the river as waste upon processing of sago logs for starch production. This situation causes environmental pollution based on the measured pollutant parameters, biochemical oxygen demand and chemical oxygen demand was 2,900 mg/L and 8,000 mg/L, respectively. Sago effluent still has 5-10 % of starch remaining, which can be converted into the sugar. The objective of this study is to convert sago effluent into fermentable sugar, as an alternative option for sago wastewater treatment. Initially, selected chemical parameters of sago effluent such as pH and starch concentration were evaluated prior to enzymatic hydrolysis process. The starch concentration was analyzed using iodine test, whereas sugar concentration was measured using Dinitrosalicyclic acid (DNS)method. In addition, ethanol concentration was determined through high-performance liquid chromatography (HPLC) system. Trial on fermentability of sago effluent hydrolysate for ethanol production was also conducted in batch fermentation. All batch fermentation trials were performed using commercial baker's yeast (Saccharomyces cerevisiae) in triplicates using 250 mL shake flasks at 100 mL working volume, at initial pH of 5.5-5.6, with temperature controlled at 30 °C and agitation controlled at 100 rpm. According to the result obtained, starch concentration for sago effluent was61.33 g/L. Further enzymatic hydrolysis of sago effluent produced 50.57 g/L of glucose which reveal 82.5% of conversion yield. Then, the fermentation process was conducted by using sago effluent hydrolysate in which 22.81 g/L of ethanol was produced, hence display a conversion of 91% based on theoretical yield. In conclusion, sago effluent can be used as an alternative raw material for bioethanol production.

Keywords: Sago Effluent; biochemical oxygen demand; chemical oxygen demand; fermentation

POSTER PRESENTER 2.19

Dr Nur Kusaira Khairul Ikram
University of Malaya

ArteMoss: A Novel Plant-Based Malarial Drug Production System

Nur Kusaira Khairul Ikram[a,d], Arman Beyraghdar Kashkooli[c,e], Alexander R. van der Krol[a], Harro Bouwmeester[c,f] and Henrik Toft Simonsen[b]

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Physcomitrella patens is a non-vascular plant that has been well established as a model organism to be used in basic research and in applied biotechnology. The genome is fully sequenced, and the haploid life cycle and efficient homologous recombination makes *P. patens* an attractive industrial production system compared to other plant hosts. Additionally, a novel transformation technology involving in vivo assembly of multiple DNA fragments in *P. patens* has been established, further increasing the potential as a photosynthetic chassis for synthetic biology. With this, *P. patens* has been chosen as the candidate organism for production of terpenoid-based drugs derived from plants, with a primary focus on the sesquiterpene lactones, artemisinin (antimalarial drug). The five genes involved in artemisinin biosynthesis were engineered into the moss *Physcomitrella patens* via direct in vivo assembly of multiple DNA fragments. Our study shows that *P. patens* can be a sustainable and efficient production platform of artemisinin that without further modifications allow for industrial-scale production. A stable supply of artemisinin will lower the price of artemisinin-based treatments, hence become more affordable to the lower income communities most affected by malaria; an important step toward containment of this deadly disease threatening millions every year.

Keywords: Artemisinin; *Physcomitrella patens*; sesquiterpenoids; malaria; biotechnology

POSTER PRESENTER 2.2

Assoc Prof Dr Rosimah Nulit

Universiti Putra Malaysia

Enhancement the Germination Performance and Early Seedling Growth of Salt-Stressed Watermelon var. 168

Narzirah Zainuddin, Rosimah Nulit*, Roslinda A Razak, Mohd Hafiz Ibrahim, Siti Nuratiqah Mahadi, Noorhazira Sidek, Nurfatiha Mustafa and Mohamad Rasyid Sukifto

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Salinity continues to be one of the most serious environmental problem especially to glycophytes (non-tolerate) crops such as rice, and watermelon. In the life cycle of plant, germination is the first stage that expose to saline, thus understanding of tolerance to salinity during the germination stage is crucial for the establishment and management of plant in saline soils. This study aimed to determine the ideal concentration of potassium nitrate (KNO_3) which enhance the germination and early seedling growth of salt-stressed watermelon var. 168. Watermelon var. 168 seeds were firstly primed in 200 mM NaCl for 4 days to induce salt stress. Followed by treated with different concentration of KNO_3 (1.0, 2.5, 5.0, 7.5 and 10.0 mM) separately and deionized water as a control. Germination percentage, germination rate, seed vigor index, seedling length and biomass were measured. Results showed that KNO_3 treatment significantly increased the germination performance of salt-stressed var. 168 seed which is germination index and seed vigor significantly higher in 2.5 -7.5 mM KNO_3 (ANOVA, $p<0.05$). Treatment with 7.5 mM KNO_3 showed 2 times higher on the germination index and 5 times higher on seed vigor than control. Results also proved that KNO_3 significantly improved the early growth of watermelon seedlings which is 7.5mM KNO_3 showed the highest on the seedling length. However, KNO_3 found has no effect on the seedling biomass. As the conclusion, 7.5 mM KNO_3 have potential to be used in the field to improve the germination performance and early growth of salt-stressed watermelon var. 168.

Keywords: salinity; germination performance; seed vigor, watermelon, KNO_3

POSTER PRESENTER 2.21

Dr Mohd Helmi Sani
Universiti Teknologi Malaysia

Selection of Microcarriers for the Mammalian Cell in Microwell Attachment Plates

Darshini Murugiah and Mohd Helmi Sani

Department of Bioscience, Faculty of Science, Universiti Teknologi Malaysia, UTM Johor Bahru, 81310 Skudai Johor

Microcarrier based cell culture system allows the growth of anchorage-dependent cells for the upscale process in the biopharmaceutical industry. However, the conventional screening conditions of microcarrier based cell culture in large scale is not cost effective and use lots of materials. In this work, Chinese hamster ovary (CHO) cells were seeded with the selected microcarriers in a 24 multi-well attachment plate. The growth rates of the cells attached on the microcarriers in the microwell plates were screened. Two microcarriers selected were Cellonsphere™3 and Cytodex-3 and two concentrations were prepared for each microcarrier (5% and 7%). The cell number was calculated using trypan blue exclusion method, whereas the glucose concentration was measured by using 3,5-dinitrosalicylic acid (DNS) assay. Initially, three seeding densities (7×10^4 cell/mL, 1×10^5 cell/mL, and 6×10^5 cell/mL) were chosen and seeded with the cells for 10 days. After the growth rate analysis, the best seeding density (1×10^5 cell/mL) was selected to be seeded with the microcarriers and analyzed for 7 days. This seeding density had the highest growth rate and lowest doubling time with the values of 0.448±0.118/h and 1.64±0.502h, respectively. Overall, Cellonsphere™ 3 with 5% concentration had the highest growth rate and lowest doubling time with the values of 0.772±0.302 /h and 1.01±0.438 h, respectively. However, based on the cell densities and cell viabilities, Cytodex-3 with 5% concentration had the highest live cell count (33.00 ±2.60) $\times10^4$ cell/mL. In conclusion, the most suitable microcarrier selected was Cytodex-3 with 5% concentration as it had a better cell attachment and could facilitate in the upscale process of biopharmaceutical industry.

Keywords: microcarrier; mammalian cells; Chinese hamster ovary; microwell

POSTER PRESENTER 2.2

Dr Helmi Wasoh @ Mohamad Isa
Universiti Putra Malaysia

Effect of Palm Olein Enriched with Lactic Acid as New Potential Moisturizing Skin Care Lotion

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Lactic acid is an alpha hydroxyl acid with well-known characteristic for its moisturizing effect. Two concentrations of lactic acid, 0.35% and 0.70% were formulated into skin whitening lotion (kojic acid was used as whitening agent) using two types of oils; sunflower seed oil: palm olein, (8:2), without the propylene glycol (common irritation agent in skin care lotion). By using ternary phase diagram, complete lotion formulation was obtained. These two formulations were identified as an oil in water (O/W) emulsion type with the behavior of pseudoplastic viscoelasticity. Final peroxide value release by both formulations were 2.50 and 3.50 respectively. Emulsion particle size was reduced using mechanical homogenizer to 365.86 nm and 341.17 nm respectively. By having this size, emulsion is believed to have longer shelf life and proven through measurement of zeta potential based on result in -20.90 mV for first formulation and -19.07 mV for second formulation. Emulsion stability was tested at various temperature; 25˚C, 37˚C and 45˚C, showing stable emulsion performance. Both formulations were formulated using free paraben preservative and showing no growth of contaminant. For final judgement, lotion was evaluated by eight trained panels for sensory analysis indicating that both formulations provide good potential acceptance. Conclusively, the newly formulated lotions with palm olein could be a great potential for ingredient in moisturizing formula in the skin care products.

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