



INTERNATIONAL  
CONFERENCE ON  
AGRICULTURAL AND  
FOOD ENGINEERING

**CAFEi  
2014**

*"New Trends Forward..."*

**CAFEi 2014**

## 2<sup>nd</sup> International Conference on **Agricultural and Food Engineering**

1–3 December 2014 | Berjaya Times Square  
Hotel, Malaysia Kuala Lumpur, Malaysia

### **PROGRAM & ABSTRACTS**



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## Foreword by Vice Chancellor



**Prof. Dato' Dr. Mohd Fauzi Haji Ramlan**  
D.P.M.S., D.M.S.M., J.S.M.  
*Vice Chancellor of Universiti Putra Malaysia*

Welcome to all participants to the 2<sup>nd</sup> International Conference of Agricultural and Food Engineering 2014 (CAFEi 2014) organised by Department of Process and Food Engineering and Department of Biological and Agriculture Engineering Universiti Putra Malaysia.

As we are all aware, the conference is held in conjunction with the nation's leading agricultural expo, MAHA International 2014. This year, MAHA International 2014, themed with "Agro-technology - Catalyst for Transformation", is intended to boost up the latest development of agro-food and agro-based industry with promoting on the future direction of agro-food and agro-based in Malaysia. This objective is in line with the CAFEi 2014 themed which is 'New Trends' that providing the new trends in agro-food technology and engineering. Therefore this eventful conference is indeed a timely-moment as it will be a platform for us to present and share the latest research ideas, findings and technologies in these fields of food production, trading and related agro based industries.

The significant efforts and initiatives that have been made to organize this 3-day international conference reflect that the agriculture and food sector play important role in economic growth. The relationship between agricultural and food engineering will also be highlighted. Thus, we are here to address the importance of bringing engineering and innovation benefits to the agriculture sector and eventually underlining the ideas and strategies to reach sustainable agriculture and to achieve self sufficiency in food production in term of food security. In fact, research in agriculture and food engineering as well as sustainable management of natural resources including land, water and soils have been shown to give a significant impact on the growth of agriculture and food sector in developing countries. Therefore, it is expected that this conference will be utilized up to the most in exploring the potential of using the scientific knowledge, practical ideas, and emerging technologies for humankind with new trends.

Finally, I would like to once again to take this opportunity to congratulate the organizers who worked very hard to make this conference a success. I hope the conference will successfully cover the promising researches and new trends of engineering solutions that can benefit the agriculture and food sector and rural activities.

**WITH KNOWLEDGE WE SERVE**



## Foreword by Dean



**Assoc. Prof. Ir. Dr. Azmi Dato' Yahya**  
*Dean of Faculty Engineering, Universiti Putra Malaysia*

On behalf of the Organizing Committee, I am delighted to welcome you to the International Conference of Agricultural and Food Engineering 2014 (CAFEi 2014). The conference organizers have put together excellent scientific and engineering benefits encompasses both the latest research in agricultural and food sectors, to renew old friendships and to make new acquaintances.

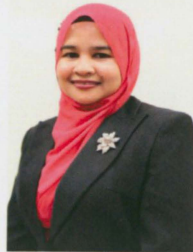
This conference also giving a golden opportunity to the researchers to discuss critically about the new trends to be applied in the area of agricultural and food engineering. Moreover, this objective can be emphasized by bringing up the current issues related to food security and sustainable agriculture. To highlight this issues, we as part of global academia community need to identify the new trends of technique which can be applied to food security and sustainable agriculture, in particular by unleashing the potential of engineering research and innovation that can bring significant impact to the development of agriculture and food sectors. While many of us come from different background and expertise, we all share the same goal to contribute and bring fresh ideas to the agriculture and food engineering research and eventually provide the new trends to the global agriculture and food sectors.

The past decades have observed an impressive change in agriculture and food sectors. Traditionally, the performance and the contribution of these sectors have been undervalued. However in recent years, both sectors have made convincing contribution to economic growth of many countries. Around the world, the agricultural models would vary by region and within the region themselves. There is a general trend toward intensification, concentration and specialization in this sector. As part of the scientific community, we hold an essential role in informing strategic investments to establish climate-resilient agricultural production systems, reducing greenhouse gas emissions, making efficient use of resources, developing low-waste supply chains, ensuring adequate nutrition, encouraging healthy eating patterns and developing a global knowledge system for sustainability. Moreover, collaboration of R&D team between institutions and industry as well as the exchange of R&D personnel between the two sectors should be encouraged and optimistic. Therefore I look forward to see this conference to be held more often in the future, as this is one of the most effective means to ensure knowledge and innovation transfer within education world.

On this occasion, I would like to take this opportunity to thank and congratulate the organizers who worked hard for the last few months to make this conference a success. Thank you also to paper and poster presenters, exhibitors and to all participants, local and foreign, for your contributions. Lastly, I sincerely hope that after the conference all participants will gain all the benefit and knowledge.



## Foreword by CAFEi 2014 Chairperson



**Assoc. Prof. Dr. Yus Aniza Yusof**  
*Chairperson of CAFEi 2014*

On behalf of the Department of Process and Food Engineering and the Department of Biological and Agricultural Engineering, Universiti Putra Malaysia, I would like to welcome all speakers, delegates, guests, and participants to the 2nd International Conference in Agricultural and Food Engineering, CAFEi 2014 with the theme – ‘New Trends Forward’. The conference is organized in conjunction with the Malaysian Agriculture, Horticulture and Agro-tourism Exhibition or MAHA 2014 and is certainly amongst the largest and most comprehensive show of its kind in the region. The main objective of CAFEi 2014 is to provide a forum to present and discuss new trends in the area of Agricultural and Food Engineering, and to strategize on how we could bring the engineering solutions, through safe and secured agricultural and food production systems, under a clean and sustainable environment.

Nowadays, as a lot of research activities are conducted on agriculture and food materials, it is necessary to discuss positive approaches in engineering path towards contributing to sustainable agriculture for the country with the aim of reaching self-sufficiency in food production. In an increasingly globalised world, there is a critical need to expand engineering research and studies to contribute to the growth of Agricultural and Food industry.

Thus, CAFEi 2014 shall serve as a platform for critical discussion, potential solutions and promotions of these new trends. Related issues must be addressed with proactive approaches, through strategic techniques and technologies derived from research so as to generate ideas, formulate frameworks and finally celebrate the outcomes. One of the significant outcomes of this conference is the publication of the selected papers in the Agriculture and Agricultural Science Procedia journal. This journal is published by a prominent publisher, Elsevier, which is popularly cited by SCOPUS, the largest abstract and citation database of peer-reviewed literature.

At this juncture, I would like to thank our keynote speakers, Prof. Dr. Murat Omer Balaban (The University of Auckland, New Zealand), Prof. Dr. Rameshwar S. Kanwar (Iowa State University, USA), Prof. Dr. Russly Abdul Rahman (Universiti Putra Malaysia, Malaysia), Prof. Ir. Dr. Lee Teang Shui (Universiti Putra Malaysia, Malaysia), and Assoc. Prof. Dr. Novizar Nazir (Agroindustrial Technology of Andalas University, Indonesia.) We greatly value their participations and look forward to their insightful visions and thoughts.

I would also like to take the opportunity to congratulate the secretariat and the committee members for their dedicated works and efforts to make this event a success. A special thanks to Universiti Putra Malaysia, other organizing committee members and industry sponsors who have taken time out of their busy schedules to help organize this year's conference. Last but not least, I wish all the participants successful and fruitful outcomes from this conference.



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### Program Overview: Monday, 1 December 2014

|                                                                                                                                              |         |
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| Keynote 1: Role of Agricultural and Biosystems Engineers in Solving Global Food and Water Security Problems<br>Prof. Dr. Rameshwar S. Kanwar | Info-30 |
| Keynote 2: Food Engineering: Overview, Emerging and Future Trends<br>Prof. Dr. Russly Abdul Rahman                                           | Info-31 |

### Program Overview: Tuesday, 2 December 2014

|                                                                                                                                 |         |
|---------------------------------------------------------------------------------------------------------------------------------|---------|
| Keynote 3: Dense Phase Carbon Dioxide Research: Current Focus and Directions<br>Prof. Dr. Murat Omer Balaban                    | Info-32 |
| Keynote 4: How Green is Your Product: Life Cycle Assessment (LCA) in Agri-food System<br>Assoc. Prof. Dr. Novizar Nazir         | Info-33 |
| Keynote 5: A Review of Climate Change Impacts on Crop Production and Some Adaptation Strategies<br>Prof. Ir. Dr. Lee Teang Shui | Info-34 |

### List of Posters

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1 - 3 December 2014  
Kuala Lumpur, Malaysia



## Conference Venue



### **Berjaya Times Square Hotel**

1 Jalan Imbi, 55100 Kuala Lumpur, Malaysia

Tel : + 60 (3) 2117 8000; Fax : + 60 (3) 2143 3352

Email : [bth.rsvn@berjayahotel.com](mailto:bth.rsvn@berjayahotel.com); <http://www.berjayahotel.com/kualalumpur/>

Towering over the skyline majestically, Berjaya Times Square Hotel is located in the heart and soul of the Kuala Lumpur city. Home to an eclectic mix of the old and new, embark on a city adventure and discover the diverse culture and heritage of this exciting city. With the adjacent Berjaya Times Square Shopping Mall providing convenience, this strategically located hotel is easily accessed via road or monorail to all major attractions in and around Kuala Lumpur. The grand exterior of the hotel and its high standard of hospitality makes this hotel regarded as among the preferred destinations for business and leisure travellers.

### About UPM



#### Universiti Putra Malaysia

43400 UPM Serdang

Selangor Darul Ehsan

Malaysia

Tel : +603.8946.6000; Fax : +603.8948.7273

UPM, a leading research university in Malaysia is located in Serdang, next to Malaysia's administrative capital city, Putrajaya. As a world renowned centre of learning and research, UPM has attracted students and staff from all around the world making it a well-respected global entity. Founded in 1931 as the School of Agriculture, the University today combines impressive modern facilities and a dynamic approach to teaching and research with its proud heritage of quality services and achievements.

### UPM Song

#### Lyric for UPM Song

#### Lirik Lagu Putra Gemilang

Universiti Putra Malaysia

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Tersemat citramu semegah kenangan

Di darjat bangsa di daulat negara

Tersurat jasamu menjana kemajuan



## Technical Visit

3<sup>rd</sup> December 2014 (Wednesday)

| Time    | Activity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.00 am | Depart from Berjaya Times Square Hotel to Putrajaya                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 9.40 am | Tour at Putrajaya <ul style="list-style-type: none"><li>• Putra Square</li><li>• Putra Mosque</li><li>• Prime Minister Office (Perdana Putra)</li><li>• Prime Minister Residence (Seri Perdana Complex)</li><li>• Botanical Garden Via Seri Perdana Bridge</li><li>• Putra Perdana Park</li><li>• Seri Bakti Bridge</li><li>• Agriculture Heritage Park</li><li>• Putrajaya Square</li><li>• Seri Gemilang Bridge</li><li>• Putrajaya International Convention Centre (PICC)</li><li>• Seri Saujana Bridge</li><li>• Seri Wawasan Bridge</li><li>• Putra Bridge</li></ul> |
| 3.00 pm | Depart from Putrajaya to UPM <ul style="list-style-type: none"><li>• Tour at Department of Process and Food Engineering and Department of Biological and Agricultural Engineering</li><li>• Lab Visit</li></ul>                                                                                                                                                                                                                                                                                                                                                           |
| 5.00 pm | Depart from UPM to Berjaya Times Square Hotel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Organisers & Supporters

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Department of Process and Food Engineering, UPM  
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### Supporters



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## CAFEI 2014 — Program Overview

| Time/Venue    | Berjaya Times Square Hotel                                                                                                                                            |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <b>30 November 2014</b>                                                                                                                                               |
| 18:00 - 20:00 | Registration<br>Poster Placement<br>Poster Evaluation for Best Poster Prize will be during breaktimes throughout Day 1 where presenters can make themselves available |

1 December 2014

|               | Manhattan III                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                     |                                                                                                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:30 - 09:00 | Registration                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                     |                                                                                                                                                                                       |
| 09:00 - 10:00 | <b>Opening Ceremony</b><br>Arrival of Honourable UPM Vice Chancellor and Honourable Guests<br>Recitation of Doa<br>Welcoming Speech by Chairman, Associate Professor Dr Yus Aniza Yusof<br>Opening Speech by UPM Vice Chancellor Prof. Dato' Dr. Mohd Fauzi b. Hj Ramlan<br>Group Photo Session |                                                                                                                                                                                     |                                                                                                                                                                                       |
| 10:00 - 10:20 | Break and Refreshment                                                                                                                                                                                                                                                                           |                                                                                                                                                                                     |                                                                                                                                                                                       |
| 10:20 - 10:50 | <b>Keynote 1:</b> Prof. Rameshwar S. Kanwar (326), Iowa State University, USA<br><b>Chairperson:</b> Assoc. Prof. Ir. Dr. Azmi Dato' Yahya                                                                                                                                                      |                                                                                                                                                                                     |                                                                                                                                                                                       |
| 10:50 - 11:20 | <b>Keynote 2:</b> Prof. Dr. Russly Abdul Rahman (325), Universiti Putra Malaysia<br><b>Chairperson:</b> Assoc. Prof. Ir. Dr. Azmi Dato' Yahya                                                                                                                                                   |                                                                                                                                                                                     |                                                                                                                                                                                       |
|               | Manhattan III                                                                                                                                                                                                                                                                                   | Bronx V                                                                                                                                                                             | Bronx VI                                                                                                                                                                              |
| 11:20 - 13:00 | Track : <b>Processing, technologies and innovations</b><br>Chairperson:<br><b>Assoc. Prof. Ir. Dr. Azmi Dato' Yahya</b><br>Assistant Chairperson:<br><b>Mr. Anwar Ridhwan Ismail</b>                                                                                                            | Track: <b>Bio-products and waste management</b><br>Chairperson:<br><b>Assoc. Prof. Dr Siti Mazlina Mustapa Kamal</b><br>Assistant Chairperson:<br><b>Mr. Ahmad Muslim Md. Rasli</b> | Track: <b>Sustainable processing and new resources</b><br>Chairperson:<br><b>Assoc. Prof. Dr Hasfalina Che Man</b><br>Assistant Chairperson:<br><b>Ms. Rahimah Shafie</b>             |
| 13:00 - 14:00 | Lunch Break                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                     |                                                                                                                                                                                       |
| 14:00 - 15:20 | Track: <b>Young Presenter Award Session (YSN-ASM)</b><br>Chairperson: <b>Assoc. Prof. Dr. Rimfiel b. Janius</b><br>Assistant Chairperson:<br><b>Mr. Anwar Ridhwan Ismail</b>                                                                                                                    | Track: <b>Modelling, simulation and control</b><br>Chairperson:<br><b>Assoc. Prof. Dr. Farah Saleena Taip</b><br>Assistant Chairperson:<br><b>Mr. Ahmad Muslim Md. Rasli</b>        | Track: <b>Food quality, safety and bio-information system</b><br>Chairperson:<br><b>Assoc. Prof. Dr. Siti Khairunniza Bejo</b><br>Assistant Chairperson:<br><b>Ms. Rahimah Shafie</b> |
| 15:20 - 15:40 | Break and Refreshment                                                                                                                                                                                                                                                                           |                                                                                                                                                                                     |                                                                                                                                                                                       |
| 15:40 - 18:20 | Track: <b>Young Presenter Award Session (YSN-ASM)</b><br>Chairperson: <b>Assoc. Prof. Dr. Rimfiel b. Janius</b><br>Assistant Chairperson:<br><b>Mr. Anwar Ridhwan Ismail</b>                                                                                                                    | Track: <b>Modelling, simulation and control</b><br>Chairperson: <b>Assoc. Prof. Dr. Farah Saleena Taip</b><br>Assistant Chairperson:<br><b>Mr. Ahmad Muslim Md. Rasli</b>           | Track: <b>Food quality, safety and bio-information system</b><br>Chairperson: <b>Assoc. Prof. Dr. Siti Khairunniza Bejo</b><br>Assistant Chairperson:<br><b>Ms. Rahimah Shafie</b>    |
| 20:00 - 22:30 | Conference Dinner and Award Giving                                                                                                                                                                                                                                                              |                                                                                                                                                                                     |                                                                                                                                                                                       |



## 2<sup>ND</sup> INTERNATIONAL CONFERENCE ON AGRICULTURAL AND FOOD ENGINEERING

### Technical Program

### Sunday, 30 November 2014

- 18:00–20:00      Registration  
Poster Placement  
*Poster Evaluation for Best Poster Prize will be during break-times throughout Day 1 where presenters can make themselves available.*

### Day 1: Monday, 1 December 2014

- 7:30–9:00      Registration  
9:00–10:00      Opening Ceremony  
*Arrival of Honourable UPM Vice Chancellor and Honourable Guests*  
Recitation of Doa  
*Welcoming Speech by Chairman, Associate Professor Dr Yus Aniza Yusof*  
*Opening Speech by UPM Vice Chancellor Prof. Dato' Dr. Mohd Fauzi b. Hj Ramlan*  
Group Photo Session

10:00–10:20      Break and Refreshment

|           |                                         |
|-----------|-----------------------------------------|
| Session   | Keynote I & II                          |
| Date/Time | Monday, 1 December 2014 / 10:20 – 11:20 |
| Room      | Manhattan III                           |
| Chair(s)  | Assoc. Prof. Ir. Dr. Azmi Dato' Yahya   |

- 10:20–10:50      **Keynote I:** Role of Agricultural and Biosystems Engineers in Solving  
Global Food and Water Security Problems      Info-30  
*Prof. Dr. Rameshwar S. Kanwar, Iowa State University, United States*
- 10:50–11:20      **Keynote II:** Food Engineering: Overview, Emerging and Future Trends      Info-31  
*Prof. Dr. Russly Abdul Rahman, Universiti Putra Malaysia, Malaysia*



|           |                                                                               |
|-----------|-------------------------------------------------------------------------------|
| Session   | Processing, Technologies and Innovations                                      |
| Date/Time | Monday, 1 December 2014 / 11:20 – 1:00                                        |
| Room      | Manhattan III                                                                 |
| Chair(s)  | Assoc. Prof. Ir. Dr. Azmi Dato' Yahya; Assist-Chair: Mr. Anwar Ridhwan Ismail |

|                    |                                                                                                                                                                                                            |   |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 11:20 hrs<br>[309] | Overview of Bacterial Cellulose Production and Application(Invited)<br><i>Faezah Esa, Siti Masrinda Tasirin and Norliza Abd Rahman</i>                                                                     | 3 |
| 11:40 hrs<br>[233] | Effects of Rotary Mower Blade Cutting Angles on the Pulverization of Sweet Potato Vine<br><i>Amer N. N. Kakahy, D. Ahmad, M. D. Akhir, S. Sulaiman and A. Ishak</i>                                        | 3 |
| 12:00 hrs<br>[269] | Coating of Mixed Commercial $\beta$ -Mannanase and Phytase Through Spraying on <i>Capra Hircus</i> Pelleted Feed<br><i>Maznah Misbah, Ida Idayu Muhamad, Shahrulzaman Shahruluddin and Atiqah Ab Rasid</i> | 3 |
| 12:20 hrs<br>[228] | Derermination of Tractor Downtime Index (TDTI) and Management Decision Parameters using Visual Basic.Net<br><i>Habib Ahmad, Aminu Gwarzo, Desa Ahmad, Umar Abubakar and Maiwada Suleiman</i>               | 4 |
| 12:40 hrs<br>[129] | Economical Evaluation of Introducing Oil-Water Separation Technology to Wastewater Treatment of Food Processing Factory Based on Separation Engineering<br><i>Eriko Ankyu and Ryoze Noguchi</i>            | 4 |

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|-----------|--------------------------------------------------------------------------------------|
| Session   | Bio-products and Waste Management                                                    |
| Date/Time | Monday, 1 December 2014 / 11:20 – 1:00                                               |
| Room      | Bronx V                                                                              |
| Chair(s)  | Assoc. Prof. Dr Siti Mazlina Mustapa Kamal; Assist-Chair: Mr. Ahmad Muslim Md. Rasli |

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|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 11:20 hrs<br>[069] | Storage Study of <i>Arenga pinnata</i> Juice<br><i>M. R. Faridatul Ain, Y. A. Yusof, N. L. Chin and Z. Mohd Dom</i>                                                      | 5 |
| 11:40 hrs<br>[079] | Effect of Moisture Content on Physical Properties of Animal Feed Pellets from Pineapple Plant Waste<br><i>M. F. Zainuddin, S. Rosnah, M. Mohd Noriznan and I. Dahlan</i> | 5 |
| 12:00 hrs<br>[087] | Quality Evaluation and Characterization of Oil Extracted From Nigerian Mango Kernel Seed ( <i>Mangifera Indica</i> L)<br><i>Afolabi-Owolabi Oluwafunke1</i>              | 5 |
| 12:20 hrs<br>[096] | Extraction and Characterization of Pectin from Passion Fruit Peels<br><i>Shan Qin Liew, Nyuk Ling Chin and Yus Aniza Yusof</i>                                           | 6 |
| 12:40 hrs<br>[098] | Extraction and Characterization of Cellulose from Durian Rind<br><i>Patpen Penjumras, Russly B Abdul Rahman, Rosnita A. Talib and Khalina Abdan</i>                      | 6 |

Technical Program

| Session   | Sustainable Processing and New Resources                            |
|-----------|---------------------------------------------------------------------|
| Date/Time | Monday, 1 December 2014 / 11:20 – 1:00                              |
| Room      | Bronx VI                                                            |
| Chair(s)  | Assoc. Prof. Dr Hasfalina Che Man; Assist-Chair: Ms. Rahimah Shafie |

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|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 11:20 hrs<br>[064] | Technology Piloting and Commercialization of Microcontroller-Based Coffee Roasting Machine<br><i>Ruel M. Mojica, Gerry M. Castillo and Mary Jane D. Tepora</i>          | 6 |
| 11:40 hrs<br>[209] | Performance of Water Allocation System at Watari Irrigation Project (WIP) Kano, Nigeria<br><i>N. J. Shanono, M. K. Othman and A. A. Ramalan</i>                         | 7 |
| 12:00 hrs<br>[109] | Performance Evaluation of Water Conveyance System at Watari Irrigation Project<br><i>Nuraddeen Mukhtar Nasidi, Nura Jafar Shanono and Mustapha Mohammed. Bello</i>      | 7 |
| 12:20 hrs<br>[217] | Machinery Utilization and Production Cost of Wetland, Direct Seeding Paddy Cultivation in Malaysia<br><i>A. Muazu, A. Yahya, W. I. W. Ishak and S. Khairunniza-Bejo</i> | 7 |
| 12:40 hrs<br>[220] | Physical and Mechanical Properties of Kenaf Stems at Varying Moisture Contents<br><i>S. M. Dauda, D. Ahmad, A. Khalina and O. Jamarei</i>                               | 7 |

1:00–2:00 Lunch Break

| Session   | Young Presenter Award Session (YSN-ASM)                                    |
|-----------|----------------------------------------------------------------------------|
| Date/Time | Monday, 1 December 2014 / 2:00 – 3:20                                      |
| Room      | Manhattan III                                                              |
| Chair(s)  | Assoc. Prof. Dr. Rimfiel b. Janius; Assist-Chair: Mr. Anwar Ridhwan Ismail |

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|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 2:00 hrs<br>[218] | Alkaline Cleaning-in-Place of Pink Guava Puree Fouling Deposit using Lab-Scale Cleaning Test Rig<br><i>N. I. Khalid, N. Ab Aziz, A. A. Nuraini, F. S. Taip and M. S. Anuar</i> | 8 |
| 2:20 hrs<br>[117] | Husk Detection using Thermal Imaging Technology<br><i>Norazlida Jamil and Siti Khairunniza Bejo</i>                                                                            | 8 |
| 2:40 hrs<br>[062] | Impedance Analysis of Physiological Parameters of Plant ( <i>Labisia pumila</i> ) Water Stress<br><i>Diyana Jamaludin, Samsuzana Abd Aziz, Desa Ahmad and Hawa ZE Jaafar</i>   | 8 |
| 3:00 hrs<br>[136] | Prediction of Sugarcane Quality Parameters using Visible-Shortwave Near Infrared Spectroradiometer<br><i>Nawi Nazmi Mat, Kamal Md Rowshon, Chen Guangnan and Jensen Troy</i>   | 8 |



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|-----------|-------------------------------------------------------------------------------|
| Session   | Modelling, Simulation and Control                                             |
| Date/Time | Monday, 1 December 2014 / 2:00 – 3:20                                         |
| Room      | Bronx V                                                                       |
| Chair(s)  | Assoc. Prof. Dr. Farah Saleena Taip; Assist-Chair: Mr. Ahmad Muslim Md. Rasli |

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|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2:00 hrs<br>[025] | Optimization of Solvent Mixture for Extraction of Phenolic Compounds from Tulip Flowers: Mixture Design Approach (Invited)<br><i>Muhammet Arici, Osman Sagdic, Gülsüm Uçak and Omer Said Toker</i> | 9  |
| 2:20 hrs<br>[027] | Assessing the Spatial Distribution of Rice Crop Evapotranspiration using Weather Radar Data<br><i>A. S. Abdullahi, D. Ahmad, M. S. M. Amin and M. K. Rowshon</i>                                   | 9  |
| 2:40 hrs<br>[036] | Precise Positioning based on Pixel Differential in Linear Optical Sensor Array<br><i>Abdallah Alsayed and Muhammad Razif Mahadi</i>                                                                | 10 |
| 3:00 hrs<br>[139] | Application of Thermosonication Treatment in Processing and Production of High Quality and Safe-to-Drink Fruit Juices<br><i>Norazlin Abdullah and Nyuk Ling Chin</i>                               | 10 |

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|-----------|--------------------------------------------------------------------------|
| Session   | Food Quality, Safety and Bio-Information System                          |
| Date/Time | Monday, 1 December 2014 / 2:00 – 3:20                                    |
| Room      | Bronx VI                                                                 |
| Chair(s)  | Assoc. Prof. Dr. Siti Khairunniza Bejo; Assist-Chair: Ms. Rahimah Shafie |

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|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2:00 hrs<br>[070] | Flowability Properties of Labisia Pumila Herbal Powder<br><i>C. J. Etti, Y. A. Yusof, N. L. Chin and S. Mohd Tahir</i>                                                                         | 10 |
| 2:20 hrs<br>[135] | Separation of Emulsified Bioactive-Compound from Agarwoodoil using Gel Electrophoresis Method<br><i>Boon Yih Tien, Noor Fitrah Abu Bakar, Rabitah Zakaria and Mohd. Nazli Naim</i>             | 10 |
| 2:40 hrs<br>[148] | Total Phenolic Contents and Colour Intensity of Malaysian Honeys from the <i>Apis</i> spp. and <i>Trigona</i> spp. bees<br><i>S. P. Kek, N. L. Chin, Y. A. Yusof, S. W. Tan and L. S. Chua</i> | 11 |
| 3:00 hrs<br>[175] | Detection of Basal StemRot (BSR) Infected Oil Palm Tree using Laser Scanning Data<br><i>Siti Khairunniza-Bejo and Vong Chin Nee</i>                                                            | 11 |

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| 3:20–3:40 | Break and Refreshment |
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|-----------|----------------------------------------------------------------------------|
| Session   | Young Presenter Award Session (YSN-ASM)                                    |
| Date/Time | Monday, 1 December 2014 / 3:40 – 6:20                                      |
| Room      | Manhattan III                                                              |
| Chair(s)  | Assoc. Prof. Dr. Rimfiel b. Janius; Assist-Chair: Mr. Anwar Ridhwan Ismail |

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|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 3:40 hrs<br>[023] | Capacitive Sensor Probe to Assess Frying Oil Quality<br><i>Alfadhl Yahya Khaled, Samsuzana Abd Aziz and Fakhrul Zaman Rokhani</i>                                                                                    | 11 |
| 4:00 hrs<br>[255] | Toughening Poly(Lactic Acid) and Aiding the Melt-Compounding with Bio-Sourced Plasticizers<br><i>Tee Yee Bond, Rosnita A. Talib, Khalina Abdan, Chin Nyuk Ling, Roseliza Kadir Basha and Khairul Faezah Md Yunos</i> | 12 |
| 4:20 hrs<br>[262] | Inhibitory Effect of Different Chemical Treatments on Mangosteen Pericarp Polyphenol Oxidase Activity<br><i>Mahsa Ziabakhsh Deylami, Russly Abdul Rahman, Jamilah Bakar, Chin Ping Tan and Lasekan Olusegun</i>      | 12 |
| 4:40 hrs<br>[288] | Development and Integration of Global Positioning System (GPS) for Fertilizer Application<br><i>Siti Mariam Shamsi, Muhammad Razif Mahadi, Aimrun Wayayok and Ahmad Fikri Abdullah</i>                               | 12 |
| 5:00 hrs<br>[141] | Gel Strength and Stability Characterization of Ultrasound Treated Whey Protein Foams<br><i>M. C. Tan, N. L. Chin, Y. A. Yusof, F. S. Taip and J. Abdullah</i>                                                        | 13 |
| 5:20 hrs<br>[078] | Analysis of Vacuum Drying and Hot Air Drying on Temperature Profile and Heat Transfer of Rubber<br><i>Ng Mei Xiang, Tham Thing Chai, Ong Sze Pheng and Law Chung Lim</i>                                             | 13 |
| 5:40 hrs<br>[213] | Preliminary Study on Detection of Basal Stem Rot (BSR) Disease at Oil Palm Tree using Electrical Resistance<br><i>E. Nurnadiah, W. Aimrun, M. S. M. Amin and A. S. Idris</i>                                         | 13 |
| 6:00 hrs<br>[216] | Impact of Mulch on Weed Infestation in System of Rice Intensification (SRI) Farming<br><i>W. Aimrun, M. S. M. Amin, A. Khalina and U. Mohammed</i>                                                                   | 13 |

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|-----------|-------------------------------------------------------------------------------|
| Session   | Modelling, Simulation and Control                                             |
| Date/Time | Monday, 1 December 2014 / 3:40 – 6:20                                         |
| Room      | Bronx V                                                                       |
| Chair(s)  | Assoc. Prof. Dr. Farah Saleena Taip; Assist-Chair: Mr. Ahmad Muslim Md. Rasli |

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|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 3:40 hrs<br>[150] | Preliminary Study of Material and Energy Balance Model of Microalgae Cultivation using Agro-industry Effluent<br><i>Nugroho Adi Sasongko and Ryoza Noguchi</i>                                                       | 14 |
| 4:00 hrs<br>[169] | Drying Kinetics of Microwave-Vacuum Drying of <i>Eurycoma Longifolia</i> Jack (Tongkat Ali)<br><i>Hada Masayu Ismail, M. Nordin Ibrahim, Pin Kar Yong, Rabitah Zakaria, Sofia Azman and Mohd. Shahidan M. Arshad</i> | 14 |

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|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 4:20 hrs<br>[170] | Drying Kinetics of Cocoa Nibs and Selected Qualities of Dried Nibs Under Convective Drying Technique<br><i>Nur Fatin Awanis Mohd Zin, Mohd Nordin Ibrahim and Siti Norsalehah Yunos</i>                                                               | 14 |
| 4:40 hrs<br>[198] | Food Factory Design: Reality and Challenges Faced by Malaysian SMEs<br><i>N. Z. Noor Hasnan, N. Ab Aziz, N. Zulkifli and F. S. Taip</i>                                                                                                               | 15 |
| 5:00 hrs<br>[199] | Optimization of Drying Conditions for 6-Shogaol Content and Antioxidant Capacity in Young Ginger using Response Surface Methodology<br><i>Ali Ghasemzadeh and Hawa ZE Jaafar</i>                                                                      | 15 |
| 5:20 hrs<br>[200] | Optimization of Reflux Extracting Conditions for Total Flavonoid and Total Phenolic Content and Antioxidant Capacity in Pandan ( <i>Pandanus Amaryllifolius</i> Roxb) Using Response Surface Methodology<br><i>Ali Ghasemzadeh and Hawa ZE Jaafar</i> | 15 |
| 5:40 hrs<br>[231] | Image Clustering Technique in Oil Palm Fresh Fruit Bunch (FFB) Growth Modeling<br><i>Muhamad Saufi Mohd Kassim, Wan Ishak Wan Ismail, Abdul Rahman Ramli and Siti Khairunniza Bejo</i>                                                                | 16 |
| 6:00 hrs<br>[235] | Multivariate Analysis of Vegetative and Physiological Traits in Oil Palm ( <i>Elaeis guineensis</i> Jacq.) Germplasm<br><i>M. A. Li-Hammed, Ahmad Kushairi, N. Rajanaidu, Mohd Sukri Hassan, Che Wan Zanariah C. W. Ngah and B. S. Jalani</i>         | 16 |

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|-----------|--------------------------------------------------------------------------|
| Session   | Food Quality, Safety and Bio-Information System                          |
| Date/Time | Monday, 1 December 2014 / 2:00 – 3:20                                    |
| Room      | Bronx VI                                                                 |
| Chair(s)  | Assoc. Prof. Dr. Siti Khairunniza Bejo; Assist-Chair: Ms. Rahimah Shafie |

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|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 3:40 hrs<br>[184] | The Effect of Storage Time of Chopped Oil Palm Fruit Bunches on the Palm Oil Quality<br><i>Fatin Syakirah Ali, Rosnah Shamsudin and Robiah Yunus</i>                                                                                         | 16 |
| 4:00 hrs<br>[203] | Efficacy of Ultraviolet Radiation as Non-Thermal Treatment for the Inactivation of <i>Salmonella</i> Typhimurium TISTR 292 in Pineapple Fruit Juice<br><i>Atikah Mansor, Rosnah Shamsudin, Noranizan Mohd Adzahan and Mohd Nizar Hamidon</i> | 17 |
| 4:20 hrs<br>[242] | Yield Prediction Modeling using Data Envelopment Analysis Methodology for Direct Seeding, Wetland Paddy Cultivation<br><i>A. Muazu, A. Yahya, W. I. W. Ishak and S. Khairunniza-Bejo</i>                                                     | 17 |
| 4:40 hrs<br>[244] | Saturated Distilled Monoglycerides Variants in Gel-Form Cake Emulsifiers<br><i>Lai Yee Lee, Nyuk Ling Chin, Choh Hock Lim, Yus Aniza Yusof and Rosnita A. Talib</i>                                                                          | 17 |
| 5:00 hrs<br>[106] | Power Ultrasound Assisted Mixing Effects on Bread Physical Properties<br><i>Nasrul Fikry Che Pa, Nyuk Ling Chin, Yus Aniza Yusof and Norashikin Abdul Aziz</i>                                                                               | 17 |
| 5:20 hrs<br>[260] | Relationship between Soil Apparent Electrical Conductivity and pH Value of Jawa Series in Oil Palm Plantation<br><i>I. Nur Aini, M. H. Ezrin and W. Aimrun</i>                                                                               | 18 |



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|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 5:40 hrs<br>[277] | Detection of Adulteration of Fresh Orange Juice by Sugar Solution using Near Infrared Spectroscopy<br><i>Jutharat Nawayon and Panmanas Sirisomboon</i> | 18 |
| 6:00 hrs<br>[224] | Timeliness Cost of Planting Field Operations at Badala Farm in Bauchi State Nigeria<br><i>B. G. Jahun and S. A. Iya</i>                                | 18 |
| 8:00–10:30        | Conference Dinner and Award Giving                                                                                                                     |    |

## CAFEI 2014 — Program Overview

Technical Program

2 December 2014

| Manhattan III |                                                                                                                                                                                  |                                                                                                                                                                           |                                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08:30 - 09:00 | Chairperson:<br><b>Prof. Ir. Dr. Wan Ishak Wan Ismail</b>                                                                                                                        | Keynote 3 - (320)<br><b>Prof. Murat Omer Balaban ,<br/>The University of Aukland, New Zealand</b>                                                                         |                                                                                                                                                                        |
| 09:00 - 09:30 |                                                                                                                                                                                  | Keynote 4 - (321)<br><b>Assc. Prof Novizar Nazir,<br/>Agroindustrial Technology of Andalas Universit,<br/>Indonesia</b>                                                   |                                                                                                                                                                        |
| 09:30 - 10:00 |                                                                                                                                                                                  | Keynote 5 - (323)<br><b>Prof. Ir. Dr. Lee Teang Shui,<br/>Universiti Putra Malaysia</b>                                                                                   |                                                                                                                                                                        |
| 10:00 - 10:20 | Break and Refreshment                                                                                                                                                            |                                                                                                                                                                           |                                                                                                                                                                        |
| Manhattan III |                                                                                                                                                                                  | Bronx V                                                                                                                                                                   | Bronx VI                                                                                                                                                               |
| 10:20 - 13:00 | Track : <b>Sustainable processing and new resources</b><br>Chairperson:<br><b>Dr. Rosnita A. Talib</b><br>Assistant Chairperson:<br><b>Ms. Nur Hawa Thaharuddin</b>              | Track : <b>Processing, technologies and innovations</b><br>Chairperson:<br><b>Assoc. Prof. Dr Khalina Abdan</b><br>Assistant Chairperson:<br><b>Ms. Nor Aini Adnan</b>    | Track : <b>Health, nutrition and wellness</b><br>Chairperson:<br><b>Assoc. Prof. Dr Norashikin Abdul Aziz</b><br>Assistant Chairperson:<br><b>Ms. Anisa Mohd Yusoh</b> |
| 13:00 - 14:00 | Lunch Break                                                                                                                                                                      |                                                                                                                                                                           |                                                                                                                                                                        |
| 14:00 - 16:40 | Track : <b>Modelling, simulation and control</b><br>Chairperson:<br><b>Dr Dayang Norulfairuz Abang Zaidel (UTM)</b><br>Assistant Chairperson:<br><b>Ms. Nur Hawa Thaharuddin</b> | Track : <b>Processing, technologies and innovations</b><br>Chairperson:<br><b>Assoc. Prof. Dr Rosnah Shamsudin</b><br>Assistant Chairperson:<br><b>Ms. Nor Aini Adnan</b> | Track : <b>Bio-products and waste management</b><br>Chairperson:<br><b>Prof. Dr Mohd Rashid Mohd Yusof</b><br>Assistant Chairperson:<br><b>Ms. Anisa Mohd Yusoh</b>    |
| 16:40 - 16:50 | Break and Refreshment / Removal of Posters                                                                                                                                       |                                                                                                                                                                           |                                                                                                                                                                        |
| 16:50 - 17:15 | Closing                                                                                                                                                                          |                                                                                                                                                                           |                                                                                                                                                                        |

## Day 2: Tuesday, 2 December 2014

|           |                                         |
|-----------|-----------------------------------------|
| Session   | Keynote III, IV & V                     |
| Date/Time | Tuesday, 2 December 2014 / 8:30 – 10:00 |
| Room      | Manhattan III                           |
| Chair(s)  | Prof. Ir. Dr. Wan Ishak Wan Ismail      |

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|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 8:30–9:00  | <b>Keynote III:</b> Dense Phase Carbon Dioxide Research: Current Focus and Directions<br><i>Prof. Dr. Murat Omer Balaban, University of Auckland, New Zealand</i>                                        | Info-32 |
| 9:00–9:30  | <b>Keynote IV:</b> How Green is Your Product: Life Cycle Assessment (LCA) in Agri-food System<br><i>Assoc. Prof. Dr. Novizar Nazir, Faculty of Agricultural Technology-Andalas University, Indonesia</i> | Info-33 |
| 9:30–10:00 | <b>Keynote V:</b> A Review of Climate Change Impacts on Crop Production and Some Adaptation Strategies<br><i>Prof. Ir. Dr. Lee Teang Shui, Universiti Putra Malaysia, Malaysia</i>                       | Info-34 |

8:00–10:30      **Break and Refreshment**

|           |                                                              |
|-----------|--------------------------------------------------------------|
| Session   | Sustainable Processing and New Resources                     |
| Date/Time | Tuesday, 2 December 2014 / 10:20 – 1:00                      |
| Room      | Manhattan III                                                |
| Chair(s)  | Dr. Rosnita A. Talib; Assist-Chair: Ms. Nur Hawa Thaharuddin |

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|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 10:20 hrs<br>[278] | Feasibility of Evaluation of Salt Content in Canned Sardine in Oil by Near Infrared Spectroscopy<br><i>Sarocho Srikornkarn and Panmanas Sirisomboon</i>                        | 19 |
| 10:40 hrs<br>[282] | Feasibility Study on Evaluation of Salt Content in Canned Sardine in Brine by Near Infrared Spectroscopy<br><i>Sakaow Pongkuan and Panmanas Sirisomboon</i>                    | 19 |
| 11:00 hrs<br>[051] | Determining Peak-hours of Cooling Requirement for Greenhouse Production of Tomato in Tropical Lowland Condition<br><i>Ramin Shamshiri, Wan Ishak Wan Ismail and Desa Ahmad</i> | 19 |
| 11:20 hrs<br>[229] | Investigation of Biogas Production Potential from Different Species of Grass in Thailand<br><i>Pitchaya Suaisom, Patiroop Pholchan and Pruk Aggarangsi</i>                     | 20 |



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|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 11:40 hrs<br>[237] | Rupture Forces of Rice Grains at Different Compression Loading Orientations<br><i>Renny Eka Putri, Azmi Yahya, Nor Maria Adam and Samsuzana Abd Aziz</i>                                                                                                      | 20 |
| 12:00 hrs<br>[264] | Response of Nitrogen Content for Some Varieties of Kenaf Fiber ( <i>Hibiscus cannabinus</i> L.) by Applying Different Levels of Potassium, Boron and Zinc<br><i>Rabar Fatah Salih, Khalina Abdan, Aimrun Wayayok, Anuar Abdul Rahim and Norhashila Hashim</i> | 20 |
| 12:20 hrs<br>[291] | The CDAA Framework for Development of Sustainable Large-Scale Smallholder Irrigation Schemes in Swaziland<br><i>N. S. Dlamini, M. K. Rowshon, M. Makhanya and S. Sithole</i>                                                                                  | 20 |
| 12:40 hrs<br>[302] | Improvement in Kenaf Fibre Washing Process using Fibre Clamps<br><i>Motaz Hassan Hamed, M. A. Azmah Hanim and A. A. Faieza</i>                                                                                                                                | 21 |

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|-----------|-----------------------------------------------------------------|
| Session   | Processing, Technologies and Innovations                        |
| Date/Time | Tuesday, 2 December 2014 / 10:20 – 1:00                         |
| Room      | Bronx V                                                         |
| Chair(s)  | Assoc. Prof. Dr Khalina Abdan; Assist-Chair: Ms. Nor Aini Adnan |

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|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 10:20 hrs<br>[324] | Human-machine Collaboration for Automated Harvesting of Fresh Market Apples(Invited)<br><i>Manoj Karkee</i>                                                                                                                            | 21 |
| 10:40 hrs<br>[093] | Pectin Extraction from Pummelo ( <i>Citrus Grandis</i> L. Osbeck) Peels Using Ultrasound-Assisted Extraction<br><i>N. J. Firdouse, N. N. A. K. Shah, R. A. Rahman and B. S. Baharin</i>                                                | 21 |
| 11:00 hrs<br>[097] | In-Vitro Dissolution of Compressed Tamarind and Pineapple Powder Tablets<br><i>A. M. Taufiq, Y. A. Yusof, N. L. Chin, S. H. Othman, A. Serikbaeva and M. G. Aziz</i>                                                                   | 22 |
| 11:20 hrs<br>[092] | Effects of Physicochemical Characteristics of Pummelo Fruit Juice Towards UV Inactivation of <i>Salmonella Typhimurium</i><br><i>Nor Nadiyah Abdul Karim Shah, Rosnah Shamsuddin, Russly Abdul Rahman and Noranizan Mohd Adzahan</i>   | 22 |
| 11:40 hrs<br>[206] | Encapsulation of Anthocyanin from Roselle and Red Cabbage for Stabilisation of Water-in-Oil Emulsion<br><i>Dayang Norulfairuz Abang Zaidel, Nur Shakira Sahat, Yanti Maslina Mohd Jusoh and Ida Idayu Muhamad</i>                      | 22 |
| 12:00 hrs<br>[131] | Evaluation of System Rice Intensification (SRI) Cultivation In Tanjung Karang<br><i>Bala Ibrahim, Wan Ishak Wan Ismail, Norhashila Hashim and Muhamad Saufi Mohd Kassim</i>                                                            | 23 |
| 12:20 hrs<br>[133] | Immobilization of Cyclodextrin glucanotransferase into Polyvinyl Alcohol (PVA) Nanofibres via Electrospinning<br><i>Suryani Saallah, M. Nazli Naim, Mohd. Noriznan Mokhtar, Noor Fitrah Abu Bakar, Masao Gen and I. Wuled Lenggoro</i> | 23 |
| 12:40 hrs<br>[065] | Effects of Tillage Systems on Soil Water Retention and Infiltration of UPM Research Farm<br><i>Desa Ahmad, Hosseinali Shamsabadi and W. Aimrun</i>                                                                                     | 23 |

## Technical Program

| Session   | Health, Nutrition and Wellness                                            |
|-----------|---------------------------------------------------------------------------|
| Date/Time | Tuesday, 2 December 2014 / 10:20 – 1:00                                   |
| Room      | Bronx VI                                                                  |
| Chair(s)  | Assoc. Prof. Dr Norashikin Abdul Aziz; Assist-Chair: Ms. Anisa Mohd Yusoh |

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| 10:20 hrs<br>[144] | Nitrite, Nitrate and Colour Analysis of Malaysian Edible Bird's Nest<br><i>Meei Chien Quek, Nyuk Ling Chin, Yus Aniza Yusof, Sheau Wei Tan and Chung Lim Law</i>                                                                                                                  | 24 |
| 10:40 hrs<br>[181] | Hypocholesterolemic and Hypoglycemic Effect of Cowpea ( <i>Vigna Unguiculata</i> L. Walp) Incorporated Experimental Diets in Wistar Rats ( <i>Rattus Norvegicus</i> )<br><i>Pabodha Weththasinghe, Ruvini Liyanage, Janak Vidanarachchi, Oshini Perera and Barana Jayawardana</i> | 24 |
| 11:00 hrs<br>[249] | Effects of Noise Pollution on the Psychological Health of Agricultural Tractor Operators<br><i>Muhammad Yamin, ZohaibYousaf, Wan Ishak bin Wan Ismail, Khalid Mahmood Bhatti and Muhamad Saufi bin Mohd Kassim</i>                                                                | 24 |
| 11:20 hrs<br>[279] | Application of Near Infrared Spectroscopy for Detection of Steroids Adulteration in Traditional Thai Medicines<br><i>Kittisak Phetpan and Panmanas Sirisomboon</i>                                                                                                                | 25 |
| 11:40 hrs<br>[307] | Effect of the Season on the Fatty Acid Composition of Lipids Camel Milk<br><i>A. D. Serikbayeva, M. Kh. Narmuratova, G. Narmuratova, Zh. K. Tulemisova and Zh. M. Suleimenova</i>                                                                                                 | 25 |
| 12:00 hrs<br>[211] | Quality of Iraqi Camel Milk Fermented by <i>Streptococcus thermophilus</i> and <i>Lactobacillus delbrueckii</i> subsp. <i>bulgaricus</i><br><i>Hussein L. Alghoory, Amir K. Al-Darwash, Eman M. Jarallah, Belal J. Muhiaddin and Nazamid Saari</i>                                | 25 |
| 12:20 hrs<br>[280] | Detection of Adulteration of Soy Sauce by Brine Using Near Infrared Spectroscopy<br><i>T. Natch and S. Panmanas</i>                                                                                                                                                               | 26 |
| 12:40 hrs<br>[290] | Encapsulation of Freeze-Dried Vitamin E with Selenomethionine Using Different Wall Materials and Evaluation on Its Properties<br><i>Nurul Asmak Md Lazim, Razauden Mohamed Zulkifli and Ida Idayu Muhamad</i>                                                                     | 26 |

1:00–2:00 **Lunch Break**

| Session   | Modelling, Simulation and Control                                                |
|-----------|----------------------------------------------------------------------------------|
| Date/Time | Tuesday, 2 December 2014 / 2:00 – 4:40                                           |
| Room      | Manhattan III                                                                    |
| Chair(s)  | Dr Dayang Norulfairuz Abang Zaidel (UTM); Assist-Chair: Ms. Nur Hawa Thaharuddin |

|                   |                                                                                                                                                                                                                                                                         |    |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2:00 hrs<br>[283] | An Integrated Modelling Framework for Water Resources Management in Newly Developed River Basin in Malaysia. I – Development of a Local Model to Assess Climate Change and Watershed Development Impacts on Water Security<br><i>Amjad Nabi and Mohd Amin Mohd Soom</i> | 26 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|

|                   |                                                                                                                                                                                                                         |    |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2:20 hrs<br>[297] | A Preliminary Study: Kinetic Model of Drying Process of Pumpkins ( <i>Cucurbita Moschata</i> ) in a Convective Hot Air Dryer<br><i>Norhashila Hashim, Onwude Daniel and Ezdalina Rahaman</i>                            | 26 |
| 2:40 hrs<br>[306] | Mesoscale Modeling and Simulation of Heat and Mass Transfer in Oil Palm Fruit Digestion Process<br><i>R. Yunus, Noerhidajat, Z. A. Zurina, S. Syafie and T. S. Chang</i>                                                | 27 |
| 3:00 hrs<br>[176] | Deep Bed Drying Simulation of Palm Kernel<br><i>Mina Habibi Asr, Mohd. Nordin Ibrahim, Mohd Noriznan Mokhtar, Khairul Faezah Md. Yunos and Nuzul Amri Bin Ibrahim</i>                                                   | 27 |
| 3:20 hrs<br>[191] | Reaction Kinetics of Cocoa Polyphenols Degradation During Drying<br><i>Ching-Lik Hii</i>                                                                                                                                | 27 |
| 3:40 hrs<br>[090] | Effects of Spray Drying Conditions of Microencapsulation of <i>Amaranthus Gangeticus</i> Extract on Drying Behaviour<br><i>P. H. Chong, Y. A. Yusof, M. G. Aziz, N. Mohd. Nazli, N. L. Chin and S. K. Syed Muhammad</i> | 28 |
| 4:00 hrs<br>[056] | A Comparative Evaluation of Rotavator Weeding Mechanisms under System of Rice Intensification (SRI)<br><i>S. Suleiman, B. W. I. Wan Ishak and M. K. Muhamad Saufi</i>                                                   | 28 |
| 4:20 hrs<br>[308] | Effect of Encapsulation Material on Quality and Bioactive Peptides of Spray Dried Black Tilapia ( <i>Oreochromis mossambicus</i> ) Hydrolysate<br><i>Jamilah Bakar and Chan Zhi Fang</i>                                | 28 |

|           |                                                                    |
|-----------|--------------------------------------------------------------------|
| Session   | Processing, Technologies and Innovations                           |
| Date/Time | Tuesday, 2 December 2014 / 2:00 – 4:40                             |
| Room      | Bronx V                                                            |
| Chair(s)  | Assoc. Prof. Dr Rosnah Shamsudin; Assist-Chair: Ms. Nor Aini Adnan |

|                    |                                                                                                                                                                                                                                              |    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2:00 hrs<br>[322]  | Individual Control of Orchard Trees: Elemental Technologies Targeting Blueberry Bushes (Invited)<br><i>Tadashi Chosa</i>                                                                                                                     | 28 |
| 2:20 hrs<br>[163]  | Physical Properties of Spray-Dried Pink Guava ( <i>Psidium guajava</i> ) Powder<br><i>M. R. I. Shishir, F. S. Taip, N. A. Aziz and R. A. Talib</i>                                                                                           | 29 |
| 2:40 hrs<br>[130]  | Influence of Drying Process on the Mushroom ( <i>Lentinula edodes</i> ) Protein Hydrolysate Properties<br><i>Pasakawee Krittalak, Banjongsinsiri Panida, Lekhavat Supaporn, Noojuy Nowwapan, Taksima Takunrat and Srimongkoluk Ubolwanna</i> | 29 |
| 3:00 hrs<br>[223]  | Effect of Kappa Carrageenan and Glycerol in Purple Sweet Potato Starch Based Edible Film<br><i>Aishah Mohd Marsin and Ida Idayu Muhamad</i>                                                                                                  | 29 |
| 12:00 hrs<br>[212] | Analyzing Fertility Effect on Growth and Yield of <i>Amaranthus carentus</i> in Nigeria<br><i>Christopher O. Akinbile, Samuel Adefolaju and Hasfalina Che bt Man</i>                                                                         | 29 |



|                   |                                                                                                                                                                                                                                                     |    |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 3:40 hrs<br>[268] | Effect of Solvent Concentration, Sample Particle Size and Solid to Liquid Ratio on Radio Frequency Assisted Extraction (RFAE) of Apple Peel Phenolic Compounds and Process Optimization<br><i>Y. M. Mohd Jusoh, V. Orsat and D. N. Abang Zaidel</i> | 30 |
| 4:00 hrs<br>[068] | Tableting and Dissolution Characteristics of Mixed Fruit Powder<br><i>M. Saifullah, Y. A. Yusof, N. L. Chin, M. G. Aziz, M. A. P. Mohammed and N. A. Aziz</i>                                                                                       | 30 |
| 4:20 hrs<br>[274] | Comparison Study of Two Different Isolation and Purification Methodfor Rice Tungro Bacilliform Virus (RTBV)<br><i>M. N. A. Uda C. M. Hasfalina, Samsuzana A. Aziz, S. Faridah, I. Zamri, B. Siti Noraini, W. Nur Sabrina and U. Hashim</i>          | 30 |

|           |                                                                     |
|-----------|---------------------------------------------------------------------|
| Session   | Bio-products and Waste Management                                   |
| Date/Time | Tuesday, 2 December 2014 / 2:00 – 4:40                              |
| Room      | Bronx VI                                                            |
| Chair(s)  | Prof. Dr Mohd Rashid Mohd Yusof; Assist-Chair: Ms. Anisa Mohd Yusoh |

|                   |                                                                                                                                                                                                                                                     |    |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2:00 hrs<br>[102] | Characterization of Jackfruit ( <i>Artocarpus heterophyllus</i> ) Waste Pectin as Influenced by Various Extraction Conditions<br><i>R. Begum, M.G. Aziz, M. B. Uddin and Y. A. Yusof</i>                                                            | 31 |
| 2:20 hrs<br>[154] | Characteristics of Particulate Emission from a Biomass Fired Boiler<br><i>M. Rashid, M. M. Syahirah, J. NorRuwaida and N. Huda</i>                                                                                                                  | 31 |
| 2:40 hrs<br>[241] | Composting of Steam Pretreated Shredded Oil Palm Empty Fruit Bunches with Palm Oil Mill Effluent and Chicken Manure as Added Amendments<br><i>N. H. Che Hamzah, A. Yahya, A. S. Baharuddin, H. Che Man, N. H. Abu Hassan and F. N. Abdul Rashid</i> | 31 |
| 3:00 hrs<br>[245] | Assay Plant as Natural Antioxidant of Capparis Spinosa Root Bark<br><i>Nidhal M. Salih AL-Janabi and Nadia N. A. AL-Hajo</i>                                                                                                                        | 32 |
| 3:20 hrs<br>[258] | Suitability of Coir Fibers as Pulp and Paper<br><i>Nor Mazlana Main, Rosnita A. Talib, Rushdan Ibrahim, Russly Abdul Rahman and Ainun Zuriyati Mohamed</i>                                                                                          | 32 |
| 3:40 hrs<br>[259] | An Innovative Oil Palm Residue Management Strategy: A Review<br><i>B. G. Jahun and D. Ahmad</i>                                                                                                                                                     | 32 |
| 4:00 hrs<br>[177] | Utilization of Sea Cucumber as an Organic Fertilizer<br><i>Nil Pembe Ozer, Halil Samet and Ilkin Deniz Ozer</i>                                                                                                                                     | 33 |
| 4:20 hrs<br>[296] | Assessment of Efficient Wick Irrigation system in Greenhouses and Nurseries<br><i>Hadi Hamaaziz</i>                                                                                                                                                 | 33 |

4:40–4:50

Break and Refreshment; Removal of Posters

## List of Posters

| Topic | Processing, Technologies and Innovations                                                                                                                                                                                   |    |
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| 082   | Technical Review on Crumb Rubber Drying Process and the Potential of Advanced Drying Technique<br><i>Thing Chai Tham, Ching Lik Hii, Sze Pheng Ong, Nyuk Ling Chin, Luqman Chuah Abdullah and Chung Lim Law</i>            | 34 |
| 113   | Achieving More with Less: SRI Single Seedling Nursery Tray an Alternative Breakthrough to Viable Seedling for System of Rice Intensification Planting Machine<br><i>U.B Zubairu, Wayayok Aimrun, MSM Amin and MM Razif</i> | 34 |
| 236   | Effect of High Hydrostatic Pressure (HHP) on Quality Parameters and Shelf Life of Anchovy ( <i>Engraulis Encrasicolus</i> )<br><i>Hami Alpas and Ceyda Akhan</i>                                                           | 34 |
| 286   | Further Improvement in the Yield of MAG During Lipase Esterification<br><i>Zanariah Mohd Dom, Nga Cha Xin and Rozita Yusoff</i>                                                                                            | 35 |

| Topic | Food Quality, Safety and Bio-Information System                                                                                                                                                                                      |    |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 042   | Isolation, Purification and Determination of Biochemical Properties of Polyphenol Oxidase from Turkish Alyanak Apricot ( <i>Prunus armenica</i> L.)<br><i>M. Ümit Ünal and Aysun Şener</i>                                           | 35 |
| 059   | Oil Palm Fresh Fruit Bunch Ripeness Classification using Impedance Spectroscopy Technique<br><i>Nur Fizura Chin @ Hashim, Samsuzana Abd Aziz and Abdul Rashid Mohamed Shariff</i>                                                    | 35 |
| 089   | Effect of Plant Density on Growth and Flowering of Cut Chrysanthemum Production in Substrate Culture<br><i>Taweesak Viyachai, Thohirah Lee Abdullah, Siti Aishah Hassan, Nitty Hirawaty Kamarulzaman and Wan Abdullah Wan Yusoff</i> | 36 |
| 112   | Weather Data Extraction and their Influences on Rice Brown Planthopper ( <i>Nilaparvata lugens</i> ) using Multispectral Images<br><i>F. Ghobadifar and W. Aimrun</i>                                                                | 36 |
| 153   | Comparison Between Polysaccharide and Polymer Resins on the Physicochemical Properties of Mengkudu Juice ( <i>Morinda Citrifolia</i> )<br><i>Adeline Yen, Haslaniza Hashim and Mohamad Maskat</i>                                    | 36 |
| 188   | Volume Development of Cake Baking Process in Convection Oven<br><i>Ramadhatul Akmal Mohamad, Farah Saleena Taip, Siti Khairunniza Bejo and Siti Mazlina Mustapa Kamal</i>                                                            | 36 |

|     |                                                                                                                                                                                                                                 |    |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 189 | Effect Of Baking Temperature to Qualities of Rice Bran Energy Bars<br><i>Amirah Syahmi Nadzari, Farah Saleena Taip, Roseliza Kader Basha and Norashikin Ab. Aziz</i>                                                            | 37 |
| 190 | The Effects of Process Conditions on Different Position Towards the Quality of Cake<br><i>Nurul Atiqah Sani, Farah Saleena Taip, Siti Mazlina Mustapa Kamal and Norashikin Ab. Aziz</i>                                         | 37 |
| 238 | Laboratory Calibration and Evaluation of Microwave Type Grain Flow Sensor for Yield Monitoring in Rice Combine Harvester<br><i>Renny Eka Putri, Azmi Yahya, Nor Maria Adam and Samsuzana Abd Aziz</i>                           | 37 |
| 253 | Influence of an Edible Coating on Microbiological Growth in Fresh Cut Cantaloupe ( <i>Cucumis Melo.L Var.Reticulatus CV.Glamour</i> )<br><i>Rosnah Shamsudin, Noranizan Mohd Adzahan, Tan Eileen and Syahidah Bt Kamaruddin</i> | 37 |
| 256 | A Comparison of the Difference in Fatty Acid Composition Between Newly-Harvested Rice and Stored Rice<br><i>Han Zhang, Hitomi Ono, Junya Sano and Jie Yu Chen</i>                                                               | 38 |
| 272 | Effect of Saline-Sodic Water on Solutes Movement and Structural Decline of Soil<br><i>Abdurazag Mustafa</i>                                                                                                                     | 38 |
| 276 | The Effect of Quantity of Salt on the Drying Characteristics of Fresh Noodles<br><i>Jie Yu Chen, Han Zhang and Yelian Miao</i>                                                                                                  | 38 |

| Topic | Bio-Products and Waste Management                                                                                                                                                                                       |    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 033   | Purification and Characterization of a Novel Amylase Enzyme from Red Pitaya ( <i>Hylocereus Polyrhizus</i> ) Peel<br><i>Mehrnoosh Amid, Mohd Yazid ABD Manap and Norkhanai Zohdi</i>                                    | 39 |
| 145   | Effect of Fungal Fermentation on Tyrosinase and Elastase Inhibition Activity in Rice Bran<br><i>Anisah Jamaluddin, Nur Yuhasliza Abd. Rashid, Dang Lelamurni Abd. Razak, Shaiful Adzni Sharifudin and Kamariah Long</i> | 39 |
| 149   | Wastewater Treatment of Palm Oil Mill Effluent (POME) by Ultrafiltration Membrane Separation Technique Couple with Adsorption Treatment as Pre-Treatment<br><i>Nazatul Shima Azmi and Khairul Faezah Md. Yunos</i>      | 39 |
| 159   | Micromechanics of Oil Palm Mesocarp Fibres<br><i>Mohd Afandi P Mohammed, Suhaiza Hanim Hanipah and Azhari Samsu Baharuddin</i>                                                                                          | 39 |
| 183   | Comparison of Methane Emission from Conventional and Modified Paddy Cultivation in Malaysia<br><i>Pardis Fazli and Hasfalina Che Man</i>                                                                                | 39 |
| 252   | Biodegradability Studies of Pomelo Peel Powder Filled Polybutylene Succinate (PBS) Biocomposites<br><i>Nur Syamimi Ramlan, Russly Abdul Rahman, Norazowa Ibrahim and Nur Hanani Zainal Abedin</i>                       | 40 |
| 257   | Bio-Nanocomposite Materials for Food Packaging Applications: Types of Biopolymer and Nano-Sized Filler<br><i>Siti Hajar Othman</i>                                                                                      | 40 |
| 267   | Production and Characterization of Tijapia by Product Hydrolysate<br><i>Jumardi Roslan, Siti Mazlina Mustapa Kamal, Khairul Faezah Md. Yunos and Norhafizah Abdullah</i>                                                | 40 |

| Topic | Modelling, Simulation and Control                                                                                                                                                                                                   |    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 052   | Wavelet-Based Analysis of Spectral Data for Estimation of Chlorophyll Concentration in Oil Palm Leaves<br><i>Ramin Shamshiri, Wan Ishak Wan Ismail and Helena Anusia</i>                                                            | 41 |
| 057   | Determining Tomato Growth Response to Vapor Pressure Deficit in Different Light Conditions<br><i>Ramin Shamshiri and Wan Ishak Wan Ismail</i>                                                                                       | 41 |
| 180   | Simulation Studies of the Effect of Airflow Velocity on Temperature Profiles of Convective Oven Butter Cake Baking Process<br><i>Nur Syafikah Mohamad Shahapuzi, Farah Saleena Taip, Norashikin Abdul Aziz and Anvarjon Ahmedov</i> | 41 |
| 275   | Optimization of Processing Conditions for Pigmented Rice Drinks<br><i>Adyati Putriekasari Handayani, Roselina Karim and Kharidah Muhammad</i>                                                                                       | 42 |

| Topic | Sustainable Processing and New Resources                                                                                                                                                  |    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 166   | Improved Industrial Paddy Drying Options for Malaysian Conditions<br><i>Mohd Nordin Ibrahim</i>                                                                                           | 42 |
| 319   | Microwave-assisted Pretreatment of Dragon Fruit Peel for Sugar Production<br><i>Rozita Omar, Shuk Ling Liew, Siti Mazlina Mustapa Kamal, Dayang Radiah Awang Biak and Saleem Mohammad</i> | 42 |

| Topic | Health, Nutrition and Wellness                                                                                                                                                                                          |    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 053   | Principle Component Analysis of Organoleptic Acceptability on Cocos <sup>TM</sup> Emulsion Product<br><i>Koh Soo Peng, Khor Yih Phing, Kamariah Long, Shariah Loh Long, Tan Chin Ping and Sharifah Zarah Syed Ahmad</i> | 43 |
| 162   | Drying Kinetics and Colour Analysis of <i>Moringa Oleifera</i> Leaves<br><i>M. A. Ali, Y. A. Yusof, N. L. Chin, M. N. Ibrahim and S. M. A. Basra</i>                                                                    | 43 |
| 232   | Antioxidant and Anti-Ulcer Effects of Ethyl Acetate Fraction of <i>Merremia Tridentata</i> (L.) Hallier F. Root<br><i>Kandhasamy Sowndhararajan and Nyuk Ling Chin</i>                                                  | 43 |
| 271   | Evaluation of Methods for the Extraction of Betalain from Red Pitaya ( <i>Hylocereus polyrhizus</i> )<br><i>Safura Shaaaruddin, Seyed Hamed Mirhosseini, Hasanah Mohd Ghazali and Kharidah Muhammad</i>                 | 43 |



## Keynote Speech I

**Date/Time:** Monday, 1 Dec. 2014 / 10:20 – 10:50 hrs

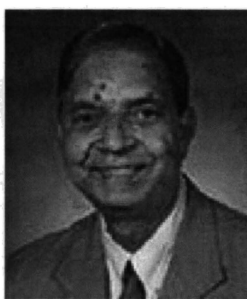
**Session Chair:** Assoc. Prof. Ir. Dr. Azmi Dato' Yahya

### Role of Agricultural and Biosystems Engineers in Solving Global Food and Water Security Problems

Prof. Dr. Rameshwar S. Kanwar

*Iowa state University, USA*

#### Biography



**Prof. Dr. Rameshwar S. Kanwar** is a professor at the Agricultural and Biosystems Engineering, Iowa State University. In 1969, he received his B.S. in Agricultural Engineering from Punjab Agricultural University, India. Later, he obtained Master of Agricultural Engineering in 1975 from Govind Ballabh (G.B.) Pant University of Agriculture and Technology, India. He was granted with PhD of Agricultural Engineering (Water Resources) from Iowa State University in 1981. Upon completion of his PhD, he has been appointed as an instructor of Agricultural Engineering at Iowa State University for a year. In the year of 1983, he began his academican career as an Assistant Professor at the same university. In 2001, he was appointed as the Department Chair of Department of Biological and Agricultural Engineering at Iowa State University for 10 years. In 2009, he was awarded C.F. Curtiss Distinguished Professor of Agricultural and Biosystems Engineering -the highest academic distinction bestowed by Iowa State University. Prof. Kanwar's research interests are in the areas of irrigation, drainage, groundwater quality, animal waste management, water table management, sustainable agricultural production systems and modeling of hydrologic systems. He has participated in many international development projects either as team member or consultant. He has worked for the World Bank, GEF, EU, FAO, UNDP, USAID, NATO, and foreign universities/governments in Belgium, Portugal, Kenya, Ethiopia, Poland, Romania, Ukraine, Georgia, Uzbekistan, Pakistan, India, China, Thailand, Japan, and 45 other countries. He has received numerous awards and honors at university, national and international level. He was the Vice President of Soil & Water Division, AAAE from 1995-1999, Chairman of Iowa Section of the ASAE from 1996-97 and also Editorial Advisory Board for Journal of Agricultural Engineering, AAAE from 1991-2002. He has published more than 200 refereed journal articles, more than 200 proceedings and written 17 chapters in books.

#### Abstract

Food and water security are two important needs of the society for its sustainability. One of the questions facing the scientific community is how to produce enough food to feed the increasing population in the world. Therefore, challenge for all Agricultural and Biosystems Engineers attending this International Conference should be "how to manage the available water resources efficiently and develop innovative production systems to double the food production by 2050 to feed 9 billion people in the world"? This will require us to grow more food on the same unit of land using lesser amounts of water and chemicals.

**Keynote Speech II**

**Date/Time:** Monday, 1 Dec. 2014 / 10:50 – 11:20

**Session Chair:** Assoc. Prof. Ir. Dr. Azmi Dato' Yahya

**Food Engineering: Overview, Emerging and Future Trends**

Prof. Dr. Russly Abdul Rahman

*Universiti Putra Malaysia, Malaysia*

**Biography**



**Prof. Dr. Russly Abdul Rahman** is a Professor in Food Engineering and Packaging. Currently he is the Director at Halal Products Research Institute, UPM and also serving as professor at two faculties namely faculty of Food Science and Technology (Department of Food Technology) and Faculty of Engineering (Department of Process and Food Engineering). His teaching activities are mainly in the area of Halal Food Processing, Food Engineering, Food Industry, Food Packaging, Physical Properties of Foods, Food Machinery Design and Food Unit Operations for both undergraduates (BS) and Post-graduates (MS and PhD). His research interests include the development and design

of processes and equipment for food processing, convenience foods (cook-chilled and cook-frozen, sous-vide, etc.), packaging of food products, postharvest handling of fruits, supercritical fluid extraction, minimal processing, drying, osmotic dehydration, etc. He is also a consultant to several food companies developing new products e.g. development of halal systems, halal central kitchen development, thermal processing (bottling and canning) dehydration of fruits, etc. At national level he sits in many committees such as National Halal Steering Committee, JAKIM Halal Certification Committee, etc. He has more than 150 publications in refereed journals, more than 120 in local and international proceedings and he has presented in more than 100 local, regional and international seminars. To date he had supervised more than 15 PhD's, more than 20 Masters and more than 100 BS's students as a main supervisor and more than 15 PhD's and 50 Masters as Co-supervisor. He has H-Index of 17 (Scopus) and with 760 citations.

**Abstract**

Food engineering, encompasses, elements of agricultural, mechanical and chemical engineering principles to produce food materials. Food engineers provide the technological knowledge transfer essential to produce safe and palatable food products with nutritional value and finding new processing techniques by formulating biochemical and economic assessments.

**Keynote Speech III**

**Date/Time:** Tuesday, 2 Dec. 2014 / 08:30 – 09:00

**Session Chair:** Prof. Ir. Dr. Wan Ishak Wan Ismail

**Dense Phase Carbon Dioxide Research: Current Focus and Directions**

Prof. Dr. Murat Omer Balaban

*University of Auckland, New Zealand*

**Biography**



**Professor Murat Balaban** has a Chemical Engineering degree and a Food Science and Technology Ph.D. from the University of Washington in Seattle. After a year of post-doc fellowship at Rutgers University, he continued his career at the University of Florida in Gainesville, where he was promoted to professor in 1997. In 2008 he accepted the position of Director of Fishery Industrial Technology Center in Kodiak, Alaska. In 2011 he moved to Auckland New Zealand as the professor and chair of Food Process Engineering. Dr. Balaban has 3 books, 170 refereed papers, 47 book chapters and about 300 abstracts. He has 4 patents, and has been the supervisor of 50 graduate students. His research interests include non-thermal food processing technologies, and quantification of quality

attributes of foods using machine vision and image analysis.

**Abstract**

Dense phase carbon dioxide (DPCD) treatment is a non-thermal processing method for heat sensitive foods that preserves the quality, nutrients and phytochemicals while reducing the microbial loads and inactivating undesirable enzymes. Most of the previous research has concentrated on liquid foods, juices and beverages. However, there is increasing interest in solid foods. The challenges associated with the treatment of solids with DPCD will be discussed. Also, use of gases other than CO<sub>2</sub> is possible depending on the specific application.

Keynote Speech IV

Keynote Speeches

**Date/Time:** Tuesday, 2 Dec. 2014 / 09:00 – 09:30

**Session Chair:** Prof. Ir. Dr. Wan Ishak Wan Ismail

## How Green is Your Product: Life Cycle Assessment (LCA) in Agri-food System

Assoc. Prof. Dr. Novizar Nazir

*Faculty of Agricultural Technology-Andalas University, Indonesia*

### Biography



**Dr. Novizar Nazir** is an Associate Professor on Agroindustrial Technology of Andalas University-Indonesia. He is working on process design, bioenergy, product development and life cycle assessment. He has experience in cooperation with several universities in Malaysia, Australia, India, Japan, Thailand, Vietnam and Spain. Since 2013, he become a coordinator of Asia Pacific Network for Sustainable Agriculture, Food and Energy (SAFE-Network). SAFE Network is an Asia Pacific network of university and college educators, researchers, and activists, who collaborate in analysis, synthesis, connecting and educating the people for a better economy, ecology, and equity in agriculture, food and energy system.

### Abstract

Agriculture accounts for more than 13 percent of total GHG emissions. This figure rises if deforestation through land clearance for agriculture and trade in agri-products are included in the analysis. Agricultural emissions grew and the production of and trade in food is projected to continue to increase in response to the growth of population and the changing of diets.



**Keynote Speech V**

**Date/Time:** Tuesday, 2 Dec. 2014 / 09:30 – 10:00

**Session Chair:** Prof. Ir. Dr. Wan Ishak Wan Ismail

**A Review of Climate Change Impacts on Crop Production and Some Adaptation Strategies**

**Prof. Ir. Dr. Lee Teang Shui**

*Universiti Putra Malaysia, Malaysia*

**Biography**



**Lee Teang Shui** is a Professor of Department of Biological and Agricultural Engineering, Faculty of Engineering, Universiti Putra Malaysia (UPM). He holds a Bachelor of Engineering (Agricultural) majoring in Water Resources Engineering from University of Canterbury, Christchurch, New Zealand in 1977. In 1978 he started his career as an assistant engineer with the Soil and Water Section, Ministry of Works and Development at Christchurch, New Zealand engaging with irrigation and drainage works in the irrigation schemes of the Canterbury Plains. In June 1979, he joined the Faculty of Agricultural Engineering, UPM as a tutor. In late 1980 he obtained his Masters of Science (Irrigation and Drainage Engineering) from Utah State University, USA and rejoined

UPM as a lecturer with the Department of Biological and Agricultural Engineering, Faculty of Engineering. Later in 1990, he was awarded a PhD degree in Structural Engineering from UPM.

His academic contributions are specific to water management and modeling; and sustainable water resource strategy. He has published his research works in more than 100 journals and proceedings. Apart from the academic world, Prof. Ir. Dr. Lee served as a fellow member of Institution of Engineers, Malaysia (IEM). He is actively involved in IEM as the Secretary of Agricultural and Food Engineering Technical Division (AFETD) from 1998-2002, Deputy Chairman of AFETD from 2002 – 2005, Chairman of AFETD from 2006 – 2008, Member of IEM Sub-committee of Training – Post qualification professional training, Continuing Professional Development (CPD) and Professional Development Program (PDP) from 2004 – 2005. Later, he has been appointed as Honorary Secretary of IEM in 2012. He is also a member of Technical Committee on Soil Quality, SIRIM Bhd. Prof. Ir. Dr. Lee is also involved in Engineering Accreditation Council of Board of Engineers Malaysia since 2004 as an evaluator panellist. He is one of the Board Members of BEM from 2013 until 2014 and Vice-President of IEM Council Session 2013/2014.

**Abstract**

One of the most significant global event happening around of our planet earth is the changing patterns of the weather systems, often defined as climate change. These changes are a resultant combination of natural occurrences. The world's weather system can be said to function according to the natural law of mass and energy conservation and the law of equilibrium and therefore reacts to and accommodate changes but abiding by these powerful laws of nature.

Day 1 — Monday, 1 December 2014

|          |                                                                                |
|----------|--------------------------------------------------------------------------------|
| Session  | Processing, Technologies and Innovations                                       |
| Time     | 11:20 – 01:00 hrs                                                              |
| Venue    | Manhattan III                                                                  |
| Chair(s) | Assoc. Prof. Ir. Dr. Azmi Dato' Yahya<br>Asstt. Chair: Mr. Anwar Ridwan Ismail |

309 11:20 hrs

**Overview of Bacterial Cellulose Production and Application**

Faezah Esa<sup>a</sup>, Siti Masrinda Tasirin and Norhiza Abd Rahman

*Department of Chemical and Process Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.  
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Bacterial cellulose (BC), produced by aerobic bacteria

tense researches on BC mainly focus on biosynthetic process to achieve low-cost preparation and high cellulose production. BC has been used as biomaterial for medical field, electrical instrument and food ingredient. However, BC alone has limited capabilities to fulfil current demand on high-performance biomaterials. Hence, BC composite has been introduced to enhance BC properties through addition of reinforcement materials. This review discusses current knowledge in fermentation process and potential application of BC including its application in food industry.

**Keywords:** Bacterial cellulose, *Acetobacter xylinum*, Fermentation, Composite material.

233 11:40 hrs

**Effects of Rotary Mower Blade Cutting Angles on the Pulverization of Sweet Potato Vine**

Amer N. N. Kakahy<sup>1</sup>, D. Ahmad<sup>2</sup>, M. D. Akhbar<sup>3</sup>, S. Sulaiman<sup>4</sup> and A. Ishak<sup>5</sup>

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A rotary mower with five different blade cutting an-

**Abstracts**

gles (10°, 20°, 30°, 40° and 50°) were used to cut sweet potato vine (CV 20 mm) and the power consumed (Joule). The best results for effects of interaction between blade angles and mower speeds was achieved by the 30° blade angle at 2440 rpm with highest percentage of pulverized vine at 61.27% while the best performance for effects of interaction between blade angles and mower speeds was achieved by the 30° blade angle at 1830 rpm with lowest power consumption of 44.00 Joule.

**Keywords:** Blade angle, Mower, Pulverization, Speed, Sweet potato, Vine.



## Day 1 — Monday, 1 December 2014

|                 |                                                                                          |
|-----------------|------------------------------------------------------------------------------------------|
| <b>Session</b>  | <b>Processing, Technologies and Innovations</b>                                          |
| <b>Time</b>     | <b>11:20 – 01:00 hrs</b>                                                                 |
| <b>Venue</b>    | <b>Manhattan III</b>                                                                     |
| <b>Chair(s)</b> | <b>Assoc. Prof. Ir. Dr. Azmi Dato' Yahya;<br/>Assist-Chair: Mr. Anwar Ridhwan Ismail</b> |

**309 11:20 hrs**

### Overview of Bacterial Cellulose Production and Application

Faezah Esa<sup>a</sup>, Siti Masrinda Tasirin and Norliza Abd Rahman

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Bacterial cellulose (BC), produced by aerobic bacteria received ample of attention due to its unique physio-chemical properties compared to plant cellulose. Intense researches on BC mainly focus on biosynthetic process to achieve low-cost preparation and high cellulose production. BC has been used as biomaterial for medical field, electrical instrument and food ingredient. However, BC alone has limited capabilities to fulfil current demand on high-performance biomaterials. Hence, BC composite has been introduced to enhance BC properties through addition of reinforcement materials. This review discusses current knowledge in fermentation process and potential application of BC including its application in food industry.

**Keywords:** Bacterial cellulose, *Acetobacter xylinum*, Fermentation, Composite material.

**233 11:40 hrs**

### Effects of Rotary Mower Blade Cutting Angles on the Pulverization of Sweet Potato Vine

Amer N. N. Kakahy<sup>1</sup>, D. Ahmad<sup>2</sup>, M. D. Akhir<sup>3</sup>, S. Sulaiman<sup>4</sup> and A. Ishak<sup>5</sup>

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A rotary mower with five different blade cutting angles was tested at five different cutting speeds to determine the resultant pulverized percentage of sweet potato vine (< 28 mm) and the power consumed (Joule). The best results for effects of interaction between blade angles and mower speeds was achieved by the 30° blade angle at 2440 rpm with highest percentage of pulverized vine at 61.27% while the best performance for effects of interaction between blade angles and mower speeds was achieved by the 30° blade angle at 1830 rpm with lowest power consumption of 44.00 Joule.

**Keywords:** Blade angle, Mower, Pulverization, Speed, Sweet potato, Vine.



269 12:00 hrs

## Coating of Mixed Commercial $\beta$ -Mannanase and Phytase Through Spraying on *Capra Hircus* Pelleted Feed

Maznah Misbah<sup>1,2</sup>, Ida Idayu Muhamad<sup>1,3,4</sup>, Shahruzaman Shaharuddin<sup>1</sup> and Atiqah Ab Rasid<sup>4</sup>

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Actual digestion of feed is aided by the microbial population in the rumen and its inclusion in animal feed may contribute to better digestive process of an animal. Pelleting ingredient were prepared, processed and subsequently coated homogeneously with mixed solution of  $\beta$ -mannanase (Hemicell W-L) and phytase (Finase®EC). The objective of this study was to evaluate the efficiency of enzyme coated and colour measurement on goat pelleted feed containing mixed commercial enzymes. The coated enzymes efficiency (%) and colour characteristic of feed were investigated. The high percentage of coating efficiency was obtained at 75.00%. Also, there was a significant difference in pellet colour measurement between before and after spraying. After sprayed pellet demonstrated darker colour of brown compared to initial pellet. High coating efficiency and determination colour values are important attributes for initial step towards enzymes delivery in animal rumen and attributes to the value-added characteristic of the pellet, respectively.

**Keywords:** Coating efficiency, Colour,  $\beta$ -mannanase, Phytase, Pelleted feed.

228 12:20 hrs

## Dermination of Tractor Downtime Index (TDI) and Management Decision Parameters using Visual Basic.Net

Habib Ahmad<sup>1</sup>, Aminu Gwarzo<sup>2,a</sup>, Desa Ahmad<sup>3</sup>, Umar Abubakar<sup>4</sup> and Maiwada Suleiman<sup>2,b</sup>

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The agricultural tractors are sometimes not operated due to avoidable circumstances and hence results in non sustainable/economical use. These stoppages/downtimes could be quantified and used as a performance index in comparing different organizations with fleet of tractors.

The daily downtimes recorded range from -100% when the tractors were not used throughout the day to 88% when used for fifteen hours in a day. The TDI programme developed using visual basic.net 2008 with Microsoft access 2007 as back end was used to generate 13 field/downtime parameters that could be used as design parameters and management decision making tools.

129 12:40 hrs

## Economical Evaluation of Introducing Oil-Water Separation Technology to Wastewater Treatment of Food Processing Factory Based on Separation Engineering

Eriko Ankyu<sup>1</sup> and Ryoza Noguchi<sup>2</sup>

<sup>1</sup>Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan.

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Oil-water separation technology contributes to reduce the initial cost and running cost of the facilities for wastewater treatment, and reuse the recovered oil as valuable resources, such as edible oil under sanitization equipment in food factory, material for biofuel or automobile tire. Using Value Function and Separation

tiveWorkUnit (SWU) of separation engineering for the oil-water separation technology in the food processing factory, Naoetsu-Yushi Co.Ltd. Japan, economical advantage of the separation technology was clarified from the viewpoint of reducing the initial cost and running cost of the facilities for wastewater treatment, and reusing the recovered oil.

**Keywords:** Economical evaluation, Food processing factory, Oil-water separation, Separation engineering, Separative work unit, Value function, Wastewater treatment.

|          |                                                                                      |
|----------|--------------------------------------------------------------------------------------|
| Session  | Bio-products and waste management                                                    |
| Time     | 11:20 – 01:00 hrs                                                                    |
| Venue    | Bronx V                                                                              |
| Chair(s) | Assoc. Prof. Dr Siti Mazlina Mustapa Kamal; Assist-Chair: Mr. Ahmad Muslim Md. Rasli |

069 11:20 hrs

#### Storage Study of *Arenga pinnata* Juice

M. R. Faridatul Ain<sup>1</sup>, Y. A. Yusof<sup>1,a</sup>, N. L. Chin<sup>1</sup> and Z. Mohd Dom<sup>1</sup>

<sup>1</sup>Department of Process and Food Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Selangor, Malaysia. E-mail: <sup>a</sup>yus.aniza@upm.edu.my

Fresh palm sap, palm juice or *air nira* is a sweet natural beverage obtained from *Arenga pinnata*, a type of palm tree. It is a traditional beverage consumed by people in Malaysia. It is readily and spontaneously fermented resulting in the development of alcoholic fermentation products. Fermented *Arenga pinnata* sap/juice has complex organic and inorganic compounds of which production depends on several factors, such as period of fermentation and also its microbial activity. The objective of this study is to investigate the physicochemical properties (colour, pH and total soluble solids(TSS)) that can contribute to the changes of taste and appearance of palm juice. The juice was kept at room temperature,  $30 \pm 0.5$  °C and in refrigerator,  $4 \pm 0.5$  °C, and evaluated at various intervals for a month. The longer the storage time, the total soluble solid (TSS) content and pH value of the palm juice will decrease. Furthermore, the colour of fresh palm juice will be decolourize into dull colour.

**Keywords:** Fruit palm, Beverages, Total soluble solids.

079 11:40 hrs

#### Effect of Moisture Content on Physical Properties of Animal Feed Pellets from Pineapple Plant Waste

M. F. Zainuddin<sup>1</sup>, S. Rosnah<sup>1,a</sup>, M. Mohd Noriznan<sup>1</sup> and I. Dahlan<sup>2</sup>

<sup>1</sup>Department of Process and Food Engineering, Faculty of Engineering, Universiti Putra Malaysia, UPM Serdang, Selangor, Malaysia. E-mail: <sup>a</sup>rosnahs@upm.edu.my

<sup>2</sup>Department of Animal Science, Faculty of Agriculture, Universiti Putra Malaysia, UPM Serdang, Selangor, Malaysia

Presently, pineapple residues are recycled through open burning before replanting, thus contributed to the air pollution. One of the possible ways to manage pineapple residues is by converting them into animal feed by densification process. Densification of biomass into pellet can increase bulk density, improve storability, reduce transportation costs, and enables easier handling with proper storage equipment. The range of pellet's friability, bulk density, true density and porosity are between 0.85-1.22%, 303.31-345.24 kg/m<sup>3</sup>, 1502.65-1520.35 kg/m<sup>3</sup> and 77.022-80.05%, respectively. Thus, from the analysis, the best condition to produce pellets from pineapple plant waste, was at 35% of moisture level.

**Keywords:** Agro-waste, Densification, Extrusion, Moisture content, Pellets, Pineapple plant waste.

087 12:00 hrs

#### Quality Evaluation and Characterization of Oil Extracted From Nigerian Mango Kernel Seed (*Mangifera Indica* L)

Afolabi-Owolabi Oluwafunke<sup>1</sup>

<sup>1</sup>Food Science and Technology Department, Faculty of Applied Science, Rufus Giwa Polytechnic, pmb Owo, Ondo State, Nigeria

Mango kernel oil was extracted using methanol and hexane solvent. The physicochemical properties, oxidative stability parameters, fatty acid composition, and chemical properties for the extract were determined experimentally. The free fatty acid, peroxide, iodine and saponification value obtained are  $(2.30 \pm 0.28$  % oleic acid,  $2.40 \pm 0.07$  Meq/KOH, 85 and 178) and total oil yield  $(8.64 \pm 0.19\%)$ , refractive index at 37°C  $(1.45 \pm 0.00)$ , pH  $(0.91 \pm 0.00 \text{g/dm}^3)$ , specific gravity  $(4.62 \text{g/m}^3)$  and color  $(4.62 \pm 0.01 \text{mg/L})$ . The fatty acids constituents are stearic acid (44.99%) and oleic acid (39.42%), while the percentage of saturated to unsaturated are 55.51% and 39.91% respectively.

**Keywords:** Mango kernel, Solvent extraction, Fatty

acid, Oxidative stability, Physicochemical properties.

**096 12:20 hrs**

#### Extraction and Characterization of Pectin from Passion Fruit Peels

Shan Qin Liew, Nyuk Ling Chin<sup>a</sup> and Yus Aniza Yusof

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The influence of pH and extraction time on pectin yield and composition was studied in a citric acid extraction process. The pectin yield and degree of esterification (DE) of the extracted pectin ranged from 2.25 to 14.60% and 41.67 to 67.31% respectively. It was found that extraction pH was the most important parameter influencing yield. DE was significantly affected by extraction time. Morphological analysis performed using scanning electron microscopy suggested that the dried passion fruit pectin has a smooth surface with little mound-shaped pellets on it.

**Keywords:** Pectin, Passion fruit, Peel, Yield, Citric acid, SEM.

**098 12:40 hrs**

#### Extraction and Characterization of Cellulose from Durian Rind

Patpen Penjumras<sup>1,5,a</sup>, Russly B Abdul Rahman<sup>1,2,3</sup>, Rosnita A. Talib<sup>1</sup> and Khalina Abdan<sup>4</sup>

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<sup>5</sup>Department of Food Science and Technology, Maejo University-Phrae Campus, Thailand

Cellulose was extracted from durian rind using delignification with acidic sodium chlorite then followed by mercerization with 17.5% (w/v) sodium hydroxide. Gas pycnometer indicated that density of extracted cellulose was 1.59 g/cm<sup>3</sup>. Fourier transform infrared (FTIR) confirmed the removal of non-cellulosic components. The micrograph by scanning electron microscopy (SEM) displayed non-fibrous components scattered over the surface of durian rind were re-

moved. Most of cellulose presented a diameter and aspect ratio in the range of 100-150  $\mu$ m and 20-25, respectively. In the future, cellulose from durian rind has a potential to be used as a reinforcement elements in composite materials.

**Keywords:** Durian rind, Cellulose, Delignification, Mercerization, FTIR, SEM.

| Session  | Sustainable Processing and New Resources                               |
|----------|------------------------------------------------------------------------|
| Time     | 11:20 – 01:00 hrs                                                      |
| Venue    | Bronx VI                                                               |
| Chair(s) | Assoc. Prof. Dr Hasfalina Che Man;<br>Assist-Chair: Ms. Rahimah Shafie |

**064 11:20 hrs**

#### Technology Piloting and Commercialization of Microcontroller-Based Coffee Roasting Machine

Ruel M. Mojica<sup>1</sup>, Gerry M. Castillo<sup>2</sup> and Mary Jane D. Tepora<sup>2</sup>

<sup>1</sup>National Coffee Research, Development and Extension Center, Cavite State University, Indang, Cavite, Philippines. E-mail: ruelmojica@yahoo.com

<sup>2</sup>Department of Agricultural and Food Engineering, Cavite State University, Indang, Cavite, Philippines

A machine was developed for processing green coffee beans into roasted coffee. The machine can produce 10 kg of roasted coffee per batch of roasting. It was designed for village operations and pilot tested in top coffee growing areas in Cavite, Philippines. Investment analysis revealed that using the roaster would be a profitable business with a benefit-cost ratio of 1.94. Coffee farmers perceived the machine as a very good technology as evidenced by its highly acceptable rating of 83.33%. The commercialization of the machine could provide increased livelihood opportunities for the coffee farmers, cooperatives and other people in the community.

**Keywords:** Coffee, Roasting machine, Coffee farmers, Bravura.

209 11:40 hrs

**Performance of Water Allocation System at Watari Irrigation Project (WIP) Kano, Nigeria**

N. J. Shanono<sup>1</sup>, M. K. Othman<sup>2</sup> and A. A. Ramalan<sup>3</sup>

<sup>1</sup>Department of Agricultural Engineering, Bayero University, Kano, Nigeria

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The study evaluated Water Allocation System, 18 farm plots were selected. Cutthroat flumes were used to measure water applied. Estimated volume/depth of water for tomato (UC82B) using CROPWAT was 1263m<sup>3</sup>/505mm. Measured volume for 2 selected sectors were ranged 875-1310m<sup>3</sup> and 819-1210m<sup>3</sup>, depth were 350-524mm and 329-484mm respectively. Means of performance (adequacy, equity, reliability) for 2 sectors were 0.87, 0.83, 0.04 and 0.82, 0.78, 0.04. Effect of release gate and farm distance on performances was significant. Only farmers at upstream received adequate water. Identified problem is type (Continues Flow Allocation System) adopted, which needs to be changed to Rotation Allocation System.

**Keywords:** Irrigation, Water allocation, Adequacy, Equity, Reliability.

109 12:00 hrs

**Performance Evaluation of Water Conveyance System at Watari Irrigation Project**

Nuraddeen Mukhtar Nasidi<sup>1</sup>, Nura Jafar Shanono<sup>1</sup> and Mustapha Mohammed Bello<sup>2</sup>

<sup>1</sup>Department of Agricultural Engineering, Bayero University, Kano, PMB 3011 Kano, Nigeria.

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<sup>2</sup>Centre for Dry land Agriculture, Bayero University, Kano PMB 3011 Kano, Nigeria

The study examined performance of water conveyance system at Watari Irrigation Project, Kano. Six metering sections were selected along the main canal; A, B, C, D, E and F. Current meter was used to determine the velocity of flow at each station. The highest conveyance loss was 0.225m<sup>3</sup>/s/Km. The hydraulic efficiency was 27.2% at section D likewise for all the sections the hydraulic efficiencies were low except at section A whose efficiency was 71%. The Manning's Roughness Coefficient in the canal was highest at section D with value of 0.092. Hence, rehabilitation of the main canal is strongly needed.

**Keywords:** Seepage, Current meeter, Hydraulic ra-

dius, Friction, Manning's roughness coefficient.

217 12:20 hrs

**Machinery Utilization and Production Cost of Wetland, Direct Seeding Paddy Cultivation in Malaysia**

A. Muazu<sup>a</sup>, A. Yahya, W. I. W. Ishak and S. Khairunniza-Bejo

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A mean mechanization index of 0.59 and a total machinery energy of 477.78 MJ/ha were recorded for the direct seeding paddy cultivation in Malaysia. Highest mechanization index and machinery energy were obtained in the harvesting operation (0.99 and 336.81 MJ/ha) while the lowest values were in pesticides operations (0.19 and 3.97 MJ/ha). The benefit-cost ratios for an average farmer with and without government support within the block were respectively 1.37 and 1.68 with a mean yield of 7.63 tons/ha and mean total production cost of RM 6658.18/ha.

**Keywords:** Mechanization index, Machinery energy, Paddy production cost, Benefit-cost ratio, Wetland paddy cultivation.

220 12:40 hrs

**Physical and Mechanical Properties of Kenaf Stems at Varying Moisture Contents**

S. M. Dauda, D. Ahmad<sup>a</sup>, A. Khalina and O. Jamarei

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Physical and mechanical properties of kenaf stem Malaysian variety V 36 were studied. The physical properties revealed maximum plant height was 310 cm and the lowest was 150 cm. Maximum stem diameter was 30 mm and the smallest was 14 mm. The mechanical properties revealed the maximum cutting force and shearing energy were 1584.55 N and 8.75 J, respectively for 35% moisture content. While 694.86 N and 3.50 J were recorded for 72% moisture content. The Young's modulus ranged between 67.59 MPa to 234.24 MPa. The greater shearing energy was obtained at the lower levels in the stem.

**Keywords:** Cutting energy, Cutting force, Kenaf stems, Moisture content.

|                 |                                                                                       |
|-----------------|---------------------------------------------------------------------------------------|
| <b>Session</b>  | <b>Young Presenter Award Session (YSN-ASM)</b>                                        |
| <b>Time</b>     | <b>02:00 – 03:20 hrs</b>                                                              |
| <b>Venue</b>    | <b>Manhattan III</b>                                                                  |
| <b>Chair(s)</b> | <b>Assoc. Prof. Dr. Rimfiel b. Janius;<br/>Assist-Chair: Mr. Anwar Ridhwan Ismail</b> |

**218 2:00 hrs**

#### **Alkaline Cleaning-in-Place of Pink Guava Puree Fouling Deposit using Lab-Scale Cleaning Test Rig**

N. I. Khalid<sup>1</sup>, N. Ab Aziz<sup>1</sup>, A. A. Nuraini<sup>2</sup>, F. S. Taip<sup>1</sup> and M. S. Anuar<sup>2</sup>

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Cleaning-in-place (CIP) of pink guava puree (PGP) fouling deposits is not well known compared to dairy deposits which is well established. Lab-scale cleaning test rig has been used to investigate the cleaning performance of PGP deposits. Removal mechanism during alkaline-based cleaning of PGP deposits were investigated using NaOH concentrations (1.0wt%-2.0wt%), temperatures (35-70°C) and fluid velocities (0.6-1.5m/s) over a range of Reynolds number ( $Re=4 \times 10^4$ - $1.8 \times 10^5$ ). Cleaning rate was quantified by measuring the remaining area of the deposits at sample holder at every 1min. The efficient CIP process for PGP fouling deposit can be obtained at 1.5m/s, 70°C, with concentration of (1.0- 2.0wt%).

**Keywords:** Cleaning-in-place, Cleaning test rig, Fouling deposit, Fouling, Pink guava puree, Test section.

**117 2:20 hrs**

#### **Husk Detection using Thermal Imaging Technology**

Norazlida Jamil and Siti Khairunniza Bejo<sup>a</sup>  
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Faculty of Engineering, Universiti Putra Malaysia  
Serdang, Selangor, Malaysia.  
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Harvested paddy normally contains impurities including husk. This study focuses on the use of thermal imaging to detect husk. Heating and cooling treatment was applied to 20%, 40%, 60%, 100% husk and 100%

seed to differentiate between husk and seeds due to heat transfer. From result, mean pixel of seed thermal image is higher compared to husks. Its value at 25s gave a suitable indicator to separate between seed and husk. The technique can be used to detect husk with 100% success rate for 20% and 40%, 98.33% for 60% and 97.67% for 100% husk, while 94.33% for 100% seeds.

**Keywords:** Paddy husk, Thermal image, Seed.

**062 2:40 hrs**

#### **Impedance Analysis of Physiological Parameters of Plant (*Labisia pumila*) Water Stress**

Diyana Jamaludin<sup>1</sup>, Samsuzana Abd Aziz<sup>1,a</sup>, Desa Ahmad<sup>1</sup> and Hawa ZE Jaafar<sup>2</sup>

<sup>1</sup>Department of Biological & Agricultural Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.

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<sup>2</sup>Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia, Serdang, Selangor Malaysia

An impedance spectroscopy technique was used in this research to measure water stress of *Labisia pumila* leaf non-invasively. A pair of electrocardiogram (ECG) electrode connected to an impedance analyzer board to measure the impedance value of leaves samples. Relationship between impedance, leaf water potential, relative water content, soil moisture content, chlorophyll fluorescent content and leaf thickness under four levels of water treatment was determined. Change in impedance with respect to frequency and relationship between resistance and reactance were explored to determine optimal frequencies. Result shows that impedance measurement technique could be used to monitor plant water stress.

**Keywords:** Impedance spectroscopy, Water stress, Plant physiology, Frequency, Reactance, Resistance.

**136 3:00 hrs**

#### **Prediction of Sugarcane Quality Parameters using Visible-Shortwave Near Infrared Spectroradiometer**

Nawi Nazmi Mat<sup>1</sup>, Kamal Md Rowshon<sup>1</sup>, Chen Guangnan<sup>2</sup> and Jensen Troy<sup>2</sup>

<sup>1</sup>Department of Biological and Agricultural Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Malaysia

<sup>2</sup>Faculty of Health, Engineering and Sciences, University of Southern Queensland, Toowoomba, Australia

This study was undertaken to explore the potential of



spectroscopic method to predict sugarcane quality parameters by directly scanning the internode samples. Spectral data was collected from 125 internode using a visible-shortwave near infrared spectroradiometer (VNIRS). The spectral data was calibrated using Partial Least Square (PLS) method against the reference values of Brix, fibre content (FC) and moisture content (MC). The prediction results for Brix, FC and MC as represented by coefficient of determination ( $R^2$ ) were 0.88, 0.93 and 0.90, respectively. These results suggested that the spectroscopic method could be used to predict sugarcane quality parameters with good accuracy.

**Keywords:** Sugarcane, Sugar content, Quality, Brix, Spectroscopic, Internode.

|          |                                                                                  |
|----------|----------------------------------------------------------------------------------|
| Session  | Modelling, Simulation and Control                                                |
| Time     | 02:00 – 03:20 hrs                                                                |
| Venue    | Bronx V                                                                          |
| Chair(s) | Assoc. Prof. Dr. Farah Saleena Taip;<br>Assist-Chair: Mr. Ahmad Muslim Md. Rasli |

025 2:00 hrs

#### Optimization of Solvent Mixture for Extraction of Phenolic Compounds from Tulip Flowers: Mixture Design Approach

Muhammet Arici, Osman Sagdic, Gülsüm Uçak and Omer Said Toker

*Yildiz Technical University, Chemical and Metallurgical Engineering Faculty, Food Engineering Department, Istanbul, Turkey*

Color of the food product is very important factor affecting consumer acceptability of the product. Many different types of coloring agents are used in the food industry to improve attractiveness of the product. In recent years, there is an increasing trend for production of natural food ingredients such as coloring agents in the food industry due to their non-toxic or health beneficial effects. Tulip is one of the possible plant source used for extraction of coloring agents. During the extraction process, selection of optimum solvent directly affects amount of the agents be used in the industry; therefore, in the present study three different solvents (acetone, methanol and water) were used to extraction of phenolic compounds from yellow and red tulip types. Mixture design methodology was used to optimize solvent concentration for extraction of phenolic compounds from both of the tulip types.

Phenolic compound extraction yield of the different solvent combinations for yellow and red tulip flower types changed between 2682 - 26333 ppm and 13258 - 33574 ppm, respectively. According to the results, solvent composition or type used for extraction purposes significantly affected amount of extracted phenolic compounds. The  $R^2$  obtained for yellow and red tulip flowers were found as 0.9785 and 0.9693, respectively. All of the linear and interaction terms were found as significant in the obtained models. The optimum solvent combination, causing to extract maximum amount of phenolic compounds, was found as 31.3% methanol, 25.3% acetone and 43.4% water for yellow type tulip flowers; 49% acetone and 51% water for red type tulip flowers.

**Keywords:** Tulip flowers, Phenolic compounds, Solvent optimization, Mixture design values of the models.

027 2:20 hrs

#### Assessing the Spatial Distribution of Rice Crop Evapotranspiration using Weather Radar Data

A. S. Abdullahi, D. Ahmad<sup>u</sup>, M. S. M. Amin and M. K. Rowshon

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Universiti Putra Malaysia, UPM Serdang, Selangor DE,  
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A study was conducted to estimate the Consumptive Water Use of rice using micro-lysimeter in Tanjung Karang Rice Irrigation Scheme (TAKRIS). Non-weighing micro-lysimeter were installed to measure rice crop evapotranspiration  $ET_c$  during 2011 and 2012 irrigation period. The FAO-PM 56 simulation model was used for calculated evapotranspiration  $ET_{cw}$ . The rainfall data observed by the weather radar for the micro-lysimeter sites were obtained from Malaysia Meteorological Department. The rainfall amount was used for predicted rice crop evapotranspiration while the in-situ and CROPWAT ET was used for comparison with radar predicted rice crop ET. The CROPWAT  $ET_{cw}$  values (2.1-5.8 mm/d) under-estimate rice crop ET compared to the micro-lysimeter  $ET_c$  (2.8-6.9 mm/d). However, the  $ET_{c-predicted}$  using weather radar ranged from 3.7-6.3 mm/d and are closely related to the measured  $ET_c$ . The predicted evapotranspiration values indicated a reliable result during the rice reproductive, ripening and grain filling growth stages. With adequate climate data, baseline research can be integrated and used to ascertain the extent of water use on real time basis. However, the use of weather radar data to predict consumptive water use

of rice is still in the infancy stage.

**Keywords:** Evapotranspiration, Micro-lysimeter, Tanjung karang, Weather radar.

036 2:40 hrs

## Precise Positioning based on Pixel Differential in Linear Optical Sensor Array

Abdallah Alsayed and Muhammad Razif Mahadi  
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Serdang, Selangor, Malaysia*

Precision farming emphasis on the efficient use of resources for optimizing the output. In the production of paddy, measurement of water level and the rate of rising are important factors. Sensing techniques suffer from some restrictions which restrict obtaining high accuracy and high resolution measurements such as noise of electrical sensor, sensing clear response, potential error, and environmental effects. This paper presents a non-contact method to measure position in linear motion. Moreover, this work is going to be background and concept for water level measuring system.

**Keywords:** Position measurement, Water level, Linear array sensor.

139 3:00 hrs

## Application of Thermosonication Treatment in Processing and Production of High Quality and Safe-to-Drink Fruit Juices

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The demand for higher quality and freshness in fruit juices with absence of additives and preservatives has encouraged the use of ultrasound technology in juice processing. Thermosonication is a novel and good alternative technique to replace the conventional heat treatment process. It has potential in enhancing quality and safety of the fruit juices. It is more energy-efficient than conventional thermal technology. It is also more efficient, safe and reliable than ultrasound application alone by itself to achieve the limit of food-borne pathogens destruction. This review covers the effects of ultrasound-heat combined application on fruit juices quality and safety aspects.

**Keywords:** Thermosonication, Fruit juice, Ultrasound, Heat, Juice yield, Ascorbic acid, Colour, Enzyme, Microorganism, Inactivation.

|          |                                                                             |
|----------|-----------------------------------------------------------------------------|
| Session  | Food Quality, Safety and Bio-Information System                             |
| Time     | 02:00 – 03:20 hrs                                                           |
| Venue    | Bronx VI                                                                    |
| Chair(s) | Assoc. Prof. Dr. Siti Khairunniza Bejo;<br>Assist-Chair: Ms. Rahimah Shafie |

070 2:00 hrs

## Flowability Properties of Labisia Pumila Herbal Powder

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This paper investigates the flowability properties of *Labisia pumila* (*L. pumila*) powder. Material properties of the powder and their influence on flowability were discussed. *L. pumila*, a popular Malaysian herb with therapeutic and medicinal functions was compressed into tablets using a stainless steel cylindrical uniaxial die with 13-mm- diameter and compaction pressures of 7 to 25 MPa. Two feed weights, 0.5 and 0.7g were used to form tablets. Compaction strength and density increased as compaction pressure increased resulting in tablets porosity reduction. Cohesion index, flow stability and caking strength were also determined to enhance the understanding of flowability properties of the *L. pumila* powder.

**Keywords:** *Labisia pumila*, Flowability, Caking strength, Cohesion, Flow stability.

135 2:20 hrs

## Separation of Emulsified Bioactive-Compound from Agarwoodoil using Gel Electrophoresis Method

Boon Yih Tien<sup>1</sup>, Noor Fitrah Abu Bakar<sup>2</sup>, Rabitah Zakaria<sup>1</sup> and Mohd. Nazli Naim<sup>1,a</sup>

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In this study, gel electrophoresis was applied to the oil that consists of bioactive-compound extracted from

agarwood tree. Using selected surfactant and followed by sonication, the size of the droplets were reduce to nano-meter order. Fine droplets are preferable in this study because each individual droplet will consists of specific compound. Specific compound in the droplet respond to a particular zeta potential value that allow the droplet mobility. Using the electrophoresis technique, a novel work to characterize the oil base on its bioactive-compound's mobility was developed. The bands that exist after the gel separation were verified using a GC-MS analysis.

**Keywords:** Agarwood, Nanoemulsion, Critical micelle concentration, Droplets size, Zeta potential, Gas chromatography–Mass spectrometry.

148 2:40 hrs

#### Total Phenolic Contents and Colour Intensity of Malaysian Honey from the *Apis* spp. and *Trigona* spp. bees

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The total phenolic content and colour intensity of the five common Malaysian honeys by the *Apis* spp. or *Trigona* spp. were studied following a modified Folin-Ciocalteu method and absorbance measurements, respectively. The total phenolic content and the colour intensity of honeys from the two types of bees were statistically different with  $P < 0.0005$ . The *Trigona* spp. honey gave highertotal phenolic content with average 784.3 mg GAE/kg than the *Apis* spp. at average 590.5 mg GAE/kg. The total phenolic content of Malaysian honeys has good correlation with its colour intensity at  $R^2 = 0.826$ .

**Keywords:** Stingless bee honey, Total phenolic content, Colour intensity.

175 3:00 hrs

#### Detection of Basal StemRot (BSR) Infected Oil Palm Tree using Laser Scanning Data

Siti Khairunniza-Bejo<sup>a</sup> and Vong Chin Nee

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Basal Stem Rot (BSR) is a well-known disease that affecting the production of oil palm. Early disease detection is vital to manage the disease effectively. This study examined the potential use of Terrestrial Laser Scanning (TLS) data to analyse the properties of oil palm tree at canopy and trunk section for non-infected and infected BSR at different severity level of infection. In summary, area and perimeter at trunk section 150cm; and size of canopy shows significant relationship with the severity level of BSR with the Pearson correlation value of -0.571, -0.530 and -0.806, respectively.

**Keywords:** Basal stem rot, Terrestrial lase scanner, Trunk, Canopy.

| Session  | Young Presenter Award Session (YSN-ASM)                                    |
|----------|----------------------------------------------------------------------------|
| Time     | 03:40 – 06:20 hrs                                                          |
| Venue    | Manhattan III                                                              |
| Chair(s) | Assoc. Prof. Dr. Rimfiel b. Janius; Assist-Chair: Mr. Anwar Ridhwan Ismail |

023 3:40 hrs

#### Capacitive Sensor Probe to Assess Frying Oil Quality

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The repeated usage of frying oil had been proven hazardous due to degradation process by chemical reactions that lead to changes in the quality of the oil. In this study, a capacitive sensor was designed to assess frying oil quality at several heating time intervals by measuring changes on its electrical capacitance. In total of 30 samples of 130 ml palm oil were heated at 180° C up to 30 hours. The electrical capacitance,

total polar compound (TPC) and viscosity of the samples were measured for analysis. Preliminary results demonstrated significant correlation between oil electrical capacitance with TPC and viscosity.

**Keywords:** Capacitance sensor, Frying oil quality, Heating.

255 4:00 hrs

## Toughening Poly(Lactic Acid) and Aiding the Melt-Compounding with Bio-Sourced Plasticizers

Tee Yee Bond<sup>1</sup>, Rosnita A. Talib<sup>1,2,a</sup>, Khalina Abdan<sup>3</sup>, Chin Nyuk Ling<sup>1</sup>, Roseliza Kadir Basha<sup>1</sup> and Khairul Faezah Md Yunos<sup>1</sup>

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The capability of bio-sourced plasticizers epoxidized palm oil (EPO) and epoxidized soybean oil (ESO) in toughening and aiding the melt-processing of PLA were investigated. At various loadings, they were melt-compounded with PLA and hot pressed into 3-mm sheets for impact strength testing. From the torque and stock temperature curves obtained during compounding, both plasticizers rapidly reduced the torque and stock temperature. While EPO readily supports the processing and toughens PLA, higher content of ESO is needed to perform correspondingly. These improvements suggest the potential of using EPO and ESO as plasticizer substitutes which shall contribute in the PLA processing industry.

**Keywords:** Epoxidized palm oil, Epoxidized soybean oil, Impact strength, Plasticizer, Poly(lactic acid), Melt-compounding.

262 4:20 hrs

## Inhibitory Effect of Different Chemical Treatments on Mangosteen Pericarp Polyphenol Oxidase Activity

Mahsa Ziaabakhsh Deylami<sup>1</sup>, Russly Abdul Rahman<sup>1,2,3,a</sup>, Jamilah Bakar<sup>1</sup>, Chin Ping Tan<sup>1</sup> and Lasekan Olusegun<sup>1</sup>

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Mangosteen pericarp is a good source of natural antioxidants. However, high polyphenol oxidase (PPO) activity in mangosteen pericarp leads to deterioration of these phytochemicals. The application of chemical inhibitors is an effective method to control enzymatic reactions. The aim of this study was to inhibit mangosteen pericarp PPO activity using different PPO inhibitors. Citric acid, acetic acid, cysteine, 4-hexylresocinol and sodium chloride were added to crude PPO extract from mangosteen pericarp. Subsequently, the residual activity of PPO was determined spectrophotometrically and compared to control without added inhibitors. The most effective inhibitor was cysteine with IC<sub>50</sub> value of 1.08 mM.

**Keywords:** Mangosteen pericarp, Polyphenoloxidase, Enzyme inhibitors, Cysteine.

288 4:40 hrs

## Development and Integration of Global Positioning System (GPS) for Fertilizer Application

Siti Mariam Shamsi<sup>a</sup>, Muhammad Razif Mahadi, Aimrun Wayayok and Ahmad Fikri Abdullah  
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Fertilizer promotes intense growth in crop yields and generates high returns. However, farmers often do not apply fertilizer in the proper manner. The objective of this research is to develop and integrate the global positioning system (GPS) for fertilizer application. The system consists of an Arduino UNO microcontroller, a Skylab SKM53GPS, and liquid crystal display (LCD). The GPS receiver received data from the satellites and relayed the location which then will be compared to the prescription map stored in the microcontroller.

Field experiments were conducted to evaluate the effectiveness of the GPS receivers in locating the points.

**Keywords:** Fertilizer application, Global positioning system, Arduino microcontroller.

141 5:00 hrs

#### **Gel Strength and Stability Characterization of Ultrasound Treated Whey Protein Foams**

M. C. Tan<sup>1</sup>, N. L. Chin<sup>1,a</sup>, Y. A. Yusof<sup>1</sup>, F. S. Taip<sup>1</sup> and J. Abdullah<sup>2</sup>

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<sup>2</sup>Plant Assessment Technology Group, Malaysia Nuclear Agency (Nuclear Malaysia), Bangi Kajang, Selangor, Malaysia.

Ultrasound treated whey protein foam at 10% concentration was characterized rheologically for its gel strength and stability. The 400 W ultrasound treatment at 20, 40 and 60% amplitude for 5, 15 and 25 minutes had increased gel strength up to 31% and improved foam stability with reduced foam drainage by 31%. The continuous network of the treated whey protein foam remained as a weak gel with  $\tan \sigma$  values  $> 0.1$  although the overall treated sample had a slight increase of gel strength from 121 to 147 Pa·s<sup>1/2</sup> compared to the untreated at 112 Pa·s<sup>1/2</sup>.

**Keywords:** Whey protein foam, Weak gel, Gel strength, Foam drainage, Ultrasound.

078 5:20 hrs

#### **Analysis of Vacuum Drying and Hot Air Drying on Temperature Profile and Heat Transfer of Rubber**

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This paper reports about effect of drying temperature and different dryers to crumb rubber drying process. By understanding characteristics of rubber drying, a better drying strategy with higher energy efficiency can be formulated. The experiment was carried out in temperatures ranged 80, 90 and 100°C. Sample dried by hot air had surface temperature remains around 90°C at pre-set temperature 100°C. All test able to obtain moisture content reduction in dry basis  $< 20\%$  within 65 minutes. The drying rate is similar at all drying condition and specific energy consumption is lower with the use of universal oven.

**Keywords:** Crumb rubber, Heat transfer, Drying characteristic, Mathematical modeling.

213 5:40 hrs

#### **Preliminary Study on Detection of Basal Stem Rot (BSR) Disease at Oil Palm Tree using Electrical Resistance**

E. Nurnadiah<sup>1,a</sup>, W. Aimrun<sup>1</sup>, M. S. M. Amin<sup>1</sup> and A. S. Idris<sup>2</sup>

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<sup>2</sup>Malaysian Palm Oil Board, Kajang, Malaysia

BSR disease attack oil palm in Malaysia caused by *Ganoderma Boninense* which resulted in the destruction of basal tissues of the plant. The study was aimed to detect healthy and an infected tree by using electrical resistance (ER). LandMapperERM-2 was used to detect the diseases by collecting ER data at eight positions surrounding the trunk at three different levels of height for each tree. Tree that has been infected gives low ER readings between 0Ω to 24.9Ω while for the healthy tree have 25Ω to 150Ω. Hence, ER approach can be utilized in detecting unhealthy oil palm tree.

**Keywords:** *Ganoderma boninense*, LandMapperERM-2, Palm oil yield, Healthy and unhealthy trees, Palm trunk.

216 6:00 hrs

#### **Impact of Mulch on Weed Infestation in System of Rice Intensification (SRI) Farming**

W. Aimrun<sup>1,2</sup>, M. S. M. Amin<sup>1,2</sup>, A. Khalina<sup>1</sup> and U. Mohammed<sup>1,3,a</sup>

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<sup>3</sup>Department of Agricultural Education, School of Vocational Education, Umar Suleiman College of Education Gashua, Yobe State, Nigeria

Weeds infestation is one of the major constraints of SRI due to wide planting geometry and moist environment, thereby reducing rice yield up to 69.15%. This study aimed at evaluating the effect of two mulching materials (rice straw SRI mats and plastic) on management of weed infestation, and determining of seedling behaviour. The parameters used for the analysis of weeds were density, relative density, dry weight, rel-



ative dry weight, summed dominance ratio and control efficiency. The results revealed that weed density was significantly reduced with range from control plot (1950.67 No.) to the rice straw SRLmats plot (33.00 No.)

**Keywords:** Soil cover, Weeding, Weed density ratio, Weed dry weight ratio, Single seedling.

|                 |                                                                                          |
|-----------------|------------------------------------------------------------------------------------------|
| <b>Session</b>  | <b>Modelling, Simulation and Control</b>                                                 |
| <b>Time</b>     | <b>03:40 – 06:20 hrs</b>                                                                 |
| <b>Venue</b>    | <b>Bronx V</b>                                                                           |
| <b>Chair(s)</b> | <b>Assoc. Prof. Dr. Farah Saleena Taip;<br/>Assist-Chair: Mr. Ahmad Muslim Md. Rasli</b> |

**150 3:40 hrs**

**Preliminary Study of Material and Energy Balance Model of Microalgae Cultivation using Agro-industry Effluent**

Nugroho Adi Sasongko<sup>1,2,a</sup> and Ryoza Noguchi<sup>1</sup>

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<sup>2</sup>The Agency for The Assessment and Application of Technology (AAAT), Banten, Indonesia

Significant potential of the Energy Profit Ratio (EPR) by utilizing agricultural wastewater from Palm Oil Mill Effluent (POME) was comprehensively analyzed. The amount of this agro-industrial effluent is extraordinary abundance and its nutrient composition is rich for microorganisms' growth. POME can be an alternative medium to reduce energy cost in the cultivation stage, by controlling composition ratio of the nutrients. Wet lipid process in the downstream stage was chosen as current best available method to reduce total energy consumption for biodiesel production cycle. The entire EPR indicated substantial figures, approximately 3.05 for microalgae-based biodiesel from integrated energy system.

**Keywords:** Biofuel production, Energy Profit Ratio (EPR), Integrated energy system, Microalgae cultivation, Palm Oil Mill Effluent (POME).

**169 4:00 hrs**

**Drying Kinetics of Microwave-Vacuum Drying of *Eurycoma Longifolia* Jack (Tongkat Ali)**

Hada Masayu Ismail<sup>1,2</sup>, M. Nordin Ibrahim<sup>1,a</sup>, Pin Kar Yong<sup>3</sup>, Rabitah Zakaria<sup>1</sup>, Sofia Azman<sup>4</sup> and Mohd. Shahidan M. Arshad<sup>3</sup>

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Microwave-vacuum drying was investigated as a method for drying the root of *E.longifolia*. Effects of microwave power and vacuum pressure on the drying kinetics were studied. Drying system was operated in the microwave power of 150W and 300W and vacuum pressure of 15kPa and 50kPa. Oven drying at 40 and 70°C was performed as a basis of comparison with microwave-vacuum drying. Kinetics data was collected to determine the drying time required to achieve equilibrium moisture content. Analyses of results indicate that microwave-vacuum drying increased the drying rate and sped up the drying process and therefore ensured a shorter drying time.

**Keywords:** Microwave-vacuum drying, Oven drying, *E.longifolia*, Drying kinetics.

**170 4:20 hrs**

**Drying Kinetics of Cocoa Nibs and Selected Qualities of Dried Nibs Under Convective Drying Technique**

Nur Fatin Awanis Mohd Zin, Mohd Nordin Ibrahim<sup>a</sup> and Siti Norsalehah Yunos

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A study was carried out to investigate on the drying kinetics of cocoa nibs and subsequent selected quality aspects of the dried nibs under convective drying technique. Fermented cocoa beans normally contain 50 - 55 % moisture which has to be reduced to about 6 - 8 % for safe storage of the dried beans. Conventionally, a complete drying process by hot air drying was carried out on the whole cocoa beans with the presence of the testa which acts as a barrier for water movement thus reducing the drying rate. The purpose of this study is to enhance the drying rate by removing

the testa when the cocoa beans reached intermediate moisture content of around 25% and continuing the drying of the nibs until final moisture content of 6 - 8% was achieved. Both cocoa beans and nibs were dried at temperatures of 45°C, 55°C and 65°C using conventional convection oven. Drying kinetics of beans and nibs were observed and compared. Comparison of physical (colour and texture) and chemical (total polyphenols, epicatechin and catechin contents) qualities were also made between beans and nibs, which showed significant differences ( $p < 0.05$ ) between them.

**Keywords:** Cocoa nibs, Drying kinetics, Convective drying, Cocoa nib quality.

198 4:40 hrs

#### **Food Factory Design: Reality and Challenges Faced by Malaysian SMEs**

N. Z. Noor Hasnan<sup>1</sup>, N. Ab Aziz<sup>1,a</sup>, N. Zulkifli<sup>2</sup> and F. S. Taip<sup>1</sup>

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<sup>2</sup>Department of Mechanical and Manufacturing Engineering, Universiti Putra Malaysia, Serdang, Selangor Darul Ehsan, Malaysia

A competent food factory cannot be achieved if the factory is poorly designed. This paper identified the difficulties experienced by Malaysian small and medium enterprises (SME) in designing a food factory due to challenges faced by them. Two important manufacturing issues were analyzed and discovered to be related with poor factory design i.e. unsatisfactory food hygiene and lacking in sustainability. The analysis was based on a review of Malaysian data and literature. It is concluded that early considerations on food hygiene and sustainability can help SMEs to comply with hygiene standards, reduce cost and increase profit margin.

**Keywords:** Food factory, Design, Manufacturing system, Small and medium enterprises, Food hygiene, Sustainability.

199 5:00 hrs

#### **Optimization of Drying Conditions for 6-Shogaol Content and Antioxidant Capacity in Young Ginger using Response Surface Methodology**

Ali Ghasemzadeh<sup>a</sup> and Hawa ZE Jaafar  
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Response surface methodology was applied to optimize the drying process for 6-shogaol and antioxidant capacity in young ginger. Two-factor central composite design was employed to determine the effects of independent variables. 6-shogaol and antioxidant capacity were measured using high-performance liquid chromatography and DPPH radicals scavenging assay. The optimum oven conditions for drying of ginger were 53.47°C for 48.6 h, with a predicted 6-shogaol content of 57.32 mg/g DW, and antioxidant capacity of 83.30%. The experimental values were found to be in agreement with those predicted, indicating the suitability of the model for optimizing the oven drying conditions for ginger.

**Keywords:** Response surface methodology, 6-gingerol, Ginger, DPPH assay.

200 5:20 hrs

#### **Optimization of Reflux Extracting Conditions for Total Flavonoid and Total Phenolic Content and Antioxidant Capacity in Pandan (*Pandanus Amaryllifolius* Roxb) Using Response Surface Methodology**

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E-mail: <sup>a</sup>[alighasemzadeh@upm.edu.my](mailto:alighasemzadeh@upm.edu.my)

Response surface methodology was applied for optimizing reflux extraction conditions for achieving high content of flavonoids, phenolics and antioxidant capacity in pandan. Central composite experimental design with three-factor and three-level was employed to evaluate the effects of the operation parameters. Two optimum extraction conditions were developed for all responses, which were methanol dilution 78.8%, temperature 69.5°C and solid to liquid ratio 32.4mL/g, for total flavonoid content and antioxidant capacity, while for total phenolics it was 75.1%, 70°C and 31.8mL/g, respectively. The experimental values were found to be in agreement with those predicted value, indicating the suitability of the models.

**Keywords:** Response surface methodology, Total

flavonoid, Total phenolic, Antioxidant capacity, Pandanus amaryllifolius roxb.

**231 5:40 hrs**

### Image Clustering Technique in Oil Palm Fresh Fruit Bunch (FFB) Growth Modeling

Muhamad Saufi Mohd Kassim<sup>1,a</sup>, Wan Ishak Wan Ismail<sup>1</sup>, Abdul Rahman Ramli<sup>2</sup> and Siti Khairunniza Bejo<sup>1</sup>

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Digital images of FFB from anthesis to harvesting stage were acquired and grouped into 25 maturity stages. K-means clustering technique was used to separate the images into three colours clusters that represent three FFB features, Fruitlet, Brown spine and Green spine. The relationship of Hue colour component and FFB maturity stages was established. The FFB was found to grow in three major stages, from week 0 to 5, week 6 to 14 and week 15 to 24. From the relationship a Growth Model was develop and was validated with actual maturity stage. The coefficient of determination, R<sup>2</sup> was 0.95.

**Keywords:** Image processing, Pattern recognition, Vision system.

**235 6:00 hrs**

### Multivariate Analysis of Vegetative and Physiological Traits in Oil Palm (*Elaeis guineensis* Jacq.) Germplasm

M. A. Li-Hammed<sup>1,a</sup>, Ahmad Kushairi<sup>2</sup>, N. Rajanaidu<sup>2</sup>, Mohd Sukri Hassan<sup>1</sup>, Che Wan Zanariah C. W. Ngah<sup>1</sup> and B. S. Jalani<sup>1</sup>

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Germplasm materials provide an opportunity for tapping advantages of natural diversity improvement. Adequate characterization for agronomic and morphological traits is necessary to ease utilization of germplasm materials by breeders. The oil palm materials were subjected to Principal Component Analysis and the result from the analysis showed that the first three PCs with Eigenvalue >1 accounted for 90.79% of the total variation. Distribution pattern of the germplasm materials into three clusters using Ward's method indicated the presence of genetic vari-

ability for most of the traits studied. The selection of these traits and palms with the desired traits could enhance oil palm improvement.

**Keywords:** Oil palm, Germplasm, Genetic variability, Multivariate analysis, Principal component analysis, Cluster analysis.

| Session  | Food Quality, Safety and Bio-Information System                          |
|----------|--------------------------------------------------------------------------|
| Time     | 02:00 – 03:20 hrs                                                        |
| Venue    | Bronx VI                                                                 |
| Chair(s) | Assoc. Prof. Dr. Siti Khairunniza Bejo; Assist-Chair: Ms. Rahimah Shafie |

**184 3:40 hrs**

### The Effect of Storage Time of Chopped Oil Palm Fruit Bunches on the Palm Oil Quality

Fatin Syakirah Ali<sup>1</sup>, Rosnah Shamsudin<sup>1,a</sup> and Robiah Yunus<sup>2</sup>

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The bulkiness of the fresh fruit bunches (FFB) cause ineffectiveness of heat distribution into the inner layers of the fruits and simultaneously led to poor palm oil quality. Thus, this research was conducted to determine the effect of storage time of chopped FFB on the palm oil quality and stripping efficiency. The FFB was chopped using a fabricated chopper blade and stored for 30min to 120min. The results showed that the FFA, moisture content, DOBI and carotene content were ranged 1.19%-2.21±0.394%, 0.175-0.411±0.097%, 2.74-0.85±0.746 and 430.402-326.081±0.768ppm respectively. The chopped FFB also had better stripping efficiency compared to unchopped FFB.

**Keywords:** Oil palm fruit, Chopping method, Storage time, Sterilization, Palm oil quality, Stripping efficiency.

203 4:00 hrs

**Efficacy of Ultraviolet Radiation as Non-Thermal Treatment for the Inactivation of *Salmonella* Typhimurium TISTR 292 in Pineapple Fruit Juice**

Atikah Mansor<sup>1</sup>, Rosnah Shamsudin<sup>1,a</sup>, Noranizan Mohd Adzahan<sup>2</sup> and Mohd Nizar Hamidon<sup>3</sup>

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The purpose of this study was to investigate the efficacy of UV-C treatment with the Dean Vortex technology to inactivate the presence of *Salmonella* Typhimurium TISTR 292 in pineapple juice at three different frequencies (30, 35 and 40 Hz). The increasing of pump frequency was resulted an increasing of flow rates. The UV dosage was measured for 30, 35 and 40 Hz which are 13.75, 10.37 and 10.10 mJ/cm<sup>2</sup>, respectively. The microbial counts of *Salmonella* Typhimurium decreased with increasing UV-C dosage. Highest microbial reduction was achieved at pump frequency of 30 Hz (dosage 13.75 mJ/cm<sup>2</sup>) with reduction of 5-log<sub>10</sub> CFU/ml.

**Keywords:** Ultraviolet, *Salmonella* Typhimurium, Flow rate, Dean Vortex, Pineapple juice.

242 4:20 hrs

**Yield Prediction Modeling using Data Envelopment Analysis Methodology for Direct Seeding, Wetland Paddy Cultivation**

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A yield prediction model was developed using measured energy inputs data from 40 wetland paddy farms in Malaysia. Energy inputs from six sources were optimized using benchmarking and data envelopment analysis. The model developed based on Cobb-Douglas production function has coefficient of determination (R<sup>2</sup>) of 91%. Analysis on the model revealed direct relationship of yield with machinery, fuel, fertilizer and pesticides energy expenditures and an inverse relationship of yield with seeding rate. Hence, suggesting the need to reduce farmers' present

seeding rate of 149 kg/ha to the optimum seeding rate of 128 kg/ha for higher yield and cost reduction.

**Keywords:** Wetland paddy cultivation, Field energy expenditure, Yield modeling, Energy analysis, Data envelopment analysis, Cobb-douglas production function, Optimization.

244 4:40 hrs

**Saturated Distilled Monoglycerides Variants in Gel-Form Cake Emulsifiers**

Lai Yee Lee<sup>1,2</sup>, Nyuk Ling Chin<sup>2,a</sup>, Choh Hock Lim<sup>1</sup>, Yus Aniza Yusof<sup>2</sup> and Rosnita A. Talib<sup>2</sup>

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Three palm based and one non-palm based saturated distilled monoglycerides (sDMG) were hydrated to form gels and applied into sponge cakes for performances evaluations. The gel structures were similar across the samples. The increase of gel dosage increased cake batter viscosity, aeration, cake specific volume and crumb softness. The performance of sDMG with high monopalmitin and high monostearin gel-form cake emulsifier in sponge cakes were of no significant difference ( $p > 0.05$ ).

**Keywords:** Emulsifier, Distilled monoglycerides, Gel, Cake.

106 5:00 hrs

**Power Ultrasound Assisted Mixing Effects on Bread Physical Properties**

Nasrul Fikry Che Pa<sup>1</sup>, Nyuk Ling Chin<sup>2</sup>, Yus Aniza Yusof<sup>2</sup> and Norashikin Abdul Aziz<sup>2</sup>

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Power ultrasound was applied during in-situ bread dough mixing process at power level of 1.00, 1.50, 2.05 and 2.50 kW for time durations of 10, 20, 30 and 40 min. Well mixed doughs were subjected to standard proofing and baking processes where physical properties of bread like mass, volume and density were investigated. Power ultrasound significantly ( $P < 0.05$ ) altered the physical properties of bread with bread volume increase by 19 %, while bread mass and density

reduced by 2.1 % and 17 %, respectively at maximum ultrasound power of 2.50 kW for exposure of 40 min.

**Keywords:** Ultrasound, Dough mixing, Aeration mechanism, Physical properties of bread.

260 5:20 hrs

## Relationship between Soil Apparent Electrical Conductivity and pH Value of Jawa Series in Oil Palm Plantation

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<sup>2</sup>Department of Biological and Agricultural Engineering, Faculty of Engineering, Universiti Putra Malaysia, Selangor, Malaysia

Having the correct pH is crucial for the healthy plant growth as it will affect the amount of nutrient available to plants. This study was carried out to determine the soil pH value in oil palm plantation based on ECa parameter measured by the soil sensor. The soil samples were collected in oil palm plantation at three different depth; 0-15cm, 15-30cm and 30-45 cm and the soil ECa was measured by using ECa sensor in the plantation. The study showed that ECa parameter had significant negative correlation to soil pH and highly related to deep ECa at the depth of 15-30 cm with  $R^2=0.484$ .

**Keywords:** Soil pH, Soil electrical conductivity, Variability maps.

277 5:40 hrs

## Detection of Adulteration of Fresh Orange Juice by Sugar Solution using Near Infrared Spectroscopy

Jutharat Nawayon<sup>a</sup> and Panmanas Sirisomboon  
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Near infrared spectroscopy was applied for determination of adulteration of orange juice with sugar solution. There were 10 samples of 100% fresh juice, 80 of different concentration of sugar solution adulterated samples and 50 of purchased juiced from 25 vendors in Bangkok and near-by provinces. Each sample was scanned with FT-NIR spectrometer. A PLS regression model for sugar-added content provided  $R^2$ , RMSEP and a bias of 92.06%, 0.0361g/ml, and -0.0041g/ml, respectively and for water-added 87.68%, 7.37%, and -1.26%, respectively. The NIR-based protocol can be

used for the purpose.

**Keywords:** Orange juice, Adulteration, Sugar solution, Near infrared spectroscopy, PLS regression.

224 6:00 hrs

## Timeliness Cost of Planting Field Operations at Badala Farm in Bauchi State Nigeria

B. G. Jahun<sup>1</sup> and S. A. Iya<sup>2</sup>

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The ability to record information during all aspects of crop production will allow collection of enormous amounts of machinery management data. Position and time data were recorded during corn planting in Badala Farm in Bauchi State Nigeria for about 140 ha. Corn was planted using a planter from mid-June to mid-July, 2009 into the ploughed and harrowed crop's field. A questionnaire was used together with the field experiment and evaluated corn planter performance. Vagaries of weather, optimum soil conditions, available field workdays, optimal level of machinery capacity were the most significant explainers of yield variability. Soil ratings, planting time of day, and planting date influenced yields to a lesser extent. Maize yield after harvesting was low to an average of 1.11ton/ha. Estimated number of work field days suitable for planting was 21 days. Operating speed for corn planters was 2.2 Km/h. Field efficiency of row crop planting operations was 80 percent and the mean effective field capacity of the planter was found to be 11.83ha/h with the effective implement width as 6.4m.

**Keywords:** Timeliness cost, Planting, Harvesting, Machinery capacity and crop yield.



## Day 2 — Tuesday, 2 December 2014

|          |                                                                |
|----------|----------------------------------------------------------------|
| Session  | Sustainable Processing and New Resources                       |
| Time     | 10:20 – 01:00 hrs                                              |
| Venue    | Manhattan III                                                  |
| Chair(s) | Dr. Rosnita A. Talib;<br>Assist-Chair: Ms. Nur Hawa Thaharudin |

278 10:20 hrs

### Feasibility of Evaluation of Salt Content in Canned Sardine in Oil by Near Infrared Spectroscopy

Sarocho Srikornkarn<sup>a</sup> and Panmanas Sirisomboon  
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E-mail: <sup>a</sup>s\_mind\_21@hotmail.com

This research applied the Near Infrared Spectroscopy (NIRS) in determination of salt content in canned sardines in oil compared with the traditional method which used auto-titrator. The samples were 25 cans (105g/can) of salt adjusted by adding sodium chloride at different levels (2, 4, 6, 8 and 10g/can) and another 5 cans were not salt adjusted. Scanning was done by FT-NIR spectrometer (12,500-4,000 cm<sup>-1</sup>). The model developed by partial least squares regression provided coefficient of determination, root mean square error of cross validation and bias of 89.99%, 0.143% and -0.003%, respectively. This indicated high possibility in applying NIRS.

**Keywords:** Canned sardine in oil, Near infrared spectroscopy, Salt content, Partial least squares regression, Cross validation.

282 10:40 hrs

### Feasibility Study on Evaluation of Salt Content in Canned Sardine in Brine by Near Infrared Spectroscopy

Sakaow Pongkuan<sup>a</sup> and Panmanas Sirisomboon  
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The application of near infrared spectroscopy (NIRS) in determination of salt content in canned sardines in brine was studied. The samples were 25 cans (155g/can) of salt adjusted by adding sodium chloride at 2, 4, 6, 8 and 10g/can and another 5 cans were not salt adjusted. The blended samples were scanned with FT-NIR spectrometer (12500-4000cm<sup>-1</sup>). Then salt content was measured by auto-titrator. Partial least square regression gave determination coefficient, root mean square error of cross validation and bias of 99.39%, 0.147% and 0.00246%, respectively. The high possibility in applying NIRS was proved.

**Keywords:** Canned sardines, Brine, Salt content, Near infrared spectroscopy, Partial least square regression.

051 11:00 hrs

### Determining Peak-hours of Cooling Requirement for Greenhouse Production of Tomato in Tropical Lowland Condition

Ramin Shamshiri, Wan Ishak Wan Ismail<sup>a</sup> and Desa Ahmad  
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The objective of this work was to determine specific hours of maximum cooling requirement in greenhouse production of tomato. Growth response functions for optimal air temperature at different growth stages were implemented in an adaptive analysis framework. Results indicated that minimum response values occur in sun condition, corresponding to peak-hours of cooling requirements between 11am to 5pm. It was also observed that these peak-hours are associated with minimum levels of relative humidity. This study showed that natural ventilation alone can save be-

tween 65 to 72% in cooling energy for greenhouse at different growth stage of tomato production.

**Keywords:** Greenhouse, Tomato, Growth response, Temperature, Tropical lowland, Sustainability.

229 11:20 hrs

#### Investigation of Biogas Production Potential from Different Species of Grass in Thailand

Pitchaya Suaisom<sup>1,2</sup>, Patiroop Pholchan<sup>1,a</sup> and Pruk Aggarangsi<sup>2</sup>

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<sup>2</sup>Energy Research and Development Institute-Nakornping, Chiang Mai University, Chiang Mai, Thailand

This research was conducted to study methane production from various types of grasses in Thailand. Results showed insignificant difference in chemical compositions among species of grasses. However, Napier Pak Chong 1 (NPC1) had the highest yield per area. Relatively high carbohydrate and low lignin contents made the 45 d-NPC1 favourable for methane production. The highest methane yield of 0.268 Nm<sup>3</sup>CH<sub>4</sub>/kgVS was obtained at C/N=30 and TS=4% from the 45 d-NPC1. Significantly higher methane yield of 0.362 Nm<sup>3</sup>CH<sub>4</sub>/kgVS was obtained from the NPC1 juice. These results showed great potentials of NPC1 to be used as the source for biogas production.

**Keywords:** Biogas, Napier Pak Chong1, Grass, Anaerobic digestion, BMP.

237 11:40 hrs

#### Rupture Forces of Rice Grains at Different Compression Loading Orientations

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Rupture forces of MR 220 CL2 variety rice grains under vertical and horizontal orientations were conducted in a compression test with an Instron 5500 Universal Testing Machine. Strong linear relationships of rice grain rupture forces with the grain moisture content existed. The rupture forces at horizontal grain orientation are 3.5 to 8.4 times greater than at vertical

grain orientation. These forces decreases from 153.71 N to 89.89 N and 43.75 N to 10.65 N with increasing grain moisture content from 11% to 29% at grain horizontal and vertical orientations. Conclusively, rice grains at low moisture content conditions are less susceptibility to breakage losses during the post-handling and post-milling operations.

**Keywords:** Rice grain, Rupture force, Fracture resistance, Grain quality.

264 12:00 hrs

#### Response of Nitrogen Content for Some Varieties of Kenaf Fiber (*Hibiscus cannabinus* L.) by Applying Different Levels of Potassium, Boron and Zinc

Rabar Fatah Salih<sup>1,3,a</sup>, Khalina Abdan<sup>1</sup>, Aimrun Wayayok<sup>1</sup>, Anuar Abdul Rahim<sup>2</sup> and Norhashila Hashim<sup>1</sup>

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<sup>3</sup>Department of Field Crops, College of Agriculture, Salahaddin University, Erbil, Kurdistan Region, Iraq

The aim of this study was to determine the impact of the potassium, boron and zinc on the nitrogen of fiber. Two kenaf varieties namely; FHH 925 and 4383, were planted. Fertilizers (0, 100 and 150), (0, 1.0 and 1.5) and (0 and 5.0) kg/ha, for potassium, boron and zinc were added respectively. The best result was achieved for variety FHH 925 when potassium was added at level of 150 kg/ha, but regarding 4383 was when potassium, boron and zinc were applied at 150, 1.0 and 5 kg/ha, respectively. Based on the results potassium was really suitable for the kenaf

**Keywords:** Nitrogen content, Fiber quality, Fertilizer recommendation rate.

291 12:20 hrs

#### The CDAA Framework for Development of Sustainable Large-Scale Smallholder Irrigation Schemes in Swaziland

N. S. Dlamini<sup>1,a</sup>, M. K. Rowshon<sup>1</sup>, M. Makhanya<sup>2</sup> and S. Sithole<sup>2</sup>

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Poverty affects nearly a billion of the world population

and many of these people are living in rural communities. Smallholder irrigation development plays a pivotal role in reducing rural poverty. Many smallholder schemes have failed in the past due to poor planning and community disputes. This paper presents a promising framework, the CDAA, for developing sustainable smallholder irrigation schemes which is currently applied in the LUSIP project in Swaziland. The strength of the framework is that; 1) it makes the primary beneficiary (community) the main driver of the development, and 2) it significantly changes the economic state of the community.

**Keywords:** Development framework, Irrigation development, Smallholder irrigation, Sugarcane.

**302 12:40 hrs**

#### Improvement in Kenaf Fibre Washing Process using Fibre Clamps

Motaz Hassan Hamed<sup>1</sup>, M. A. Azmah Hanim<sup>1,2</sup> and A. A. Faieza<sup>1</sup>

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<sup>2</sup>Laboratory of Bicomposite Technology, Institute of Tropical Forestry and Forest Products, Universiti Putra Malaysia, Malaysia

Mainly found in Africa and Asia, Kenaf is an herbaceous plant. Fibre produced from this plant is called Kenaf fibre. The objective of this study was to design and build a mechanism for solving fibre movement problem during washing. Results showed that Kenaf fibre surface is smooth and clean as in the SEM results because during the washing process, the fibre is fixed properly to maintain at the same position while the forces of water applied wash away the remnants of the lignin effectively. The design analysis for the material selection related to the fibre clamp prototype was also discussed.

**Keywords:** Kenaf fibre, Prototype, Washing process, Mechanism, Lignin and hemicelluloses.

|          |                                                                    |
|----------|--------------------------------------------------------------------|
| Session  | Processing, Technologies and Innovations                           |
| Time     | 10:20 – 01:00 hrs                                                  |
| Venue    | Bronx V                                                            |
| Chair(s) | Assoc. Prof. Dr Khalina Abdan;<br>Assist-Chair: Ms. Nor Aini Adnan |

**324 10:20 hrs**

#### Human-machine Collaboration for Automated Harvesting of Fresh Market Apples

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Harvest is the most labor-intensive operation in apple orchards, requiring heavy utilization of seasonal labor. The development of robotic technology for harvesting apples and other tree fruit crops has achieved only limited success due to insufficient speed and accuracy of fruit recognition and removal. Lack of such technology is a crucial problem for the long-term sustainability of the apple industry because the cost of labor continues to increase and the availability of the labor force is becoming increasingly uncertain.

**093 10:40 hrs**

#### Pectin Extraction from Pummelo (Citrus Grandis L. Osbeck) Peels Using Ultrasound-Assisted Extraction

N. J. Firdouse<sup>1</sup>, N. N. A. K. Shah<sup>2</sup>, R. A. Rahman<sup>1,2,3</sup> and B. S. Baharin<sup>1,4</sup>

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Pummelo peels are a good source of pectin. This study explored the effect of sample-to-solvent ratio (SR), time, temperature and pH, on pectin extraction from pummelo peels, using ultrasound. Pectin yield ranged from 7.26 % to 38.74% of the dried pummelo peels. SR and time had negative effect ( $p < 0.05$ ) on pectin yield. Temperature gave positive effect ( $p=0.000$ ), while pH had no significant effect on pectin yield ( $p > 0.05$ ) but pH interacted with other factors (sample-to-solvent ratio and time) to give significant effect ( $p < 0.005$ ) on pectin yield. Pectins produced have  $54.64 \% \pm 0.503$

degree of esterification, with  $67.37 \% \pm 1.88$  galacturonic acid content.

**Keywords:** Pectin, Galacturonic acid, Pummelo, Degree of esterification, Citrus, Ultrasound.

097 11:00 hrs

## **In-Vitro Dissolution of Compressed Tamarind and Pineapple Powder Tablets**

A. M. Taufiq<sup>1</sup>, Y. A. Yusof<sup>1,a</sup>, N. L. Chin<sup>1</sup>, S. H. Othman<sup>1</sup>, A. Serikbaeva<sup>2</sup> and M. G. Aziz<sup>3</sup>

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<sup>3</sup>Department of Food Technology and Rural Industries, Bangladesh Agricultural University, Mymensingh, Bangladesh

Tamarind and pineapple fruit powders dissolution properties are important as it depends on time taken for it to dissolve. Both powders produced from spray drying with addition of 10% w/v of maltodextrin. The tamarind and pineapple fruit powders were then compressed into tablets with applied force of 28.65MPa. A dissolution tester was used for *in-vitro* dissolution studies. These findings indicate the moisture content, bulk density, tapped density and water activity showed a significant difference at  $p < 0.05$ . Thus, it is important to compress fruit powder into tablet form as it easy to dissolve and provide healthy beverages to meet consumer's demand.

**Keywords:** In-vitro dissolution, Tamarind, Pineapple, Fruit powder.

092 11:20 hrs

## **Effects of Physicochemical Characteristics of Pummelo Fruit Juice Towards UV Inactivation of *Salmonella Typhimurium***

Nor Nadiah Abdul Karim Shah<sup>1</sup>, Rosnah Shamsuddin<sup>1,a</sup>, Russly Abdul Rahman<sup>1,2,3</sup> and Noranizan Mohd Adzahan<sup>2</sup>

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There is substantiated evidence that Ultraviolet (UV) light reduces the level of microbial contamination for

a wide range of liquid foods and beverages. However, the major disadvantage of UV light is the limitation of light penetration. Liquid foods have been known to absorb inadequate UV light due to its physicochemical properties. These attributes largely depend on suspended matters, organic solutes and color compounds of liquid foods. Subsequently, these factors will lower the performance efficiency of UV pasteurization. This study examined the effects of physicochemical properties of pummelo fruit juice towards inactivation of *Salmonella typhimurium*.

**Keywords:** Dean vortex ultraviolet pasteurization, *Salmonella typhimurium*, Absorption coefficient, Pummelo fruit juice.

206 11:40 hrs

## **Encapsulation of Anthocyanin from Roselle and Red Cabbage for Stabilisation of Water-in-Oil Emulsion**

Dayang Norulfairuz Abang Zaidel<sup>1</sup>, Nur Shakira Sahat<sup>1</sup>, Yanti Maslina Mohd Jusoh<sup>1</sup> and Ida Idayu Muhamad<sup>b</sup>

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Addition of encapsulated anthocyanins in margarine formulation improved the stability of margarine. In this study, investigation on the storage and stability characteristics of water-in-oil emulsion, i.e. margarine, containing encapsulated or non-encapsulated anthocyanins from roselle and red cabbage was carried out. Encapsulation of anthocyanins was performed using microwave-assisted technique to study the dispersion and stability of anthocyanins in the margarine. Margarines were formulated with three different oil-to-aqueous ratios (75:25, 80:20, and 85:15). The stability of the margarine was determined by using Solid Fat Content, thermal and phase stability analysis. Margarine containing encapsulated anthocyanin showed improved stability compared to non-encapsulated anthocyanin.

**Keywords:** Anthocyanin, Emulsion, Margarine, Stability.

131 12:00 hrs

#### Evaluation of System Rice Intensification (SRI) Cultivation In Tanjung Karang

Bala Ibrahim<sup>1</sup>, Wan Ishak Wan Ismail<sup>1</sup>, Norhashila Hashim<sup>1</sup> and Muhamad Saufi Mohd Kassim<sup>2</sup>

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Experiments were conducted at Tanjung Karangrice irrigation project to assess the performance of modified planting claw (kuku-kambing) to single seedling transplanting. The objective of this study was to develop a modified transplanter for agricultural system for operation in paddy fields. The seedlings were transplanted at 14 days old with different hill systems, each having 75 grams of seeds per tray were used in the research phase. The spacing of 30cm×24cm produces the least number of missing hills with higher percentage of single seedlings and more tillers per plant.

**Keywords:** Rice, System of rice intensification, Young seedlings, Transplanter, Transplanting.

133 12:20 hrs

#### Immobilization of Cyclodextrin glucanotransferase into Polyvinyl Alcohol (PVA) Nanofibres via Electrospinning

Suryani Saallah<sup>1,2</sup>, M. Nazli Naim<sup>1,a</sup>, Mohd. Noriznan Mokhtar<sup>1</sup>, Noor Fitrah Abu Bakar<sup>3</sup>, Masao Gen<sup>4</sup> and I. Wuled Lenggoro<sup>4,5</sup>

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<sup>5</sup>Graduate School of Bio-Applications and Systems Engineering, Tokyo University of Agriculture and Technology, Japan

A novel work for immobilization of cyclodextrin glucanotransferase (CGTase) in nanofibres demonstrated. CGTase solution (1% v/v) and PVA (8 wt%) solution were mixed followed by electrospinning (-9 kV, 60 min). CGTase/PVA fibres with an average diameter of 176 ± 46 nm were successfully produced. The fibres consist of immobilized CGTase

were crosslinked with glutaraldehyde vapor. A CGTase/PVA film made up from the same mixture and treated the same way was used as a control. The immobilized CGTase in nanofibres showed superior performance with nearly 2.5 fold higher enzyme loading and 31% higher enzyme activity in comparison with the film.

**Keywords:** Nanofibres, Immobilization, CGTase, Electrospinning, Cyclodextrins.

065 12:40 hrs

#### Effects of Tillage Systems on Soil Water Retention and Infiltration of UPM Research Farm

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The present study investigates water infiltration (WI) and water retention (WR) at two depths of 0-10 cm and 20-30 cm as affected by different tillage systems. The experiments were carried out on the sandy clay loam soil texture, Serdang series (*Typic Paleodults*) at University Putra Malaysia (UPM) Research Farm under corn-corn rotation, in 2008 and 2009. The four tillage treatments were conducted using i) Mouldboard Plough followed by one time tandem disc harrowing (MP), ii) Disc Plough followed by one time tandem disc harrowing (DP), iii) Rotary Cultivator (RC) and iv) No-Tillage (NT) as control. The experiments were performed using a 4×2 factorial treatment based on Randomized Complete Block Design. The results showed tillage methods had significant effects on WR at p<0.05 and WI at p<0.01.

**Keywords:** Field capacity, Moisture content, Tillage, Water infiltration, Wilting point.



|          |                                                                              |
|----------|------------------------------------------------------------------------------|
| Session  | Health, Nutrition and Wellness                                               |
| Time     | 10:20 – 01:00 hrs                                                            |
| Venue    | Bronx VI                                                                     |
| Chair(s) | Assoc. Prof. Dr Norashikin Abdul Aziz;<br>Assist-Chair: Ms. Anisa Mohd Yusoh |

144 10:20 hrs

#### Nitrite, Nitrate and Colour Analysis of Malaysian Edible Bird's Nest

Meei Chien Quek<sup>1</sup>, Nyuk Ling Chin<sup>1,a</sup>, Yus Aniza Yusof<sup>1</sup>, Sheau Wei Tan<sup>2</sup> and Chung Lim Law<sup>3</sup>

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Eight local edible bird's nests were purchased to evaluate its nitrite and nitrate contents using ion chromatography system and its colour using the CIE system in L\*a\*b\* parameters. The nitrite content obtained ranged from 5.7 µg/g for the house nests to 843.8 µg/g for the cave nests. The cave nests with darker colour had higher nitrite and nitrate contents than the brighter house nest suggesting that the nitrite and nitrate contents may have correlations with the colour of edible bird's nests. These findings suggest that colour may be a useful indicator for measuring nitrite and nitrate contaminations.

**Keywords:** Nitrite, Nitrate, Color, Ion chromatography, Edible bird's nest.

181 10:40 hrs

#### Hypocholesterolemic and Hypoglycemic Effect of Cowpea (*Vigna Unguiculata* L. Walp) Incorporated Experimental Diets in Wistar Rats (*Rattus Norvegicus*)

Pabodha Weththashghe<sup>1</sup>, Ruvini Liyqe<sup>2,a</sup>, Janak Vidanarachchi<sup>1</sup>, Oshini Perera<sup>2</sup> and Barana Jayawardana<sup>1</sup>

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This study was carried out to investigate the hypocholesterolemic and hypoglycemic effect of four cow-

pea cultivars. Wistar rats were grouped and fed high fat diet with 20% Bombay (BO), 20% MI 35 (MI), 20% Waruni (WA), 20% Dawala (DA) in comparison with 20% casein (HFD). Serum total cholesterol, non-HDL cholesterol, triacylglyceride and glucose concentrations and serum antioxidant activity were analysed. Serum lipids, glucose concentrations and serum antioxidant activity in WA fed rats were significantly lower ( $P < 0.05$ ) than HFD. Therefore, raw Waruni cowpea produced significant hypolipidemic and hypoglycemic effects in Wistar rats.

**Keywords:** Cowpea, Wistar rats, Cholesterol, Hypolipidemic effect, Hypoglycemic effect.

249 11:00 hrs

#### Effects of Noise Pollution on the Psychological Health of Agricultural Tractor Operators

Muhammad Yamin<sup>1</sup>, Zohaib Yousaf<sup>2</sup>, Wan Ishak bin Wan Ismail<sup>3</sup>, Khalid Mahmood Bhatti<sup>4</sup> and Muhamad Saufi bin Mohd Kassim<sup>5</sup>

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A field study was performed in Faisalabad and Narowal districts of Pakistan to investigate the propagation of tractor noise and its psychological effects on the health of tractor operator. Land scraper, cultivator, disc harrow and seed drill were employed to find the noise levels of MF-260 (44.74 kW) turbo tractor at two speeds of 5.3 and 10.6 km/h involving five distances from tractor in four directions. Disc harrow and cultivator which consume more power were found to be noisiest and health damaging implements because during their operation, operator was exposed to high noise intensities of 86.9 and 84.9 dB respectively.

**Keywords:** Noise intensity level, Noise propagation, Physical effects, Psychological health, Social relations.

279 11:20 hrs

# **Application of Near Infrared Spectroscopy for Detection of Steroids Adulteration in Traditional Thai Medicines**

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Traditional Thai Medicines products (TTM) are used widely in elderly Thai patients and have been found to be adulterated with steroids. This study was focused on the application of Near-Infrared (NIR) spectroscopy to identify the adulteration of TTM by steroid. One hundred and ten samples were prepared with pure TTM and 10 different concentrations of steroid (0.25 - 5, mg steroid/g TTM). The Fourier Transform near infrared (FT-NIR) spectrometer was used to scan TTM samples. Adopting a qualitative approach with spectral data and applying PCA, it was possible to discriminate among the groups. With PLS, the steroid content was also quantified.

**Keywords:** Traditional thai medicines, Adulteration, Steroids, PLS regression, Principle component analysis, Near infrared spectroscopy.

307 11:40 hrs

# **Effect of the Season on the Fatty Acid Composition of Lipids Camel Milk**

A. D. Serikbayeva<sup>1,a</sup>, M. Kh. Narmuratova<sup>2</sup>, G. Narmuratova<sup>3</sup>, Zh. K. Tulemisova<sup>1</sup> and Zh. M. Suleimenova<sup>1</sup>

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The composition of fatty acids in the lipids of camel milk, depending on the season. Observed fluctuations containing certain fatty acids, depending on the season. During the year the content of saturated fatty acids varies greatly. Observed fluctuations in the concentration of butyric acid in a year, in spring and autumn, its content increased 0.2 % and 0.3 %, respectively. The same concentration of hexanoic acid (0.1%) contain winter, spring and summer collecting samples of milk. Spring content with caprylic acid (C8) is increased by 2 times than in winter and spring. Content

of capric acid (C10) in winter and spring up 23.2% and 25.6 %, respectively, decreasing to 4.8% in the summer and autumn rising to 7.8 % ( $P \leq 0,05$ ). Summer milk samples rich in palmitic acid (C16) 29.0%. Autumn milk samples are characterized by high concentration of saturated fatty acids, due to the presence of myristic (16.6 %) and stearic acid (23.5 %) ( $p \leq 0,05$ ).

Spring, summer and winter samples of camel milk fat contain "useful" a combination of fatty acids. From the fatty acid composition of milk fat camel milk can be explained by some dietary properties of camel milk has long known and used in traditional medicine, but do not have to date scientifically sound explanation.

**Keywords:** Camel milk, Fatty acids, Lipids, Season, Monounsaturated fatty acids, Polyunsaturated fatty acids.

211 12:00 hrs

# **Quality of Iraqi Camel Milk Fermented by *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus***

Hussein L. Alghoory<sup>1,a</sup>, Amir K. Al-Darwash<sup>2</sup>, Eman M. Jarallah<sup>3</sup>, Belal J. Muhialdin<sup>4</sup> and Nazamid Saari<sup>4</sup>

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Camel milk is well known for heal promoting and been used for centuries. In this study, 5% starter of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* (50:50) inoculated to camel milk and incubated at 42°C for 6h. The initial pH was 6.7 and the peptide content was 0.161 mg/ml. After six hours of incubation the viable starter cells were 10<sup>7</sup>cfu/ml, the pH value was 4.2 and lactic acid concentration was 0.89%. The peptides content was 0.702 mg/ml as determined by O-Phthaldialdehyde assay. The quality of the fermented product was evaluated by expert food scientist. On scale of 10, the flavor awarded 8.9, Acidity, appearances, bitterness, and color awarded 9.5 scores, while texture was awarded 6.8. This study demonstrates that fermented camel milk can be used as health promoting product due to the high peptide content and the acceptable quality of the fermented product.

**Keywords:** Camel milk, Iraqi sour milk, Starter, Peptide.

280 12:20 hrs

## Detection of Adulteration of Soy Sauce by Brine Using Near Infrared Spectroscopy

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Near infrared spectroscopy was applied for determination of adulteration of soysauce with brine. Thirty samples with 5 brands were bought from department stores and flea markets. Five samples were fabricated of 20 %w/w brine, mono sodium glutamate and black soysauce. Thirty five samples of 7 levels of 20 % brine adulterated (10, 20, 30, 40, 50, 60 and 70 %) were prepared. Each sample was scanned with FT-NIR spectrometer. A PLS regression model for percentage of brine adulterated provided  $R^2$ , RMSEP, RPD and bias 92.73 %, 6.42 %, 4.61 % and 3.81, respectively.

**Keywords:** Soy sauce, Adulteration brine, PLS regression, Near infrared spectroscopy.

290 12:40 hrs

## Encapsulation of Freeze-Dried Vitamin E with Selenomethionine Using Different Wall Materials and Evaluation on Its Properties

Nurul Asmak Md Lazim<sup>1</sup>, Razauden Mohamed Zulkifli<sup>2,3</sup> and Ida Idayu Muhamad<sup>1,3,a</sup>

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<sup>2</sup>Department of Biosciences and Health Sciences, Faculty of Biosciences and Medical Engineering, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia

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In this study, vitamin E consists of 22.9 % tocopherol and 77.1 % tocotrienols was encapsulated with natural polysaccharides and gelling agent as wall materials and freeze-dried to form powder with final moisture content between  $1.37 \pm 0.45$  and  $6.27 \pm 0.58$  percent. The purpose was to enhance the protection of antioxidant activity and improve its activity. From DPPH analysis, it was found that antioxidant value was decreased for formulation containing seleno element compared to Vitamin E encapsulated. In average, the optimum core retention was 42.4%, meanwhile, their sizes were ranging from 2.6 to 6.7  $\mu\text{m}$ .

**Keywords:** Vitamin E, Encapsulated, Freeze-dry, Antioxidant activity, DPPH.

|          |                                                                                |
|----------|--------------------------------------------------------------------------------|
| Session  | Modelling, Simulation and Control                                              |
| Time     | 02:00 – 04:40 hrs                                                              |
| Venue    | Manhattan III                                                                  |
| Chair(s) | Dr Dayang Norulfairuz Abang Zaidel (UTM); Assist-Chair: Ms. Nur Hawa Tharuddin |

283 2:00 hrs

## An Integrated Modelling Framework for Water Resources Management in Newly Developed River Basin in Malaysia.I – Development of a Local Model to Assess Climate Change and Watershed Development Impacts on Water Security

Amjad Nabi<sup>1</sup> and Mohd Amin Mohd Soom<sup>2</sup>

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A conceptual model HuTVeC was developed to evaluate effects of climate and vegetation changes on water yield in a catchment in this region. A distributed parameter modelling approach was used whereby a catchment was subdivided into relatively homogeneous ground response units (GRUs) to provide distributed parameter capabilities. Climate scenarios based on the GCM prediction for this region were applied on the Trolak catchment of the Bernam River basin. The results showed that this framework is an effective and practical integrated approach to assess the impacts of climate and vegetation changes on the hydrologic response of a catchment in wet tropics.

**Keywords:** Hydrological modelling, Climate change, Land use change, Wet humid tropical catchment, Bernam basin, Malaysia.

297 2:20 hrs

## A Preliminary Study: Kinetic Model of Drying Process of Pumpkins (*Cucurbita Moschata*) in a Convective Hot Air Dryer

Norhashila Hashim<sup>1,a</sup>, Onwude Daniel<sup>2</sup> and Ezdalina Rahaman<sup>1</sup>

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Drying of pumpkin (*Cucurbitamoschata*) was investigated experimentally using a hot air convective dryer. 30 samples of pumpkin with thickness of 2mm and 4mm were subjected to 11 hours drying at temperatures 50°C, 60°C and 70°C respectively. The drying data were fitted to the Moisture Ratio (MR) models, which produced  $MR = a \exp^{-kt}$  as the model of prediction. Selection of the best model was investigated using statistical analysis of variance, carried out via SPSS 17.0. Lewis, Henderson and Pabis models gave the best prediction with  $R$  (97.1%),  $R^2$  (94.2%),  $SSE$  (0.577) and  $R$  (95.7%),  $R^2$  (91.6%),  $SSE$  (0.703) respectively.

**Keywords:** Pumpkin, Convective drying, Thin layer drying, Drying kinetics, Modeling, SPSS.

306 2:40 hrs

#### Mesoscale Modeling and Simulation of Heat and Mass Transfer in Oil Palm Fruit Digestion Process

R. Yunus<sup>1,2</sup>, Noerhidajat<sup>1</sup>, Z. A. Zurina<sup>1</sup>, S. Syafie<sup>1</sup> and T. S. Chang<sup>1</sup>

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This paper describes simulation of the transport phenomena during digestion process of oil palm fruits using Comsol Multiphysics software ver. 4.4. The measured average water diffusivity coefficients of sterilized oil palm fruits were 3.03E-09 m<sup>2</sup>/s, 2.4545E-08 m<sup>2</sup>/s, and 9.433E-09 m<sup>2</sup>/s for intact fruits, a-b axis sliced, and c-axis sliced fruits respectively. The diffusivity coefficients of oil release from mesocarp were 1.04E-08 m<sup>2</sup>/s, 4.5578E-09 m<sup>2</sup>/s, and 4.083E-09 m<sup>2</sup>/s respectively. For simulation purposes, the fruit was modeled as a half ellipsoid shape. Digestion time was 30 minutes and the initial bulk and fruit temperatures were at 95°C and 28°C respectively.

**Keywords:** Digestion process, Oil palm fruit, Model, Comsol multiphysics, Simulation.

176 3:00 hrs

#### Deep Bed Drying Simulation of Palm Kernel

Mina Habibi Asr<sup>1,a</sup>, Mohd. Nordin Ibrahim<sup>1,b</sup>, Mohd Noriznan Mokhtar<sup>1,c</sup>, Khairul Faezah Md. Yunos<sup>1,d</sup> and Nuzul Amri Bin Ibrahim<sup>2</sup>

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Current method of palm kernel drying in palm oil industry is silo drying in which kernels are dried in a stationary silo in a deep layer with passage of hot air for some hours; then dried palm kernels are discharged. Thus silo drying of palm kernels is in intermittent deep bed drying mode. The aim of this study was to calculate the heat and mass transfer between air and palm kernel in deep bed dryer by simulation. An existing computer program was modified and used. Moisture content, temperature of kernel, temperature, relative humidity of air during drying was predicted.

191 3:20 hrs

#### Reaction Kinetics of Cocoa Polyphenols Degradation During Drying

Ching-Lik Hii

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The aims of the studies were to investigate the reaction kinetics of cocoa polyphenols during drying at 60-80°C. Total polyphenols were analysed for nib and shell layers. Results showed that the reaction kinetics can be modelled using a first order reaction. Final total polyphenols contents determined were within 20 – 43.6 mgGAE/g dry solid for the nib and 3 – 3.7 mgGAE/g dry solid for the shell, respectively. Activation energies were estimated at 31.3 kJ/mol and 17.1 kJ/mol for the nib and shell layers, respectively.

090 3:40 hrs

**Effects of Spray Drying Conditions of Microencapsulation of *Amaranthus Gangeticus* Extract on Drying Behaviour**

P. H. Chong<sup>1</sup>, Y. A. Yusof<sup>1,a</sup>, M. G. Aziz<sup>1,2</sup>, N. Mohd. Nazli<sup>1</sup>, N. L. Chin<sup>1</sup> and S. K. Syed Muhammad<sup>3</sup>

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<sup>3</sup>Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, UPM Serdang, Selangor, Malaysia

The aim of the study is to investigate the drying behaviour of spray-dried betacyanin pigment powder extracted from *Amaranthus gangeticus* as influenced by spray drying conditions which include inlet temperature, feed concentration and feed flow rate.  $\beta$ -cyclodextrin and maltodextrin were used as encapsulating agents. Central composite design was applied to model spray drying process with seventeen and thirteen formulations were conducted, respectively. Several parameters including feed moisture, powder moisture, drying ratio, productivity, surface tension, density and viscosity of feed were determined experimentally. The drying rate, droplet size and drying time of *A. gangeticus* extracted betacyanins were investigated during spray drying.

**Keywords:** *Amaranthus gangeticus*, Betacyanins,  $\beta$ -cyclodextrin, Maltodextrin, Central composite design, Spray drying, Drying rate, Droplet size, Drying time.

056 4:00 hrs

**A Comparative Evaluation of Rotavator Weeding Mechanisms under System of Rice Intensification (SRI)**

S. Suleiman<sup>1</sup>, B. W. I. Wan Ishak<sup>1,a</sup> and M. K. Muhamad Saufi<sup>2</sup>

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The objective of this research was to evaluate four different types of local SRI rotavatorsthat control weeds at different paddy growth stages. Experimental field was located at Tanjun Karang Irrigation Scheme, Malaysia. A split plot design with four main plots and four sub plot treatments (speed levels) was used,

with four replications. Results showed that due to low ground clearance, all four treatments were unable to weed at 40 days of Transplanting (DAT). Theeffect of machine revolution per minutes on weeding efficiency, field capacity and crop damage indicates significance at 0.05 levels.

**Keywords:** Rotavator, Evaluation, Weeding, System of Rice Intensification (SRI), & Paddy.

308 4:20 hrs

**Effect of Encapsulation Material on Quality and Bioactive Peptides of Spray Dried Black Tilapia (*Oreochromismossambicus*) Hydrolysate**

Jamilah Bakar<sup>1,2</sup> and Chan Zhi Fang<sup>1,2</sup>

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Tilapia hydrolysate was spray dried at 150 °C/ 96 °C (inlet/outlet temperature) with maltodextrin and its combination with 5 % gelatin as wall material. Out of the six treatments evaluated, treatment 3 (30 % maltodextrin) had the highest yield (~24.5 %) while treatment 4 (15 % maltodextrin + 5 % gelatin) had the lowest yield (~ 13.1 %). Powders had moisture content of 2.5 to 3.0 % with water activities  $\leq 3.0$ . Particle size distribution of powders was in the range of 1-40  $\mu\text{m}$ . The DPPH and antioxidative values were highest in treatment 4, which was also the best wall material.

**Keywords:** Encapsulation, Spray drying, Tilapia hydrolysate, Bioactive peptides.

|          |                                                                       |
|----------|-----------------------------------------------------------------------|
| Session  | Processing, Technologies and Innovations                              |
| Time     | 02:00 – 04:40 hrs                                                     |
| Venue    | Bronx V                                                               |
| Chair(s) | Assoc. Prof. Dr Rosnah Shamsudin;<br>Assist-Chair: Ms. Nor Aini Adnan |

322 2:00 hrs

**Individual Control of Orchard Trees:Elemental TechnologiesTargetingBlueberry Bushes**

Tadashi Chosa

Tokyo University of Agriculture and Technology, Japan. E-mail: chosa@cc.tuat.ac.jp

The condition of a crop varies depending on the climate, soil, and other factors. Crop management has to

be based on such information and not simply follow a yearly schedule.

We evaluated the changes in stem diameter continuously and non-destructively. We observed thickening growth and periodical increases and decreases. We also devised an individual cooling and heating method. The individualized management of temperature should contribute to controlling fruit quality and reduce the energy required for greenhouse control. Investigations monitoring the reactions of blueberry plants and research to develop new technologies are on-going.

163 2:20 hrs

#### Physical Properties of Spray-Dried Pink Guava (*Psidiumguajava*) Powder

M. R. I. Shishir, F. S. Taip<sup>a</sup>, N. A. Aziz and R. A. Talib

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Spray drying of pink guava puree is important for preservation, volume reduction and prolongation of its shelf-life. This investigation was carried out to assess selected physical properties of its powder dried using lab plant spray dryer SD-05. The juice (brix  $10.0 \pm 0.1$ ) of pink guava puree was mixed with MD at 10%, 15% and 20% and dried using temperatures 150, 160 and 170°C at feed flow rate 350 ml/hr. Quality powder in terms of final moisture content, particle size, powder yield, bulk density, tapped density, flowability and color was found to be yielded at drying temperature of 150°C with 15% maltodextrin.

**Keywords:** Pink guava puree, Spray drying, Maltodextrin DE 10, Physical properties.

130 2:40 hrs

#### Influence of Drying Process on the Mushroom (*Lentinulaedodes*) Protein Hydrolysate Properties

Pasakawee Krittalak<sup>a</sup>, Banjongsinsiri Panida, Lekhavat Supaporn, Noojuy Nowwapan, Taksima Takunrat and Srimongkoluk Ubolwanna

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Spray-dried and freeze-dried mushroom protein hydrolysates (SD-MPH and FD-MPH) prepared by papain enzyme were evaluated for the physicochemical properties, antioxidant activity, and angiotensin-

I converting enzyme (ACE) inhibitory. The results showed that SD-MPH had a higher protein content and a\* value than that of FD-MPH ( $p < 0.05$ ). The Principle Component Analysis (PCA) showed two separated clusters between SD-MPH and FD-MPH. Most of amino acids loss was affected by drying process, except aspartic acid. High antioxidant activity was found in both MPHs, whereas FD-MPH had low ACE inhibitory activity. There is a potential application of mushroom protein hydrolysate in functional food products.

**Keywords:** Lentinula edodes, Mushroom protein hydrolysate, Properties, Spray drying, Freeze drying.

223 3:00 hrs

#### Effect of Kappa Carrageenan and Glycerol in Purple Sweet Potato Starch Based Edible Film

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The solubility and mechanical properties of purple sweet potato (PSP) starch based edible films are being investigated. The formulation was prepared using constant amount of PSP starch (4 % w/v) with five different ratios of carrageenan and glycerol (1:1, 1.5:0.5, 0.5:1.5, 0.5:0.5, 1:0) which act as gelling agent and plasticizers respectively. PSP starch generates 61.79 mg/100 g anthocyanin and retains 16.78 % antioxidant capacity. Carrageenan and glycerol (0.5:1.5) ratio shows the highest solubility in water ( $53.50 \pm 0.1085$  %) and highest tensile strength ( $9.1674 \pm 0.5399$  MPa) with the lowest elongation at break ( $20.436 \pm 2.826$  %).

**Keywords:** Purple sweet potato, Edible film, Carrageenan, Solubility, Mechanical properties.

212 3:20 hrs

#### Analyzing Fertility Effect on Growth and Yield of *Amaranthus curentus* in Nigeria

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The behavioural effect of different types of fertilizer application on *Amaranthus curentus* was examined. One organic and inorganic fertilizer each was considered for this study. Standard rates of cow dung; NPK and control (no fertilizer) were administered to



a  $5 \times 5\text{m}^2$  plot using randomized complete block design (RCBD). Parameters measured were plant height, leaves number, biomass and edible yield. NPK was outstanding in all treatments during the experiment going by the responses. Usage of raw cow dung was not encouraged due to the possibility of *Escherichia coli* and NPK has proved to be the most suitable fertilizer.

**Keywords:** Amaranthus, Cow dung, NPK, Vegetable, Akure.

268 3:40 hrs

**Effect of Solvent Concentration, Sample Particle Size and Solid to Liquid Ratio on Radio Frequency Assisted Extraction (RFAE) of Apple Peel Phenolic Compounds and Process Optimization**

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A new method for recovering bioactive compounds using radio frequency heating technology was highlighted in this work. The effects of solvent concentration (0.500 to 2.000 mM aqueous hydrochloric acid), sample particle size (0.250 to 0.750  $\mu\text{m}$ ) and solid to liquid ratio (0.002 to 0.02 g/ml) on the quality of crude apple peel extract recovered using radio frequency assisted extraction (RFAE) were investigated. The quality of the crude extract were assessed using the amount of total phenolic compounds (TPC), total flavonoids contents (TFC) and antioxidant ability (DPPH). Response surface methodology was employed for experimental design and analysis. Three significant and reliable models for predicting TPC, TPC and DPPH were obtained. The multi-response optimization step suggests that the highest quality of crude apple peel extract with overall desirability of 91.00 % which corresponds to TPC of 2.37 mg GAE/g DM, TFC of 1.23 mg CAT/g DM and 79.84 % DPPH inhibition could be obtained if the extraction is performed using 1.25 mM hydrochloric acid, apple peel particle with the size of 0.6  $\mu\text{m}$  and solid to liquid ratio of 0.002 g/ml.

**Keywords:** Radio frequency assisted extraction, Phenolic compounds, Apple peel, Solvent concentration,

Particle size, Solid to liquid ratio, Optimization.

068 4:00 hrs

**Tableting and Dissolution Characteristics of Mixed Fruit Powder**

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<sup>2</sup>Department of Food Technology and Rural Industries, Bangladesh Agricultural University, Mymensingh, Bangladesh

In this study four types fruit powder were mixed together in a 1:1 ratio and tableting was carried out by direct compaction method. Two types tablet were produced, normal mix fruit powder tablet and fruit powder effervescent tablet. Compressibility of the powder mixtures were observed by using Kawakita and Lüdde equation. Normal fruit powder mixture was more compressible rather than fruit powder mixture with effervescent agent. Dissolution test was carried out in the dissolution medium of distilled water and simulated saliva fluid at room temperature and 37.5°C temperature, respectively. Fruit powder effervescent tablet was dissolved faster in simulated saliva.

**Keywords:** Tableting, Mix fruit powder tablet, Dissolution, Fast dissolving tablet.

274 4:20 hrs

**Comparison Study of Two Different Isolation and Purification Method for Rice Tungro Bacilliform Virus (RTBV)**

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This paper studies two different virus purification method for Rice Tungro Bacilliform Virus. In the first method, infected samples were extracted using liquid nitrogen with mixture of 10% Cellulases whereas the second method used alternate spinning of the infected samples at high and low speed with 5% Cellulases.

Viral particles from both methods were examined by transmission electron microscopy (TEM) and rod-shaped with rounded ends was only seen on samples that were extracted with method 2. The estimated purity and concentration of method 2 is higher compare to method 1 which are 1.608mg/ml and 1.363 and 0.565mg/ml and 0.958 respectively.

**Keywords:** Tungro disease, Rice Tungro Bacilliform Virus (RTBV), Rice Tungro Spherical Virus (RTSV).

|          |                                                                        |
|----------|------------------------------------------------------------------------|
| Session  | Bio-products and Waste Management                                      |
| Time     | 02:00 – 04:40 hrs                                                      |
| Venue    | Bronx VI                                                               |
| Chair(s) | Prof. Dr Mohd Rashid Mohd Yusof;<br>Assist-Chair: Ms. Anisa Mohd Yusoh |

102 2:00 hrs

#### Characterization of Jackfruit (*Artocarpus heterophyllus*) Waste Pectin as Influenced by Various Extraction Conditions

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Pectin was extracted from jackfruit (*Artocarpus heterophyllus*) waste using three different extraction conditions to assess its potentiality as an alternative source of commercial pectin. Jackfruit waste was treated separately with ammonium oxalate, dilute sulphuric acid and sodium hexametaphosphate. The pectin obtained from these methods was compared in terms of yield, physicochemical properties and chemical structure. Among the three solvents, extraction with sodium hexametaphosphate gave the highest yield, however it contained high ash and showed the lowest solubility. Fourier transform infrared spectroscopy of jackfruit waste pectin irrespective of extraction condition revealed a similar surface structure to commercial pectin.

**Keywords:** Pectin extraction, Jackfruit waste, Yield, FTIR, Physicochemical properties.

154 2:20 hrs

#### Characteristics of Particulate Emission from a Biomass Fired Boiler

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This study evaluates the emission characteristics of particulate emission from a palm waste biomass fired boiler with a capacity of 13,600 kg steam/hr. The average particle emission concentration obtained at stack was  $5.84 \pm 1.88 \text{ g/Nm}^3$  @ corrected to 7% oxygen. It was found that 3.22% and 12.5% of the average particulate concentration is attributed to PM<sub>2.5</sub> and PM<sub>10</sub> i.e particulate size fraction of less than 2.5 and 10 microns, respectively. Notably, 26% of the PM<sub>10</sub> concentration is accounted by the finer size fraction of PM<sub>2.5</sub>, which is not easily removed by the existing particulate control device. Meanwhile, the SEM analysis revealed the presence of different shaped particles.

**Keywords:** Air pollution, Emission factor, Fine particle, Fly ash, Stack sample, Multi-cyclone.

241 2:40 hrs

#### Composting of Steam Pretreated Shredded Oil Palm Empty Fruit Bunches with Palm Oil Mill Effluent and Chicken Manure as Added Amendments

N. H. Che Hamzah<sup>1</sup>, A. Yahya<sup>2</sup>, A. S. Baharuddin<sup>1</sup>, H. Che Man<sup>1</sup>, N. H. Abu Hassan<sup>1</sup> and F. N. Abdul Rashid<sup>1</sup>

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Effects of steam pre-treatment, chicken manure or palm oil mill effluent (POME) addition as amendments, and effective microbes (EM) usage in the composting of shredded oil palm empty fruit bunch (EFB) fibers were investigated under an indoor environment. The composting materials in their respective plastic containers were regularly turned and watered, and also monitored for moisture content, temperature, oxygen content, bulk density, chemical compositions and tensile strength. This conducted study was able to conclude that both pressure pre-treatment and organic amendments addition were found to have significant effects on hastening the composting process and im-

proving the final compost quality.

**Keywords:** Composting, Oil palm empty fruit bunch, Steam pre-treatment, Amendment, Compost.

**245 3:00 hrs**

#### **Assay Plant as Natural Antioxidant of Capparis Spinosa Root Bark**

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<sup>2</sup>Department of Animal Resources, College of Agriculture, Baghdad University, Iraq

Root bark of *Capparis spinosa* L.(CS) was used in this study, CS is one of the most aromatic plants in wild in the dry region around the west, central Asia and the Mediterranean basin. It contains a wide range of phytochemical constituents. The present study detected active compounds in root bark, flavonoids, glycosides, tannins and alkaloids, all these gave positive test. As well as determination of total phenols in aqueous and ethanolic extracts (RBAA), (RBEA), 8.712 and 5.781%, also flavonoids 8.154 and 5.385% respectively. Evaluated antioxidant activity of RBAE and RBEE in vitro by two applications (1) reducing power of RBAE that, 74.289% more than of RBEE, 67.331% according to reference BHT, 93% at 10 mg/ml. While RBAE and RBEE were exhibited less chelating ability (2 application) less than reducing power for two extracts. RBAE showed higher chelating ability 51.504% compared to RBEE 35.210% at 10 mg/ml concentration depending on EDTA as reference.

**Keywords:** *Capparis spinosa*, Antioxidant activity, Active compounds, Phenolic constituent.

**258 3:20 hrs**

#### **Suitability of Coir Fibers as Pulp and Paper**

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This study was to investigate the suitability of coir fibers as an alternative material in making pulp and paper. Maceration process was used to characterize the fiber. Soda-AQ pulping with various combinations of active alkali (18-22%) and cooking time (90-150 minutes) at fixed temperature was done. Physical properties evaluated were density, brightness, opacity, scattering coefficient, tear, burst and tensile index. As concentration of active alkali and cooking time increased, the physical properties values also increased, except for the opacity and scattering coefficient. The optimum condition for producing the strongest paper is using 22% active alkali in 120 minutes.

**Keywords:** Coir fiber, Characterization, Soda-AQ pulping, Pulp and paper, Paper properties.

**259 3:40 hrs**

#### **An Innovative Oil Palm Residue Management Strategy: A Review**

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This article reviews the methods of oil palm residues management in the past and present trend of approaches. These relationships are valuable to designers and oil palm farmers in selecting the optimal equipment that pulverizes the residues and eradicates breeding grounds of the Rhinoceros Beetle, a serious pest for oil palm plantation and improve access to the field which remains a problem. The World's total annual production of Oil Palm Wastes (OPW) is estimated at about 184 million tonnes with

about 5% annual increment. Oil Palm Fronds (OPF's) form the largest group of OPW (in the form of solid residues) whose total global generation capacity currently amount to nearly 92.4 million tonnes (by dry weight) annually. An estimate of about 56 million tonnes/ year of OPF would be generated in Malaysia alone during the replanting process by the year 2020. The presence of large amount of chunks of palm biomass, equivalent to about 85T/ha of dry matter, impedes field access and hinder replanting and the subsequent field upkeep work. The various techniques used are more expensive to implement for forest clearing and requires heavy machinery which are not available to smaller plantation owners. A Howard Tractor Mounted Mulcher would provide solutions to the problem.

**Keywords:** Oil palm, Pulverization, Crop residue, Mulcher, Mulching.

177 4:00 hrs

#### Utilization of Sea Cucumber as an Organic Fertilizer

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In this study the intestinal organs and body wall are used as an organic fertilizer. For this purpose, body wall of cucumber skin and intestinal organs were powdered properly. Three different dosages (2, 3.5 and 5 t/da) of both material were mixed to the soil before sowing for the test plants those grass (perennial) and rucola (annual). The pH, EC, CaCO<sub>3</sub>, nitrogen and organic matter were analysed in the experimental soil. While usage of increasing intestinal organs increased dry weights of test plants, powdered body wall affected negatively, compared to control.

296 4:20 hrs

#### Assessment of Efficient Wick Irrigation system in Greenhouses and Nurseries

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Capillary wick irrigation system is the lowest flow rate of micro irrigation system which ranges from 6mm to 16 mm of water daily. This is the most water saving water application technique without energy cost. However, the objectives of this research are hydraulic performance assessment of the wick based on capillary action and gravity forces, also how the moisture of the growing media distributes. Furthermore, development of the relationship between volumetric water content and growing media water suction is essential to find available water. The assessment undergoes two stages; quantifying watering in laboratory and field evaluation.

## Poster Sessions

Session

Processing, Technologies and  
Innovations (Poster)

082

### Technical Review on Crumb Rubber Drying Process and the Potential of Advanced Drying Technique

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<sup>3</sup>Department of Chemical and Environmental Engineering, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

Intensive thermal energy and extensive drying period are required in rubber drying process due to its low conductivity and dielectric properties. Thus, selection of advanced drying techniques of crumbs rubber is essential for the sake of efficiency and energy conservation. The integration of advanced dryers ranging from electromagnetic heater, fluidized bed dryer, heat pump and the vacuum environment were discussed in details in paper. In summary, cost and energy efficient dryer is the aim of this research work and it is important that this technology offers a robust and reliable solution to the rubber processing industry.

**Keywords:** Crumb rubber, Drying technique, Vacuum, Convective drying.

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### Achieving More with Less: SRI Single Seedling Nursery Tray an Alternative Breakthrough to Viable Seedling for System of Rice Intensification Planting Machine

U.B Zubairu<sup>1,a</sup>, Wayayok Aimrun<sup>1,b</sup>, MSM Amin<sup>1,2,c</sup> and MM Razif<sup>1,d</sup>

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The problem of adapting SRI techniques is high labor requirements for manual transplanting of single seedling in the field. However, the existing seedling raising methods remain challenging due to absence of mechanized SRI spacing standards. This study created modern techniques for increasing quality and transplanting potentials of seedlings. It involved development of rectangular tray having 924 square cavities with sliding base to facilitate seedling transfer. 100% germination in 10 days was obtained from the sunken MR219 seeds in 80g/L of NaCl solution. SRI-seed picker was developed with 924 pickers to place seeds with good result at 150g/L of tapioca.

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### Effect of High Hydrostatic Pressure (HHP) on Quality Parameters and Shelf Life of Anchovy (*Engraulis Encrasicolus*)

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Anchovy (*Engraulis encrasicolus*) samples were treated with HHP at 200, 300 and 400 MPa, at 5, 10 and 15 °C for 5 and 15 min. Physical and chemical analysis were performed such as colour ( $L^*$ ,  $a^*$ ,  $b^*$  and  $\Delta E$ ), trimethylamine nitrogen (TMA-N), and 2-thiobarbituric acid (TBA). According to the results, optimal HHP combination was selected for storage analysis as 200 MPa, 5 °C for 5 min and HHP treated samples were stored at refrigeration temperature (4

°C). Sensory, physical, chemical and microbiological analyses were monitored at this temperature for 15 days. Statistical (ANOVA) analysis was performed for untreated and treated samples. Considering the rejection limits of all analysis performed, results were utilized with shelf life extension of pressurized anchovy samples as 7 days.

**Keywords:** Anchovy, Quality, High hydrostatic pressure, Shelf-life, Safety.

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#### Further Improvement in the Yield of MAG During Lipase Esterification

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Monoacylglycerol and Diacylglycerols were synthesized by lipase esterification of glycerol with palm fatty acid distillate. Lipase from oil palm mesocarp fiber was used and a response surface methodology was used to study the effect of substrate molar ratio, quantity of lipase and the reaction time on the product yield. An analysis of variance showed that ( $R^2 = 0.8292$ ) of the observed variation was explained by the polynomial model. The optimum operating conditions are 17.47 grams of lipase, 2:1 molar ratio of substrate and 3.63 hours reaction time which gave 43.61% of degree of esterification and 9.293mg/ml of MAG.

**Keywords:** Lipase-esterification, Monoacylglycerol, Diacylglycerol, Response surface methodology.

|         |                                                          |
|---------|----------------------------------------------------------|
| Session | Food quality, safety and bio-information system (Poster) |
|---------|----------------------------------------------------------|

042

#### Isolation, Purification and Determination of Biochemical Properties of Polyphenol Oxidase from Turkish Alyanak Apricot (*Prunus armenica* L.)

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<sup>2</sup>University of Adiyaman, Faculty of Engineering, Department of Food Engineering, Altinsehir, Turkey

Polyphenol oxidase (PPO) was extracted and purified

from Alyanak apricot cultivated in Turkey and its characteristics were studied. Ammonium sulfate fractionation, ion exchange chromatography using DEAE-Toyopearl 650 M and gel filtration chromatography using Sephadex G-100 resulted in three PPO isoenzymes which were denoted as A1, A2 and B. Isoenzymes A1 and A2 exhibited similar pH activity profiles with the maximum activity at pH 4.98 whereas that for isoenzyme B was found to be at 5.80. Temperature optimum for A1 and A2 was 30°C and that for B was 40°C. Substrate specificities of the isoenzymes differed. The isoenzyme B had a higher affinity toward catechol whereas isoenzyme A1 had the highest affinity toward chlorogenic acid. Heat stability of the isoenzymes also differed in that isoenzyme B was more heat resistant. The most potent inhibitor was cysteine.

**Keywords:** Alynak apricot, Polyphenol oxidase, Purification, Kinetics, Thermal inactivation.

059

#### Oil Palm Fresh Fruit Bunch Ripeness Classification using Impedance Spectroscopy Technique

Nur Fizura Chin @ Hashim<sup>a</sup>, Samsuzana Abd Aziz<sup>b</sup> and Abdul Rashid Mohamed Shariff<sup>c</sup>

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Ripeness classification of oil palm fresh fruit bunch (FFB) is important because during the ripe stage, it will produce highest quality of oil compared to other stages. Conventionally, FFB ripeness was classified by counting the number of loosened fruits. In this paper, impedance spectroscopy technique was used to determine the ripeness stages of FFB. Oil palm samples were tested using an electrocardiogram (ECG) connected to an impedance analyzer board (50kHz-100kHz) and the results show that this technique has potential for ripeness classification.

**Keywords:** Alynak apricot, Polyphenol oxidase, Purification, Kinetics, Thermal inactivation.



089

### Effect of Plant Density on Growth and Flowering of Cut Chrysanthemum Production in Substrate Culture

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Two varieties of chrysanthemum "New White" and "New Yellow" were grown in seedling tray volume 140 ml contained with coconut peat. Plants were arranged at three different plant density 64, 81 and 99 plants m<sup>2</sup>. Chrysanthemum grown at 99 m<sup>2</sup> had highest plant height of 61.28 cm but did not significantly differ from other two plant densities. Plant densities did not significantly affect to day to flowering, number of flower, flower diameter, inflorescence diameter, flower color and vase life.

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### Weather Data Extraction and their Influences on Rice Brown Planthopper (Nilaparvata lugens) using Multispectral Images

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Infestation of rice Brown Planthopper is one of the greatest risks in tropical areas. Under particular conducive environment such as high Temperature and heavy rainfall, BPH population will increased. This paper presents the extraction of weather data derive from Landsat images compared with the BPH infestation. The data set was used for extracting temperature (T), Normalize Difference Vegetation Index (NDVI), relative Humidity (RH) and Extraterrestrial radiation (Ra) from Landsat images. Image investigations revealed that BPH were existing at the higher limits of temperatures in the form of nymphs. Consequently, in tropical regions with warmclimate distribution of BPH would bind.

**Keywords:** Temperature, Pest population, Humidity, Radiation, Rice yield.

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### Comparison Between Polysaccharide and Polymer Resins on the Physicochemical Properties of Mengkudu Juice (*Morinda Citrifolia*)

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This study was conducted to determine the effects of polysaccharide and polymer resin amount on the physicochemical properties of mengkudu juice. Two types of weak base anion exchanger, namely polysaccharide resin (Sephadex A-50) and polymer resin (Amberlite IRA-67) in the amount of 8, 10 and 12% (w/v) were used. The parameters measured were pH, titratable acidity (TA), total soluble solids (TSS) and clarity. Results showed that reduction in TSS was more significant ( $p \leq 0.05$ ) for Sephadex A-50 compared to Amberlite IRA-67. There were no significant differences in the mengkudu juice properties after deacidification using either polysaccharide or polymer resin.

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### Volume Development of Cake Baking Process in Convection Oven

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Monitoring cake volume changes during baking can be used as a tool to study the effect of different cake parameters on cake batter expansion. Volume development was observed at different temperatures; 160°C, 170°C and 180°C in different baking times; 35, 40, 45 and 55 minutes by height profile method in convection oven. The cake height was increased when time and temperature increased and became decrement when reached 45 minutes at 170°C. The highest percentage of relative height is 126.5% at 180°C for 40 minutes. The cake formed a dome-shaped contour with a slight shrinkage. The highest increment was at center.

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### Effect Of Baking Temperature to Qualities of Rice Bran Energy Bars

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Control of temperature during baking is an engineering problem that is critical in determines the quality of energy bars. This study evaluated the effect of temperature on quality of rice bran energy bars. Rice bran energy bars were baked at 130, 140 and 150°C. The hardness, cohesiveness, gumminess, and springiness of energy bars linearly increase with the increase of baking temperature while the springiness of energy bars reduce linearly with the increase of baking temperature. Moisture content also decrease with the increasing baking temperature but there are not significant effect of baking temperature on colour of energy bars as honey contains weak reducing sugar.

**Keywords:** Energy bars, Texture profile analysis, Moisture content analysis, Colour determination, Rice bran.

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### The Effects of Process Conditions on Different Position Towards the Quality of Cake

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There are two related dynamic process occurring simultaneously during baking. The objective was to evaluate the effects of processing conditions towards the quality of cake such as firmness, springiness and moisture content. The cake was baked at three different temperature (160°C, 170°C, and 180°C), and two different airflow (0m/s and 1.88m/s). The different position of sample for analysis was taken. Results showed that, process conditions and position of sample has no significant difference towards the firmness and moisture content of cake. However, processing condition has significant difference towards the springiness of cake while there was no significant difference of springiness of cake at different position.

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### Laboratory Calibration and Evaluation of Microwave Type Grain Flow Sensor for Yield Monitoring in Rice Combine Harvester

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A complete calibration test stand was constructed and instrumented to examine the effect of varying pitch and roll positions on the measurement errors of a SWR solid flow sensor. Results indicated that measurement errors ranging from 2.50% to 6.82% and 1.80% to 8.86% were obtained by the changing of chute pitch (descending and ascending) and roll angle positions from 1.5° to 4.5°, respectively. Greater measurement errors were found at the low screw auger conveyor speed range. However, the magnitude of errors is within the acceptable margin for any typical wet paddy land topography.

**Keywords:** Crop yield mapping, Microwave flow sensor, Flow sensor calibration, Flow measurement accuracy.

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### Influence of an Edible Coating on Microbiological Growth in Fresh Cut Cantaloupe (*Cucumis Melo*.L Var. *Reticulatus* CV. *Glamour*)

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Fresh cut fruits are known as minimally processed fruits imply that the fresh cut fruits have been washing, trimming, peeling, and cutting into usable products and to offer consumers with high nutrition, convenience while still maintaining the freshness of the products. Unfortunately, the fresh-cut processing of fruits causes microbiological effects. Edible coating is one of the treatments to keep the quality of fresh-cut Cantaloupe where it can be used as a semipermeable

barrier that helps to retard moisture loss, color changes and helps to reduce gas transfer throughout the process of handling and storage. The effects of alginate-based edible coating on the microbiological stability of fresh cut Cantaloupe (*Cucumis Melo* L. var. Glamour) melon was investigated. Fresh-cut Cantaloupe was coated with alginate based (2% w/v sodium alginate, 1.5% w/v glycerol, 0.025% w/v sunflower oil) and gellan based (0.5% w/v gellan, 0.6% w/v glycerol, 0.025% w/v sunflower oil). Fresh-cut Cantaloupe were immersed for 2 minutes in alginate based and gellan based film solution followed by 2 minutes submerging in 2% w/v calcium chloride before packing in with a container. For control, the fresh-cut Cantaloupe was not coated. The microbiological growth, which is Total Plate Count (TPC) and Yeast and Mould (YM) was studied during 21 days storage at 4°C and 80% relative humidity. Overall, it was found that there is a significant difference ( $p < 0.05$ ) in the population of mesophilic microorganism at the end of the storage was shown between control, alginate coated and gellan coated. Alginate coated and gellan coated treatments were effective to improve the microbiological stability up to 14 days while compared with uncoated fresh cut cantaloupe (control) where microbiological shelf life was up to 11 days. Edible coating could strengthen the cell wall structure and improve the resistance to bacterial attack. Meanwhile, a significant difference ( $p < 0.05$ ) of yeast and mould population was also observed among the coated and uncoated samples. Generally, the edible coatings retard the microbial growth on fresh cut cantaloupe.

**Keywords:** Edible coating, Gellan, Alginate, Fresh-cut cantaloupe, Microbiological growth.

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#### **A Comparison of the Difference in Fatty Acid Composition Between Newly-Harvested Rice and Stored Rice**

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Changes in chemical characteristics of rice stored for 0, 1, 2, 4, 6 and 7 years at 6°C and 60% RH were compared. Variation in lipid content in different parts of the grain was analyzed: brown rice flour from newly-harvested rice had the highest lipid content with the lowest in rice stored for 7 years. The saturated and unsaturated fatty acids indicated the extent of lipid oxidation during storage. The total fatty acids content

declined most rapidly with storage time. The variations in content of unsaturated oleic and linoleic fatty acids are important indicators of the quality of stored rice.

**Keywords:** Rice lipid contents, Saturated fatty acid, Unsaturated fatty acid, Newly-harvested rice, Stored rice, Brown rice flour, White rice flour.

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#### **Effect of Saline-Sodic Water on Solutes Movement and Structural Decline of Soil**

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An experiment was carried to know the effect of applying saline-sodic irrigation water and to determine soil physical properties in the glasshouse. In this study, soil columns of 40-60 cm height and 30 cm diameter were used to evaluate the effect of saline-sodic water application on soil-water and solute movement and structural decline in soils. This study helps to understand the effects of soil texture and water application systems on soil-water and solute dynamics, which are clearly explained under limiting conditions. The validity of hypothesis was carried out during this experiment.

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#### **The Effect of Quantity of Salt on the Drying Characteristics of Fresh Noodles**

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The effect of adding different quantities of salt on the drying characteristics of fresh salted noodles was investigated. Fresh salted noodles for the drying experiments were produced using wheat flour and salt water at different salinities. The drying curves of fresh salted noodles were modeled very well using Page's equation with drying characteristic parameters  $k$  and  $n$ . The drying rate for fresh salted noodles became lower as the quantity of salt added increased. Based on the results, a new improved drying model that takes salinity into account can be put forward.

**Keywords:** Noodle, Drying, Characteristic, Quantity of salt, Simulation.

Session

Bio-Products and Waste Management  
(Poster)

033

**Purification and Characterization of a Novel  
Amylase Enzyme from Red Pitaya (*Hylocereus  
Polyrhizus*) Peel**

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An amylase enzyme from pitaya peel was purified 234.2 folds with 72.1% recovery using ammonium sulphate precipitation, gel filtration and ion exchange chromatography. Gel filtration chromatography and SDS-PAGE revealed that the enzyme is monomeric with a molecular weight of 42.1 kDa. The apparent  $K_m$  and  $V_{max}$  of the amylase were 2.7 mg/ml and 34.30 u/min/mg of protein, respectively. The enzyme was highly active and stable over a wide pH range from pH 3 to pH 11.0, with optimum activity being observed at pH 5.0. The enzyme was highly selective for soluble starch, amylopectin, glycogen and pulullan.

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**Effect of Fungal Fermentation on Tyrosinase  
and Elastase Inhibition Activity in Rice Bran**

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This study was carried out to evaluate the effect of solid-state fermentation (SSF) on cosmeceutical functionalities of rice bran using GRAS fungal strains namely *Monascus purpureus* and *Aspergillus niger*. Analysis on water extracts demonstrated the enhancement in tyrosinase and elastase enzyme inhibition activity in comparison to the unfermented substrate. High performance liquid chromatography (HPLC) analysis exhibited that the ferulic acid component which commonly related to cosmeceutical purposes has increased about 2 to 5-fold in all fermented extracts. Results indicated that the SSF can be an efficient strategy to improve bioactivities in rice bran with associated enhancement of cosmeceutical functionality.

**Keywords:** Rice bran, Solid-state fermentation, *Monascus purpureus*, *Aspergillus niger*, Tyrosinase,

Elastase, Phenolic acids.

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**Wastewater Treatment of Palm Oil Mill Effluent  
(POME) by Ultrafiltration Membrane Separation  
Technique Couple with Adsorption Treatment  
as Pre-Treatment**

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The application of membrane separation technology coupled with adsorption treatment (pre-treatment) can be effective means of treating palm oil mill effluent (POME). The pre-treatment process was done by stirring the raw palm oil mill effluent (POME) with 0.20 g/L of palm kernel shell-based activated carbon (PKS-AC) in 35.94 min with stirring speed 39.82 rpm and able to reduce 71.26% of suspended solid. Ultrafiltration membrane separation was subsequently applied for further treatment of POME. From a random observation on the result, it was found that at pressure 2 bar with 600 rpm speed and pH 8 obtained lower dissolved solid (123.70 mg/L) and turbidity (4.50 NTU) concentration.

**Keywords:** POME, PKS-AC, Adsorption, Ultrafiltration membrane separation, Treated POME.

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**Micromechanics of Oil Palm Mesocarp Fibres**

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This work investigates the non-linear mechanics of oil palm mesocarp fibres using tensile tests, microstructure analysis and finite element model. In particular the focus is on silica bodies partly embedded in the fibre surface. The geometry of silica bodies are analysed using finite element model, namely the effect of spikes, volume fractions and possible anisotropy. The results suggested that silica bodies contributed to the mechanical behaviour of the fibres.

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### Comparison of Methane Emission from Conventional and Modified Paddy Cultivation in Malaysia

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Methane (CH<sub>4</sub>) is a potent greenhouse gas (Global Warming Potential= 25). Flooded rice fields are main sources for methane. Finding solutions to suppress the methane emission seems necessary toward a sustainable rice production. This study's aim is to assess the methane emission from some modified rice cultivation systems in Malaysia. Three cultivation methods including, two modified cultivation systems (MC) and conventional method (C) were studied. Consequently, the maximum methane emission was significantly lower in MCs (3.15 and 3.29 mg CH<sub>4</sub> m<sup>-2</sup> d<sup>-1</sup>) compared to C (8.91 mg CH<sub>4</sub> m<sup>-2</sup> d<sup>-1</sup>). Irrigation pattern and plant density were the key factors.

**Keywords:** Greenhouse gas, Methane, Rice, Cultivation system, Modified cultivation system, Sustainable production.

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### Biodegradability Studies of Pomelo Peel Powder Filled Polybutylene Succinate (PBS) Biocomposites

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The objectives of this research were to study the biodegradability and water absorption rates of pomelo peel powder filled polybutylene succinate. The samples were prepared by melt-blending method. The samples were buried in soil for 90 days. The amount of water absorbed was weighted every week for 90 days. The finding shows that higher content of pomelo peel powder blends had increased the weight loss in soil burial test. The higher content of pomelo peel powder biocomposites increased the water intakes. Conse-

quently, the utilization of the pomelo peel waste has potential to develop into an environmentally friendly packaging material.

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### Bio-Nanocomposite Materials for Food Packaging Applications: Types of Biopolymer and Nano-Sized Filler

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Majority of materials employed for food packaging are non-biodegradable materials which do not meet increasing demands in society for sustainability and environmental safety. Thus, numerous biopolymers have been exploited to develop biodegradable food packaging materials. Nonetheless, the usage of biopolymers has been limited due to the poor mechanical and barrier properties. These properties can be enhanced by adding reinforcing nano-sized compounds or fillers to form composites. This article reviews variety types of biopolymer and nano-sized filler used to form bi-nanocomposite materials.

**Keywords:** Nanocomposite, Biopolymer, Nanofiller, Food packaging.

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### Production and Characterization of Tilapia by Product Hydrolysate

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First protein hydrolysate was produced from tilapia by-product through enzymatic hydrolysis by using commercial enzyme Alcalase. Hydrolysis reaction of tilapia by-product was monitored according to degree of hydrolysis (DH) by employing O-phthalaldehyde (OPA) method. In order to obtain high yield of DH, response surface methodology (RSM) was used to optimize the hydrolysis condition with combination of four independent variables (pH, temperature,

substrate concentration, enzyme concentration). Optimization of enzymatic hydrolysis was performed using central composite design (CCD). The optimal enzymatic hydrolysis conditions were obtained at pH 7.5, temperature of 60°C, substrate concentration of 15% and 2.5% of enzyme concentration. The degree of hydrolysis was achieved at 20.75% after hydrolysis at 120 min. The freeze dried protein hydrolysate was characterized in term of chemical compensation, amino acid composition and molecular weight using SDS-PAGE. Tilapia by-product hydrolysate powder contained high protein content and higher level of amino acid compositions particularly essential amino acids. Low molecular peptides containing in tilapia by-product hydrolysate may potentially serve as a functional food producta.

**Keywords:** Enzymatic hydrolysis, Tilapia by-product, Degree of hydrolysis, Alcalase.

|         |                                            |
|---------|--------------------------------------------|
| Session | Modelling, Simulation and Control (Poster) |
|---------|--------------------------------------------|

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#### Wavelet-Based Analysis of Spectral Data for Estimation of Chlorophyll Concentration in Oil Palm Leaves

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The objective of this research was to develop an algorithm for real-time classification of oil-palm leaves based on chlorophyll concentration. The hypothesis that wavelet transform improves detection of the spatial features in multi-spectral images was tested. Appropriate wavelet functions and optimum coefficients (at particular scales and positions) that provide the greatest sensitivity to chlorophyll band were determined. Results showed that accuracy of the image-processing technique improved by applying wavelet analysis to the 1<sup>st</sup> and 2<sup>nd</sup> derivatives of reflectance spectra. This research can be used in variable rate technology that fast image processing is demanded to assess leaves chlorophyll level.

057

#### Determining Tomato Growth Response to Vapor Pressure Deficit in Different Light Conditions

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The objective of this research was to test the hypothesis that tomato's Growth Response (GR) to temperature, relative humidity (RH) and vapor pressure deficit (VPD) has different means under different light condition (sun, cloud or night) in tropical lowland Malaysia. Continuous data collection for 126 days was used for analysis of tomato GR functions according to peer-reviewed published works. Preliminary results showed that the lowest VPD values belong to night hours at which temperature and RH are at their minimum and maximum levels respectively. Further results indicated that response values for each parameter depend on specific growth stage.

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#### Simulation Studies of the Effect of Airflow Velocity on Temperature Profiles of Convective Oven Butter Cake Baking Process

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Reliable temperature predictions are important for understanding cooking environment and evaluating performance of an oven. A grey box model for quantitative evaluation of the effect of airflow velocity on temperature profile of convective oven butter cake baking process was proposed. The proposed model was simulated based on Fourier's second law approach using MATLAB Simulink. The model was established predicting temperature profiles within the oven chamber and cake batter. The simulation results were shown the relationship between the airflow velocity to the temperature profiles and agreed generally well with the experimental temperature profiles recorded during a cake baking process.



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### Optimization of Processing Conditions for Pigmented Rice Drinks

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Pigmented rice can be categorized as a functional food due to its various health benefits. The antioxidants in pigmented rice were extracted using hot water, and the extract can further be processed into drinks. The objective of this study was to determine the optimum processing conditions (extraction temperature, time, and water/rice (W/R) ratio) for minimum DPPH radical scavenging activity IC<sub>50</sub>, and maximum total flavonoid (TFC) and total phenolic content (TPC) in the pigmented rice extracts. Further studies will be performed to compare the antioxidant activity of pigmented rice drinks with that of commercial antioxidant drinks.

**Keywords:** Red rice, Black rice, Hot water extraction, Response surface methodology.

Session

Sustainable Processing and New Resources (Poster)

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### Improved Industrial Paddy Drying Options for Malaysian Conditions

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Efficient production of high quality product with low energy requirement should be the main concern of any food processing industry. Rice is the staple food for majority of the world's population; thus producing high quality rice is an important task of the rice processing industry. The quality of this staple grain is changed by different drying techniques and drying parameters. A review on industrial paddy drying practices in Malaysia is made with the objective of tracking current status and probable improvements achieved so far. Brief insights on some new research outcomes are given for possible applications by the industry.

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### Microwave-Assisted Pretreatment of Dragon Fruit Peel for Sugar Production

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In this study, microwave was used to pretreat dragon fruit peel to produce monomeric sugars. The peel contain 30.98% cellulose, 2.81% hemicellulose and 12.85% lignin. Microwave at 2.45GHz, 800W and 10 minutes were used to pretreat 1:10 dried peels to solvents (distilled water, 0.2, 0.5 and 1.0M H<sub>2</sub>SO<sub>4</sub>). 20-30% of the initial mass of samples were reduced after pretreatment process, increasing with increasing acid strength. Microscopy picture showed a noticeably damaged structure after pretreatment showing the effectiveness of the treatment. The most efficient acid concentration is 1.0M yielding 1.13 mg/mL glucose and 10.1 mg/mL arabinose.

| Session | Health, Nutrition and Wellness (Poster) |
|---------|-----------------------------------------|
|---------|-----------------------------------------|

053

### Principle Component Analysis of Organoleptic Acceptability on Cocos<sup>TM</sup> Emulsion Product

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A sensory analysis was conducted among targeted consumers, which were 150 schoolchildren (age 4-12) and 100 adult panelists (age 21-60). The principle component analysis (PCA) was applied to assess the organoleptic acceptability of public and schoolchildren on this novel product. In summary, both adults and schoolchildren panelists showed a significant preference ( $P \leq 0.05$ ) towards Cocos<sup>TM</sup> Emulsion than virgin coconut oil for both sensory attributes of taste and odour, as it was palatable. The scores plot of sensory attributes among all panelists were found highly scattered around, indicating no age-dependent preference on the sensory rating of each attributes

**Keywords:** Virgin Coconut Oil (VCO), Emulsion, Principle Component Analysis (PCA), Sensory.

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### Drying Kinetics and Colour Analysis of *Moringa Oleifera* Leaves

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The drying kinetics of (*Moringa Oleifera*) leaves was investigated at different oven drying temperatures (40, 50 and 60 °C) using an established drying mathematical model. The experimental drying data of moringa leaves on the basis of reduced chi-square ( $X^2$ ) and coefficient of determination ( $R^2$ ), the mathematical model exposed the best fit to the drying curves. The

values of coefficient of determination ( $R^2$ ) and reduced chi-square ( $X^2$ ) at 50 °C temperature was (0.998 to 0.999) and (0.009 to 0.0002) respectively. Oven dry at 40 °C revealed optimum colour values.

**Keywords:** Moringa leaves, Drying, Mathematical modelling, Colour analysis.

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### Antioxidant and Anti-Ulcer Effects of Ethyl Acetate Fraction of *Merremia Tridentata* (L.) Hallier F. Root

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The present study was aimed to determine the antioxidant and anti-ulcer effects of *Merremia tridentata* root (Arrow-leaf Morning Glory). Antioxidant potential of crude acetone extract and its fractions was evaluated by using various in vitro assays. In the anti-ulcer study, pre-treatment with ethyl acetate fraction (MEF) (50, 100 and 200 mg/kg b.wt.) significantly protected the ethanol-induced gastric ulcer in rats. Simultaneously, the antioxidant enzyme levels of superoxide dismutase, catalase and glutathione in the stomach tissues were significantly increased while pre-treated with MEF. From the results, MEF has the therapeutic potential to prevent gastric ulceration induced by ethanol.

**Keywords:** Antioxidant, Anti-ulcer, Ethanol-induced ulcer, *Merremia tridentata*, Root.

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### Evaluation of Methods for the Extraction of Betalain from Red Pitaya (*Hylocereus polyrhizus*)

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Red pitaya (*Hylocereus polyrhizus*) extract has demonstrated high potential as a natural food colorant and functional ingredient based on its purple red tincture and high antioxidative properties. Several different extraction methods were evaluated including

ultrasound assisted extraction (UAE), enzyme assisted extraction (EAE), and freeze-thaw extraction (FTE). Control was produced through centrifugal separation of pulp. Acidity, total soluble solids, yield, betalain content, and chromatic properties of the extracts were evaluated. Antioxidant capacity of the extracts was also measured through di(phenyl)-(2,4,6-trinitrophenyl)iminoazanium (DPPH) radical scavenging activity, ferric reducing ability of plasma (FRAP), total phenolic content (TPC) as well as total flavonoid content (TFC).

*Keywords:* Red pitaya, Enzyme assisted extraction, Ultrasound assisted extraction, Freeze-thaw extraction, Antioxidant capacity.

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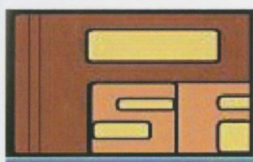
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