



**UPM**  
UNIVERSITI PUTRA MALAYSIA  
BERILMU BERBAKTI



# DBAE NEWSLETTER

*Volume 1, Issue 2021*



DRONE RESEARCH FACILITY CENTER,  
DEPARTMENT OF BIOLOGICAL AND  
AGRICULTURAL ENGINEERING (DBAE),  
FACULTY OF ENGINEERING, UPM

## DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING (DBAE)

### FACT SHEET

- 1<sup>ST</sup> AGRICULTURAL ENGINEERING DEGREE PROGRAMME OFFERED IN MALAYSIA SINCE 1975
- 6 YEARS ACCREDITATION (2019-2024) BY EAC BEM
- NO.OF PROFFESOR: 4  
NO.OF ASSOC.PROFFESOR: 6  
NO. OF SENIOR LECTURER: 16  
NO. OF SUPPORTING STAFF: 13
- CURRICULUM 2016-2020: 135 CREDITS IN 4 YEARS
- NO. OF LABORATORIES: 11
- CURRENT UNDERGRADUATE ENROLLMENT SEMESTER 1 2020.2021: 189 STUDENTS

## WORDS FROM HOD: Welcome to DBAE Newsletter!

Assalamualaikum w.b.t and salam sejahtera. We are excited to share our very first DBAE newsletter. We hope that this newsletter will continue to provide the latest information on DBAE and UPM in general. Even though our country is still recuperating from the COVID-19 pandemic which started over a year ago, we are grateful for the blessings we have today.

In the face of the pandemic, UPM has developed a holistic educational approach. All staff

and students show resilience in adapting to the new normal and embracing digital learning. This period is also fully used by the staff and students to write scientific publications and participate in virtual conferences. As UPM remains stable in the top 200 universities in the world and 2<sup>nd</sup> in Malaysia as reported by QS World University Rankings 2022, we will continue to strive for excellence.



“We are all in this together”

## MAIN HIGHLIGHTS

### CONGRATULATIONS ON NEW PROMOTION



PROFESSOR DR.  
ABDUL RASHID  
MOHAMED SHARIFF  
PROF. B (VK6)



PROFESSOR DR.  
KHALINA ABDAN  
PROF. C (VK7)



PROFESSOR IR. DR.  
HASFALINA CHE MAN  
PROF. C (VK7)



ASSOCIATE PROF. DR.  
AHMAD FIKRI  
ABDULLAH  
DS54



ASSOCIATE PROF. DR.  
NAZMI MAT NAWI  
DS54

### NEW APPOINTMENT

#### PROF. KHALINA ABDAN

Director, Institute Of  
Tropical Forestry And  
Forest Product  
(INTROP).

#### ASSOC. PROF. DR. AHMAD FIKRI ABDULLAH

Head of Laboratory  
International Institute of  
Aquaculture and Aquatic  
Sciences (iAQUAS)

#### ASSOC. PROF. DR. HASFALINA CHE MAN

Deputy Director, PUTRA  
International Centre  
(i-PUTRA).

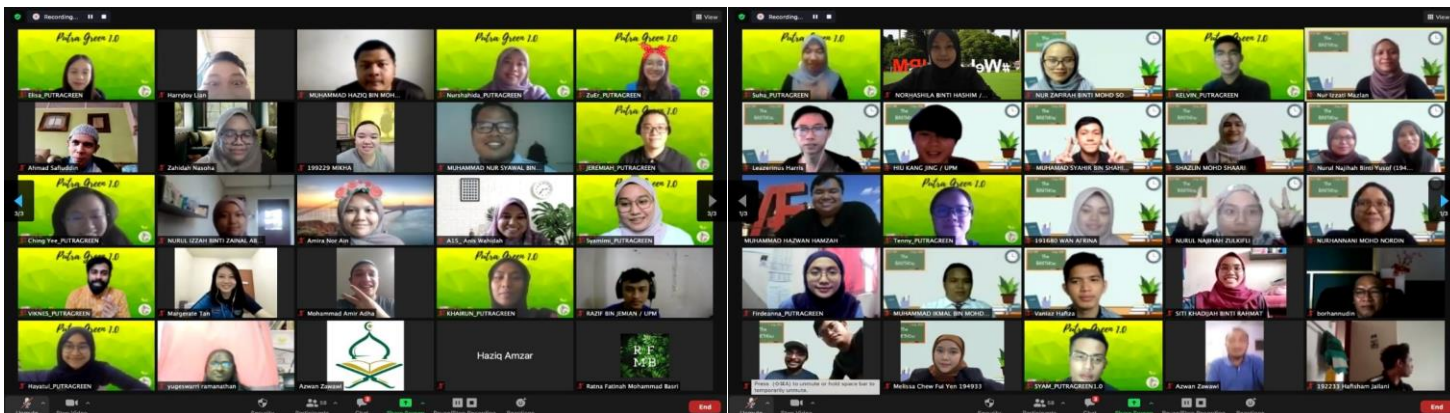
## CAFEi 2021

On the 3<sup>rd</sup>. and 4<sup>th</sup>. February 2021, CAFEi 2020 was held virtually with the theme: **“Agriculture 4.0: The future for farming and food engineering”**. This event was held concurrently with the 13th International FRUTIC Symposium 2020. CAFEi 2021 was organized by the Department of Biological and Agricultural Engineering and the Department of Process and Food Engineering, in collaboration with the Leibniz Institute of Agricultural Engineering and Bioeconomy, Germany, the Malaysian Investment Development Authority (MIDA) and supported by 11 agencies/associations/universities around the world.

The main objective of this conference was to provide a meeting place for scientists, engineers and technologists to present the latest research findings as well as technological applications in the field of agricultural and food engineering. The total number of participants was 485 where 94% of them were local participants and 6% international participants. The conference also received sponsorships from 12 local companies. A total of 84 papers were selected for publication in Journal of Food Packaging and Shelf Life, myJAFE, Food Research and Basrah Journal of Agricultural Sciences.







***“Online teaching and learning is even more challenging when laboratory work and examinations must be conducted online.”***

## **Preparing our students for future challenges**

The element of Artificial Intelligence (AI) is introduced in five high level courses: Agricultural and Biosystems Engineering Design Project, Bachelor Project, Intelligent Systems for Agricultural and Biosystems Engineering, Control Environment, and Automation in Agriculture.

For more information on BAE curriculum, please refer to [The INGENIEUR, Vol.84](#), page 35 – 39.

## **ACADEMIC: Coping with the pandemic**

The current academic year has been very challenging due to the global pandemic. Since March 2020, online teaching and learning has replaced all conventional teaching and learning.

In the beginning, both lecturers and students struggled, especially in preparing basic infrastructures. It was even more challenging when laboratory work and examinations must be conducted online.

Nonetheless, lecturers quickly rise to the challenge, and have been continuously improving their online

teaching skills to suit the demand. Students too, have been adapting very well and getting used to online learning.

Though online learning is not as convenient as having the traditional classroom set-up, everyone is doing their best to make full use of all available resources.

Indeed, this pandemic has revolutionized our learning system.

## **Curriculum review 2021/2024**

Curriculum review is conducted every five years in UPM to ensure that the quality of the curriculum is up to date. This allows recent technologies and research findings to be included in the curriculum. Currently, the Bachelor of Agricultural and Biosystems Engineering with Honors program comprises 100 credits of engineering courses and 35 credits of non-engineering courses covered over 4 years of study.

For the current review, we have taken the initiative to further strengthen the alignment between our curriculums with National Policy on IR4.0 in the field of agricultural engineering. The current curriculum offered is consolidated by

strengthening the elements of Information Technology (IT), Internet of Things (IoT), Artificial Intelligence (AI), Innovation & Entrepreneurship and Big Data. It is aimed that our graduates are equipped to produce innovative and effective solutions in addressing the challenges in the agricultural industry



# INTEGRATED DESIGN PROJECT

Integrated design project is a compulsory course for all undergraduate engineering students in their final year of studies. In this course, the students work in teams to design and innovate a system for agricultural use. Here, we list the top six projects selected by judges. (Evaluator's Choice Award 2020)

1. Lora P2P Communication-Based Monitoring System for Empurau Fish Farming: <https://youtu.be/cVhsvUkFOCk>

LoRa communication protocol was developed to monitor the temperature and pH of the water using an IoT system (FISHIoT) installed on a buoy. A user-friendly interface for real-time data acquisition was demonstrated.

2. Fixed Distance Pineapple Planting: <https://youtu.be/7-4SkqIQm18>

A lightweight soil digger to assist pineapple planting at fixed distances was designed and developed.. Four hollow cylinders were used to bore hole into the soil. The design was developed in accordance with Malaysian Pineapple Industry Board (MPIB) specifications.

3. Oil Palm Loose Fruit Collector: <https://youtu.be/FzHxRRUWaCI>

Malaysia is the world's second largest producer of palm oil after Indonesia. IThe collection of loose fruits is important because they contain higher percentage of oil compared to fresh fruits on bunches. A loose fruit-collecting roller was designed in this project.

4. Vertical Farming for *Azolla pinnata*: <https://youtu.be/qqRw4TqFQMcc>

*Azolla pinnata* is a good source of high quality protein. It also contains almost all essential amino acids, vitamins, Beta-carotene, minerals and appreciable quantities of bio-polymers. Although *Azola pinnata* has a lot of benefits, the cultivation of it is not widely practised. The vertical farming system is an alternative to the conventional farming system

5. Auto-Release Mechanism of Methane Gas in a Bio-booster Production: <https://youtu.be/jbTDQ2qnUG0>

In the bio-booster production, methane gas is released during fermentation and could cause equipment failure (burst). In this project, a methane gas auto-release mechanism was demonstrated when systems exceeds the allowable limit..

6. Portable Poultry Auto Feeder: <https://youtu.be/tbZWwj9qgLQ>

Students designed a portable poultry auto feeder for small farmers. The prototype was demonstrated.



# INDUSTRY & COMMUNITY ENGAGEMENT

Our department would like to thank our collaborators from government agencies and private companies for their continuous support in our teaching and research activities. This year we invited professional speakers from MARDI, Lembaga Pertubuhan Peladang (LPP), The Institution of Engineers Malaysia, Zaiyadal Aquaculture Sdn Bhd,

Lenga Palmoil Industries Sdn. Bhd. and Kulim Malaysia Berhad to share their expertise with our students. Our industrial partners also contributed as juries/evaluators for our student projects in Integrated Design Project and Final Year Project courses. The feedback was key to improve our students' performance and understanding

of innovation-based activities in the industry.

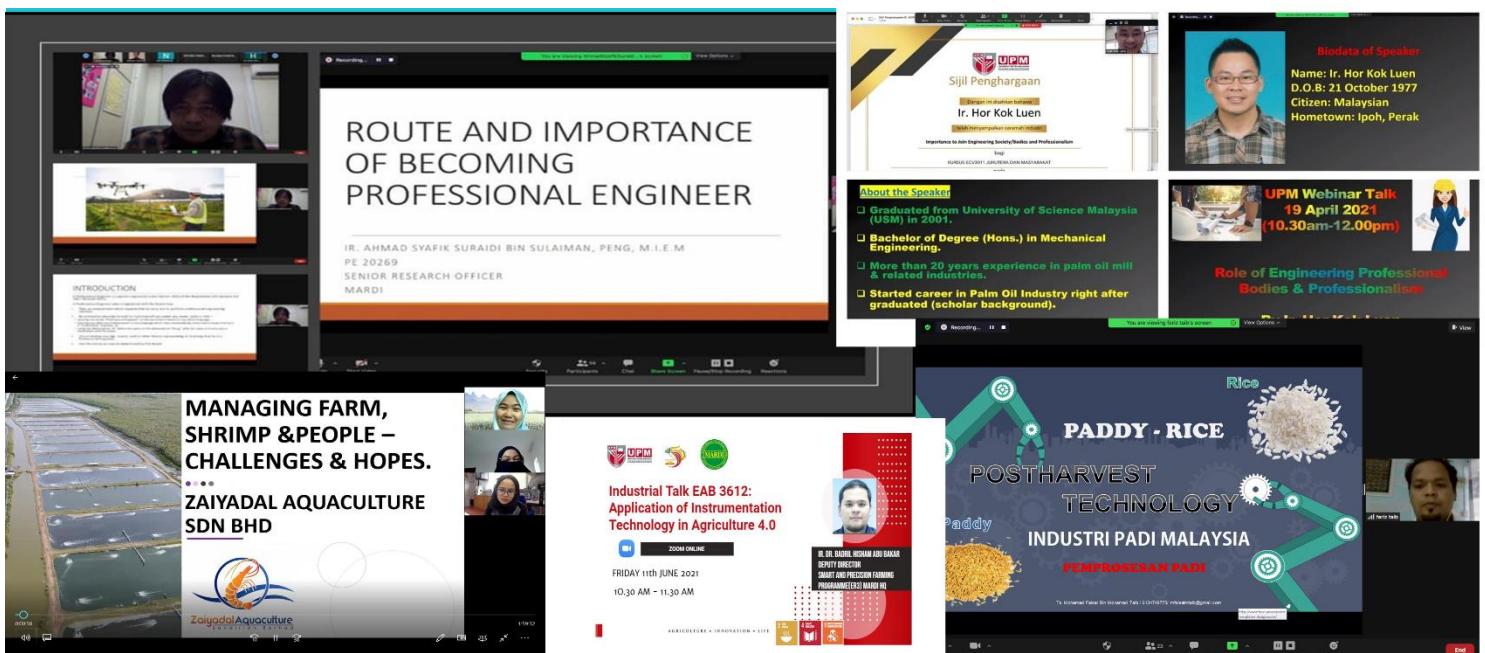
Currently, 50 third-year students are currently undergoing industrial training, beginning July 26<sup>th</sup> until October 1<sup>st</sup>. This activity involves 30 companies and government agencies.

## TECHNOLOGY TRANSFER TO COMMUNITY

Early this year, our department was honored to initiate two community engagements with the communities of Taman Suria Tropika, Sepang and Sekolah Kebangsaan Bandar Tun Hussein Onn 2, Cheras. The engagement with Taman Suria Tropika residents, involves the development of agricultural facilities for the community's newly built farm. In the first phase, the project focuses on the

development of water resources and distribution, and electricity supply through solar energy. In the next phase, the project will venture into developing facilities for agricultural waste composting, hydroponic and aquaponic systems which will be equipped with IoT for monitoring and management of water supply and water quality. The engagement with the community of SK Bandar

Tun Hussein Onn focuses on developing an efficient irrigation and drainage systems for the school's agricultural activities. We are looking forward to continue these activities and the outcomes!





# HANDOVER CEREMONY OF THE RICE PROCESSING MACHINE FROM IPMA INDUSTRY SDN BHD

The handover ceremony of a paddy processing machine donated by IPMA Industry Sdn Bhd to the Faculty of Engineering UPM was held virtually on 3 February 2021, during the opening ceremony of the 5th International Conference of Agricultural and Food Engineering organized by the Department of Biological and Agricultural Engineering and the Department of Process and Food Engineering.

A total of 4 paddy processing machines, which are small scale pre-cleaner, paddy huller, cylinder grader and polisher worth RM100 000 were donated to the Faculty of Engineering UPM by IPMA Industry Sdn Bhd in collaboration with the Malaysian Investment Development Authority (MIDA) and the Malaysian Association of Agricultural and Food Engineers (MSAE). These machines are placed at Biomaterial Processing Laboratory DBAE. Industry contribution can enhance students learning of the latest techniques in the rice processing industry.



## HANDOVER OF RICE PROCESSING MACHINE FROM IPMA INDUSTRY SDN BHD TO FACULTY OF ENGINEERING UPM

### 1. SMALL SCALE PRE-CLEANER



### 2. SMALL SCALE PADDY HULLER



### 3. SMALL SCALE CYLINDER GRADER



### 4. SMALL SCALE POLISHER



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*"This contribution is made to show our support to this outstanding university. We hope these machine will be beneficial to student to learn about the latest technology use in rice processing industry"*

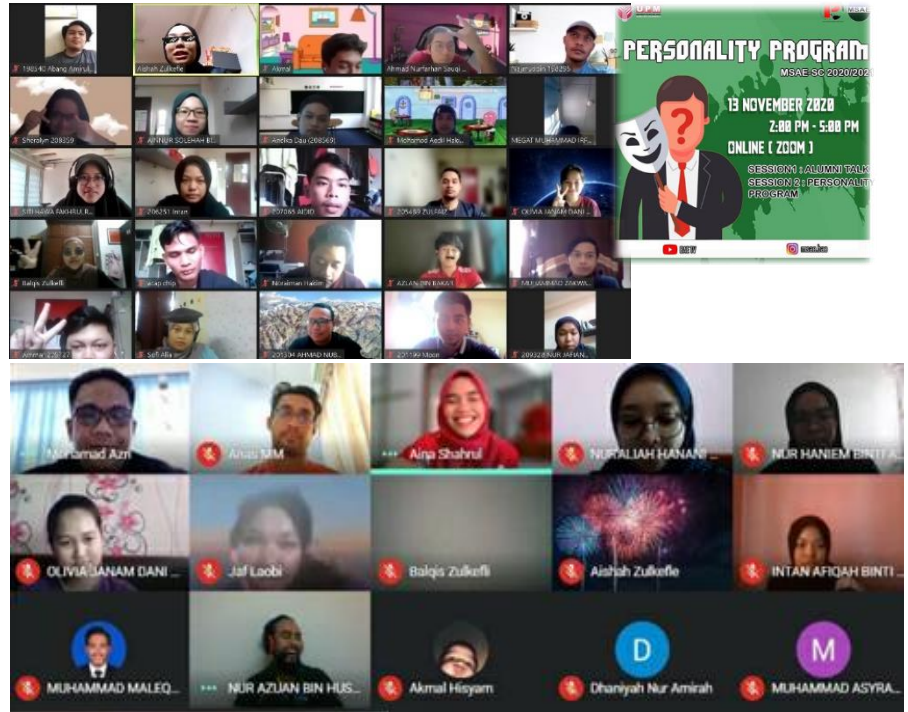
*Mr. Ong Kheng Teong  
(Managing Director IPMA Industry Sdn. Bhd)*

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# STUDENT ACTIVITY



The Malaysian Society of Agricultural Engineers- Student Chapter (MSAE-SC) have actively organized various activities from October 2020 to June 2021 virtually as face-to-face activities are not allowed. Online workshops, talk and programs organized by MSAE-SC show that there is no boundary in gaining knowledge from experts and professionals, and getting together with peers.



## MSAE –SC ORGANIZATION

The committee members of MSAE-SC for the year 2021/2022 were elected during the Annual General Meeting of MSAE-Sc on 8<sup>th</sup> June 2021.







# RESEARCH Highlight

## The application of a nanodelivery system and nanosensor in smart farming for actual detection and control of *Ganoderma Boninense*

This project focuses on the implementation of **Smart Farming systems for *Ganoderma boninense* control management** for actual detection and control of *Ganoderma Boninense* (*G. boninense*). It consists of **MyGano** - an online system, that provides a real-time monitoring and alert system in detecting and monitoring the *G. boninense*; a **Drilljector** - a mechanical system that delivers the treatment solution effectively and efficiently; and a **Nanoporous pipe** - to control the *G. boninense* by delivering irrigation water when required or draining excess water.

### MyGano Online System

<http://myganoonline.com/>

- A real-time monitoring and alert system in detection and monitoring oil palm trees infected by *G. boninense*.
- Technologies used: Internet of things (IoT), remote sensing and machine learning.
- The system consists of 3 sub-systems representing a different detection approach namely:
  - **Soil Sensor Network System**  
Detect *G. boninense* in an oil palm seedling (age: 5 months) as early as 12 weeks (3 months) after infection with **98% accuracy**.
  - **Laser Scanning Canopy Biometrics System**  
Detect *G. boninense* in an oil palm tree (age: 9 years old) at 4 severity levels of infection with **85% accuracy**.
  - **Spectral Properties System**  
Classify between healthy and unhealthy tree with **84% accuracy**.



**MASSEY**  
UNIVERSITY  
TE KUNENGA KI PŪREHUROA

UNIVERSITY OF NEW ZEALAND



# RECENT PUBLICATION

## LIST OF PUBLICATIONS FOR HALF YEAR CALENDAR 2021

- Sanchez, P.D.C., Hashim, N., Shamsudin, R., Mohd Nor, M.Z. (2021) Effects of different storage temperatures on the quality and shelf life of Malaysian sweet potato (*Ipomoea Batatas* L.) varieties Food Packaging and Shelf Life 28 (Jun-21) ISSN:22142894 Q1
- Camara, M., Jamil, N.R., Abdullah, A.F., Hashim, R. (2021) Analysis of time-space varying relationship between land use and water quality in a tropical watershed Arabian Journal of Geosciences 14 (5) ISSN:18667511 Q4
- Nasidi N.M., Wayayok A., Abdullah A.F., Mohd Kassim M.S. (2021) Dynamics of potential precipitation under climate change scenarios at Cameron highlands, Malaysia. SN Applied Sciences 3(3) ISSN:25233971 SCOPUS
- E. Al-Esawi J.S., Wayayok A., Al-Ogaidi A.A.M., Rowshon M.K., Fikri Abdullah A., Abdullahi S. (2021) Effect of Soil Compaction a Palm Oil Application on Soil Infiltration Rate Journal of Irrigation and Drainage Engineering 147(3) ISSN: 7339437 Q3
- Abba M.U., Man H.C., Azis R.S., Idris A.I., Hamzah M.H., Abdulsalam M. (2021) Synthesis of nano-magnetite from industrial mill chips for the application of boron removal: Characterization and adsorption efficacy International Journal of Environmental Research and Public Health. 18 (4) pp1-18 ISSN:16617827 Q2
- Abba M.U., Man H.C., Azis R.S., Idris A.I., Hamzah M.H., Yunos K.F., Katibi K.K. (2021) Novel pvdf-pvp hollow fiber membrane augmented with tio2 nanoparticles: Preparation, characterization and application for copper removal from leachate Nanomaterials 11(2) pp 1-18 ISSN: 20794991 Q2
- Onwude D.I., Hashim N., Chen G., Putranto A., Udoenoh N.R. (2021) A fully coupled multiphase model for infrared-convective drying of sweet potato Journal of the Science of Food and Agriculture 101(2) pp 398-413 ISSN 225142 Q2
- Sabaruddin F.A., Tahir P.M., Sapuan S.M., Ilyas R.A., Lee S.H., Abdan K., Mazlan N., Roseley A.S.M., Khalil Hps A. (2021) The effects of unbleached and bleached nanocellulose on the thermal and flammability of polypropylene-reinforced kenaf core hybrid polymer bionanocomposites Polymers 13 (1) pp 1-19 ISSN: 20734360 Q1
- Nik Baihaqi N.M.Z., Khalina A., Mohd Nurazzi N., Aisyah H.A., Sapuan S.M., Ilyas R.A. (2021) Effect of fiber content and their hybridization on bending and torsional strength of hybrid epoxy composites reinforced with carbon and sugar palm fibers Polymers/Polymers 66(1) pp36 – 43 ISSN: 322725 Q4
- Harith H.H., Mohd M.F., Nai Sowat S. (2021) A preliminary investigation on upper limb exoskeleton assistance for simulated agricultural tasks Applied Ergonomics 95 ISSN: 36870 Q1
- Mohd Ali M., Hashim N., Shahamshah M.I. (2021) Durian (*Durio zibethinus*) ripeness detection using thermal imaging with multivariate analysis Postharvest Biology and Technology 176 ISSN: 9255214 Q1
- Nurazzi N.M., Asyraf M.R.M., Khalina A., Abdullah N., Aisyah H.A., Rafiqah S.A., Sabaruddin F.A., Kamarudin S.H., Norrrahim M.N.F., Ilyas R.A., Sapuan S.M. (2021) A review on natural fiber reinforced polymer composite for bullet proof and ballistic applications Polymers 13 (4) pp 1-42 ISSN: 20734360 Q1
- Maringgal B., Hashim N., Tawakkal I.S.M.A., Mohamed M.T.M., Hamzah M.H., Ali M.M. (2021) Effect of kelulut honey nanoparticles coating on the changes of respiration rate, ascorbic acid, and total phenolic content of papaya (*carica papaya* L.) during cold storage Foods 10(2) ISSN: 23048158 Q1
- Zulkifli N., Hashim N., Harith H.H., Mohamad Shukery M.F., Onwude D.I., Sairi M. (2021) Finite element modelling for predicting the puncture responses in Papayas Foods 10(2) ISSN: 23048158 Q1
- Rafiqah S.A., Khalina A., Harnaen A.S., Tawakkal I.A., Zaman K., Asim M., Nurrazi M.N., Lee C.H. (2021) A review on properties and application of bio-based poly(Butylene succinate) Polymers 13 (9) ISSN: 20734360 Q1
- Hadi M.K., Kassim M.S.M., Wayayok A. (2021) Development of an Automated Multidirectional Pest Sampling Detection System Using Motorized Sticky Traps IEEE Access 9 pp 67391- 67404 ISSN: 21693536 Q1
- Putri R.E., Yahya A., Ju O.Y., Isa M.M., Aziz S.A. (2021) Portable wireless yield monitoring system on conventional rice combine Applied Engineering in Agriculture 37 (1) pp 193 -203 ISSN: 8838542 Q4

- Jahun B.G., Ahmad D.B., Mahadi M.R., Sulaiman S., Iya S.A. (2021) Effects of degree of oil palm frond mulching using tractor mounted mulcher blades Journal of Agricultural Engineering 52 (1) ISSN: 19747071 SCOPUS
- Sulaiman S., Azis R.S., Ismail I., Shaari A.H., Man H.C., Ahmad Nazri N.A., Azuan A. (2021) Structural, morphological, magnetic and adsorption properties of  $Fe_3O_4$  for copper removal from aqueous solution Desalination and Water Treatment 215 pp136-146 ISSN: 19443994 Q4
- Nurazzi N.M., Asyraf M.R.M., Khalina A., Abdullah N., Sabaruddin F.A., Kamarudin S.H., Ahmad S., Mahat A.M., Lee C.L., Aisyah H.A., Norraahim M.N.F., Ilyas R.A., Harussani M.M., Ishak M.R., Sapuan S.M. (2021) Fabrication, functionalization, and application of carbon nanotube-reinforced polymer composite: An overview Polymers 13 (7) ISSN:20734360 Q1
- Houma A.A., Kamal M.R., Mojid M.A., Abdullah A.F.B., Wayayok A. (2021) Climate change impacts on rice yield of a large-scale irrigation scheme in Malaysia Agricultural Water Management 252 ISSN: 3783774 Q1

*Selected papers presented in 5<sup>th</sup> Conference on Agricultural and Food Engineering (CAFEi 2021) are published in Food Research Journal*



## FOOD RESEARCH

Volume 4, Supplementary 6

5th International Conference on Agricultural and Food Engineering



<https://www.myfoodresearch.com/vol49474supplementary-6.html>



## FOOD RESEARCH

Volume 5, Supplementary 1

5th International Conference on Agriculture and Food Engineering

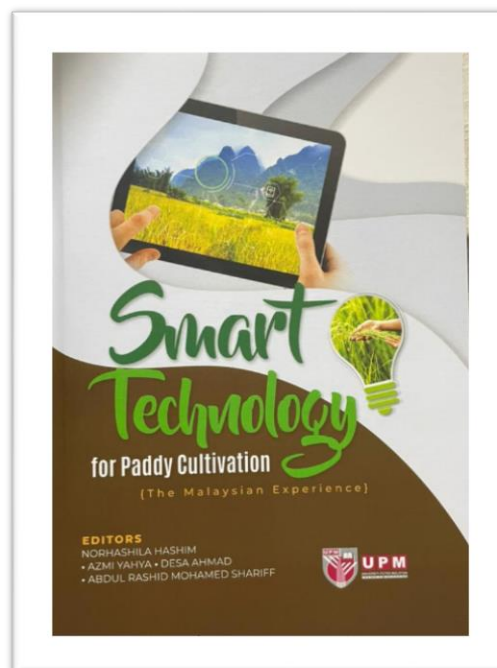


<https://www.myfoodresearch.com/vol-59474supplementary-1.html>



## THE SMART TECHNOLOGY FOR PADDY CULTIVATION – THE MALAYSIAN EXPERIENCE

The book is written by academicians from the Department of Biological and Agricultural Engineering (DBAE), Faculty of Engineering, UPM and published by UPM Press. It is the first of its kind; it presents a comprehensive collection of important findings by DBAE researchers on the potential and advancement of smart technology for improving paddy productivity, covering land preparation, planting, growth monitoring, quality evaluation and yield estimation. The content of this book is divided into three sections, namely System of Rice Intensification (SRI), Computers and Electronics in Paddy Cultivation and Decision Support System in Paddy Cultivation. It is suitable as a reference book for academicians, researchers, professionals, individuals who are involved in agricultural industry, students and the community at large.



## GRANTS

### TRGS

- Enhancing Glutinous Rice Productivity and Sustainability Through Smart Farming Practice
- RM741, 952
- Leader: Assoc. Prof. Dr. Norhashila Hashim

### FRGS

- Detection and Classification of White Root Disease (WRD) in Rubber Plantation Using a Portable Spectroscopic Method and Advanced Learning Algorithm
- RM111 500
- Leader: Assoc. Prof. Dr. Nazmi Mat Nawi

### FRGS

- Finite Element Analysis of Mechanical Response of Carica Papaya L. under Impact Loading
- RM146 700
- Leader: Assoc. Prof. Dr. Norhashila Hashim

### PUTRA GRANT UPM

- Drone Application for Ganoderma Boninense Disease Detection in Oil Palm Plantation
- RM60 000
- Leader: Dr. Nur Azuan Husin

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