ICIABC 2023

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UNIVERSITI MALAYSIA PAHANG
AL-SULTAN ABDULLAH

UNIVERSITAS DIPONEGORO
SEMARANG

PROGRAM & ABSTRACT BOOK

2nd International Conference on Industry-Academia Initiatives in Biotechnology and Chemistry

27 - 28 NOVEMBER 2023
8 AM - 5 PM
VIRTUAL CONFERENCE
UNIVERSITI MALAYSIA PAHANG AL-SULTAN ABDULLAH

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MESSAGE
CHAIRMAN, iCIABC 2023

Dear esteemed colleagues and guests,

It is with great pleasure that I welcome you all to the iCIABC 2023. Our conference theme this year is "Advancements in Sequencing Technology for Sustainable Industrial Biotechnology and Chemistry," and we are thrilled to have such a diverse and accomplished group of professionals gathered here today.

As a chairman for iCIABC 2023, I am honored to be a part of this exciting event. Our conference aims to showcase the latest advancements in sequencing technology for sustainable industrial biotechnology and chemistry, and to provide a forum for researchers, practitioners, and industry professionals to share their knowledge and insights.

The potential for sustainable industrial biotechnology and chemistry to revolutionize the way we produce goods and services cannot be overstated. It is through events like iCIABC that we can collaborate, learn from one another, and explore new ideas and technologies that will enable us to create a more sustainable and prosperous future.

Over the next few days, we will be hearing from some of the most brilliant minds in our industry. I encourage you all to participate fully in the sessions, to network and engage with your colleagues, and to take the time to explore the latest developments in sequencing technology for sustainable industrial biotechnology and chemistry.

Once again, welcome to iCIABC 2023. Let us make the most of this opportunity to learn, connect, and work together to create a brighter future for us all. Thank you.

TS. DR. HAJAR FAUZAN BIN AHMAD

Chairman of iCIABC2023

iCIABC 2023 OVERVIEW

The 2nd International Conference on Industry-Academia Initiatives in Biotechnology and Chemistry (iCIABC2023), will be held virtually on 27-28 November 2023, aims to explore the latest advancements and exchange cutting-edge ideas in the fields of industrial biotechnology and chemistry. The conference theme is Advancement in Sequencing Technologies for Sustainable Industrial Biotechnology and Chemistry. It will cover a wide range of subthemes, including Microbiology, Green Technology and Renewable Energy, Environmental Sciences, Gene Technology, Molecular Biology and Bioinformatics, Food Technology, Agricultural Technology, Enzyme Technology, Biomaterials, Biosensor and Molecular Diagnostics, and Nanotechnology. This highly anticipated conference, organized by the Faculty of Industrial Sciences and Technology (FIST) at Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), in collaboration with Universitas Diponegoro, Indonesia, promises to be a game-changer in the world of biotechnology and chemistry research. The conference will bring together some of the brightest minds from around the globe, including academics, researchers, and industrial players.

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PROGRAM SCHEDULE

Day 1

Time	Event		
8:15 – 8:45	**Registration**		
8:45 – 9:00	**Session Login and Preparation**		
9:00 – 9:10	**Welcoming speech by Director of iCIAB2023** Ts. Dr. Hajar Fauzan bin Ahmad Faculty of Industrial Sciences and Technology, UMP		
9:10 – 9:15	**Montage**		
9:15 – 9:30	**Opening Speech by Dean of IPS, UMP** Prof. Ts. Dr. Che Ku Mohammad Faizal bin Che Ku Yahya		
9:30 – 10:15	**Plenary Speaker** Prof. Dr. Norfilza binti Mohd Mokhtar Genomic Medicine Professor, UKM		
10:15 – 11:00	**Keynote 1** Prof. Ts. Dr. Gaanty Pragas A/L Maniam (Chemistry Professor, UMP		
11:00 – 11:05	**Session Login and Preparation**		
Theme	**Natural Product (Dr. Normaiza binti Zamri + Mr. Saiful Azahari bin Sallehuddin)**	**Microbiology (Ts. Muhammad Adam Lee bin Abdullah + Mr. Shaharunizam bin Umar)**	**Agricultural Technology (Dr. Tay Joo Hui + Mr. Ikram bin Safiee)**
	Session 1A	**Session 1B**	**Session 1C**
11:05 - 11:25	Paper 1	Paper 8	Paper 33
11:25 - 11:45	Paper 4	Paper 16	Paper 11
11:45 - 12:05	Paper 9	Paper 24	Paper 13
12:05 - 12:25	Paper 14	Paper 37	Paper 39
12:25 - 12:45	Paper 23	Paper 79	Paper 41
12:45 - 13:05	Paper 77		Paper 42
13:05 - 13:45	**Break**		

13:45 – 14:00	**Session Login and Preparation**		
14:00 – 14:45	**Keynote 2** Prof. Dr. Chee-Onn Leong (CEO at AGTC Genomics)		
Theme	**Agricultural Technology (Assoc. Prof Dr. Nina Suhaity binti Azmi + Mr. Muhamad Husaini bin Sulaiman)**	**Environmental Sciences & Molecular Biology and Bioinformatics (Ts. Dr. Nurul 'Azyyati binti Sabri + Mdm. Norshahida binti Zaidon)**	**Biomaterials & Nanotechnology (Ts. Dr. Ros Azlinawati binti Ramli + Ms. Nurul Azwa binti Muhamad Tamrin)**
	Session 2A	**Session 2B**	**Session 2C**
14:45 – 15:05	Paper 48	Paper 21	Paper 20
15:05 – 15:25	Paper 31	Paper 29	Paper 60
15:25 – 15:45	Paper 36	Paper 43	Paper 40
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16:25 – 16:45	Paper 70	Paper 22	Paper 59
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17:05		**END DAY 1**	

Day 2

8:30 – 9.00	**Session Login and Preparation**		
Time	**Event**		
9:00 – 9:45	**Keynote 3** Prof. Dr. Hermin Pancasakti Kusumaningrum (Biotechnology Professor, UD)		
9:45 – 9:50	**Session Login and Preparation**		
Theme	**Natural products (Dr. Nor Adila binti Mhd Omar + Ms. Nor Atiqah bitni Abd Rahim)**	**Green Technology and Renewable Energy & Reaction and Catalysis (Dr. Kamrul Fakir bin Kamarudin + Mr. Mohd Farid bin Jaafar)**	**Food Technology & Gene Technology (Assoc. Prof Dr. Tan Suat Hian + Mdm. Nurul Salma Munirah binti Ruslan)**
	Session 3A	**Session 3B**	**Session 3C**
9:50 – 10:10	Paper 28	Paper 10	Paper 55
10:10 – 10:30	Paper 32	Paper 30	Paper 69
10:30 – 10:50	Paper 49	Paper 12	Paper 5
10:50 – 11:10	Paper 57	Paper 17	Paper 25
11:10 – 11:30	Paper 58	Paper 74	Paper 51
11:30 – 11:50	Paper 52	Paper 75	
11:50 - 12:30	**Closing Ceremony** (Assoc. Professor Aizi Nor Mazila binti Ramli)		
	END		

COMPILATION OF ABSTRACTS

Plenary

Unlocking the Future of Medicine: Harnessing the Power of Multi-Omics Technology for Precision Healthcare

Norfilza Mohd Mokhtar. MD, MMed.Sci., Ph.D.

Abstract: Precision medicine, a concept at the forefront of healthcare, relies on comprehensive data derived from multi-omics approaches to achieve enhanced clinical decision-making. The concept of precision medicine encompasses data derived from individual omics including genomics, transcriptomics, metagenomics, epigenomics, metabolomics and proteomics. The integration of multi-omics data not only enables a holistic perspective on healthcare but also facilitates a precise comprehension of disease mechanisms. This, in turn, lays the foundation for the development of targeted therapies and interventions tailored to the unique molecular profile of each individual. The predictive power of multi-omics technology extends beyond disease diagnosis, offering the potential for proactive and preventive healthcare measures. Our GUT research group focuses to unravel the complexities of digestive related diseases on the use of multi-omics methodologies**.** While the promises of multi-omics are profound, challenges such as data integration, ethical considerations, and standardisation of analytical methodologies must be addressed for the responsible and equitable implementation of these technologies. The transformative potential of multi-omics in shaping the future of medicine, emphasising the need for interdisciplinary collaboration from various disciplines and ethical frameworks to harness its full potential for the benefit of individual and population healt

Keynote 1

Powering the Future: Diversification of energy sources for vehicles

Prof. Ts. Dr. Gaanty Pragas A/L Maniam

Abstract: Powering the Future: Diversification of energy sources for vehicles In the thirst to discover sustainable energy, diverse sources are being explored. The more the diverse, the more the possibility in realizing their potentials to power vehicles in air, water, and land. From the first-generation to the fourth-generation biofuels, environmental, sustainability, efficiency aspects are being continuously sought after. Advanced biofuel technologies, such as gasification, pyrolysis, and genetically modified organisms, were among the active research areas. Yet, the debate over the net carbon emissions, land use changes, social impacts of largescale crop cultivation for feedstocks, and water resources remains. Meanwhile, many countries had implemented policies and regulations on blending requirements and tax incentives. On the other hand, the global market for electric vehicles (EVs) is growing continuously at a compounded annualised growth rate (CAGR) of above 20%. Their biggest challenge is the vehicle purchase cost; versus a massive supply of gas-powered vehicles that are comparatively cheap. The associated pollution comes from the source of electricity, the materials used in battery production, and the overall energy efficiency of the process. Other challenges such as charging stations, travel range, long charging sessions persists. Then again, manufacturers still believe that hydrogen fuel cell could secure a place. Although it is readily a pricy technology, the manufacturers persist with developing fuel-cell vehicles and believe that this technology has its place in a multi-fuel future. Yet, the large portion of hydrogen production is not fully eco-friendly. That means focusing only on one solution is not enough to decarbonise transport: need a variety of tools to decarbonise the majority of existing and future fleet that run on liquid fuels. So, the term diversify energy sources probably will be the key underlying principle to power the future vehicles.

Keynote 2

Multiomic Approaches to Understanding the Microbiome in Health and Disease Dynamics

Prof. Dr. Chee-Onn Leong

Abstract: Recent advancements in multiomics—including meta-transcriptomics, meta-proteomics, and metabolomics—have opened new perspectives in understanding microbial communities. Multiomics enables unparalleled characterization of transcriptional and translational activities in these communities, providing holistic insights into microbial membership and functionality. With microbiota populations influencing various health disorders, multiomics offers invaluable insights by identifying and sequencing different microbial populations within the human body. The data extracted from multiomics research, such as genomes from metagenomes, helps in understanding the ecology and physiology of microbial communities. Techniques have been developed to predict metabolic and phenotypic traits of microorganisms, connecting genome data to cellular processes, thus linking genotype and phenotype. These methods are crucial for predicting the metabolic capabilities and roles of different microbes in complex communities like the human gut. Metatranscriptomes and metaproteomics contribute significantly to understanding the active and passive members in microbial communities, revealing their metabolic pathways. Analyzing data from different environments helps draw correlations between environmental conditions and gene expression, providing insights into gene functions in various microbial habitats. Understanding these interactions within microbial communities, both cooperative and antagonistic, is essential for comprehending their survival strategies and the resulting impacts on human health. However, multiomics data also have limitations, with one significant challenge being the difficulty of assigning functions derived from community-wide data to specific taxa. Additionally, functional and metabolic traits inferred are often based on annotated genes, which might not always be accurate. Emerging technologies like single-cell sequencing and AI tools are enhancing multiomics approaches, offering deeper insights and facilitating the analysis of large datasets. As these technologies mature, their clinical applications, such as developing personalized medical interventions and therapies based on an individual's microbiome composition, are expected to expand. Nonetheless, challenges like the need for standardized methodologies, comprehensive databases, and ethical guidelines for data sharing and privacy protection still need addressing. These advancements in multiomics research offer promising avenues for improving healthcare and patient outcomes through a better understanding of the microbiome in health and disease dynamics.

Keynote 3

Algae Nanoparticle as Ecofriendly and Natural Antimicrobial and Bioreductant of Metal Pollution in Aquatic Environment

Hermin Pancasakti Kusumaningrum

Abstract: Algae play an important role in aquatic environments because determining fertility and waters quality. Nanoparticles from algae from the Cyanophyceae, Chlorophyceae, Phaeophyceae and Rhodophyceae classes have been synthesized using gold, silver and several other metal nanoparticles. Its antimicrobial activity and ability to be used as a bioreductant has been proven to reduce metal pollution in waters and is safer for the environment, especially due to the presence of pigments and antioxidants in the cell extract which act as cell protectors and compatible bioreductant. This review will examine the research of algae to trap metal nanoparticles, its safety as a natural food, and its potential as an antimicrobial and bioreductor which is supported by various other related research. The research that has been carried out is the manufacture of silver nanoparticles from Dunaliella and Chlorella microalgae to be used as natural and antimicrobial food for Penaeus monodon shrimp larvae and their effect on the growth and survival of shrimp larvae. Furthermore, other research that has been carried out shows the ability of the microalgae Chlorella and Dunaliella to trap the heavy metal silver. Research in metal-polluted aquatic environments has also shown the ability of both microalgae to trap metal polluting waters. The results of various studies that have been obtained show the potential of microalgae nanoparticles to be used as natural antimicrobials that are not harmful to the environment. Apart from the research that has been carried out, we will also explain various other studies that also use algae in the form of nanoparticles for use as an antimicrobial and for the ability to reduce pollution in the aquatic environment. In this way we will get a comprehensive understanding of the role of algae nanoparticles in the aquatic environment and their safety for organisms and the aquatic environment and their enormous potential if they are used for antimicrobial production on a mass scale.

Keywords: algae, nanoparticle, metal, waters, antimicrobial

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Cytotoxicity Effect of Rodent Tuber (*Typhonium flagelliforme*) Mutant Pekalongan Accession Against MCF-7 & MCF-10A Cell Lines

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Abstract: Plants have been used as medicine throughout history. Molecular compounds isolated from plants or their synthetic derivatives are commonly used as cancer chemotherapeutic drugs. Due to advances in combinatorial chemistry, natural products have been rediscovered as important tools for drug development. Gamma-ray irradiation enhanced the anticancer activity of a chemical compound from *Typhonium flagelliforme* Pekalongan accession. All extracts were tested on human breast cancer cell lines MCF-7 (estrogen receptor positive) and MCF-10A (estrogen receptor negative). The cytotoxicity of rodent tuber mutant plants was assessed on breast cancer MCF-7 and MCF-10 cells using a Prestoblue assay. On MCF-7 cells, rodent tuber mutant plants PM 4, PM 6, PM 9, and wild type exhibited cytotoxic effects with IC_{50} values of 402.878 µg mL^{-1}, 487.337 µg mL^{-1}, 457.103 µg mL^{-1}, and 242.053 µg mL^{-1}, respectively. It was found that mutant varieties of rodent tuber PM 4, PM 6, PM 9, and wild type were ineffective against MCF-7 cancer cells. The wild type still has the greatest cytotoxic effect according to IC_{50} values. Rodent tuber mutant varieties PM 4, PM 6, PM 9 and wild type did not potentially toxic affect the growth of MCF-10A non-cancerous cell cultures. In comparison with MCF-10A, the IC_{50} values of rodent tuber PM 4, PM 6, PM 9, and wild type were 460.937 µg mL^{-1}, 680 µg mL^{-1}, 615 µg mL^{-1} and 422.544 µg mL^{-1}, respectively. The morphological features did not show differentiation cells with different concentration extracts. As a result of this study, it was demonstrated that rodent tuber mutant plants PM 4, PM 6, and PM 9 did not show promising anticancer effects. It is possible to test rodent tuber mutants Pekalongan accession on other cells and explore the potential of the leaves extract.

Keywords: *Typhonium flagelliforme*, Pekalongan accession, MTT assay, rodent tuber mutant

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Research and Assessment of the Health Supporting Effects of Green Skin Pomelo Peel Tea

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Abstract. Pomelo peel has been and is being interested in applications in the food, cosmetic, and pharmaceutical industries. Pomelo peel tea is a unique product because of its attractive taste and high nutritional value. Following the results of the previous study, in this study, the safety of pomelo peel tea was evaluated through acute toxicity testing on a white mouse model. Besides, the healthpromoting effects of this product have also been demonstrated through in vitro and in vivo evaluation models. The results noted that pomelo peel tea was not toxic in mice when administered at a dose of5000 mg/kg body weight. Pomelo peel tea extract has the ability to treat diabetes by inhibiting the activity of starch hydrolyzing enzymes α-amylase and α-glucosidase. Moreover, when tested in a white mouse model, the weight of diabetic mice was improved as effectively as when using glucopage.

Keywords: Pomelo peel; acute toxicity; α-amylase; α-glucosidase; diabetes

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Research and Develop a Formula to Produce Tea Products from Pomelo Peels and Herbs

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Abstract. Pomelo is a fruit with high commercial value. However, the by-products of pomelo are currently still a burden on farmers. In the previous study, the green rind of pomelo applied treatmentprocesses to remove the bitter taste and obtained pomelo peel tea. In this study, herbs (sweet grass,butterfly pea flower, and hibiscus flower) were used to diversify tea products from pomelo peel. Nutritional components such as polyphenols, flavonoids, and antioxidant activity were used as monitoring indicators throughout the evaluation of the effects of mixing ratios. The results showed that pomelo peel tea combined with hibiscus flower had the highest nutritional value, respectively, TPC = 14.86 mgGAE/g, TFC = 58.78 mg QE/100g, and TEAC = 89.86 µmol TE/g. The finished products are highly appreciated for their sensory value and show the potential for large-scale production expansion.

Keywords: Pomelo peel tea, polyphenol, flavonoid, antioxidant

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Isolation and Screening of Effective Microbes (EM) From Transformer Oil Contaminated Soil for Remediation of Polychlorinated Biphenyls (PCB) in Waste Transformer Oil

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Abstract. Known for its recalcitrant nature, health and environmental hazards, polychlorinated biphenyls (PCB) still pose a threat even after its long history of massive commercialization and nationwide ban. Polychlorinated biphenyls were commonly used as coolant or dielectric in electrical appliances such as capacitors, lighting ballasts and transformers and due to its stable nature, it is still detectable in transformer oil from transformers that were manufactured prior to its ban. To degrade the PCBs, bioremediation through usage of telluric bacteria from soil affected with transformer oil spill has been explored. A total of eleven bacterial strains have been successfully screened for the ability to degrade polychlorinated biphenyls in selective liquid medium. The eleven isolates were identified and designated as Acinetobacter baumannii 1A-3, Comamonas testosteroni 1A-5, Cupriavidus taiwanensis 2A-1, Cupriavidus oxalaticus 2A-2, Acinetobacter junii 2A-10, Diaphorobacter nitroreducens 3A-1, Bacillus cereus 3A-3, Acidovorax delafieldii 3A-6, Stenotrophomonas acidaminiphila 3A-9, Acinetobacter baumannii 3A-10 and Stenotrophomonas nitroreducens 4A-6 based on 16S rRNA sequencing with PCBs degradation rate of 25.65%, 43.60%, 60.00%, 58.31%, 7.23%, 43.26%, 52.98%, 55.00%, 47.04%, 2.17% and 57.36% respectively after 20 days of incubation. The three most efficient isolates in degrading PCBs were Cupriavidus taiwanensis 2A-1 (60.06%), Cupriavidus oxalaticus 2A-2 (58.31%) and Stenotrophomonas nitroreducens (57.36%).

Keywords: Polychlorinated biphenyls, PCB, Bioremediation, Transformer Oil-contaminated Soil, PCB in Transformer Oil.

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Histopathological Observations of Acute Toxicity Effects of Rodent Tuber (*Typhonium flagelliforme*) Extract in Mice

Sendi Sukmara[1,a], Nesti Fronika Sianipar[2,3,b*], Yuni Elsa Hadisaputri[1,c], Khoirunnisa Assidqi[2,3,d], Idris Gautama So[4,e]

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Abstract. The acute toxicity of pharmaceutical preparations is tested as part of the preclinical safety testing process. There are various chemical compounds in rodent tuber (*Typhonium flagelliforme*), including alkaloids, steroids, saponins, terpenoids, and glycosides, which have anticancer and antioxidant properties. A rodent tuber extract was administered as part of a study to evaluate potential toxicity, the LD_{50} value, the effect of body weight, organ weight, and organ histopathology. In this study, 70% ethanol was used to extract the tuber of rodent tuber simplicia. For 14 days, the extract was administered orally to BALB/C mice in four groups, the control group at Na-CMC 0.5% and the extract group at 2000, 5000, and 15000 mg/kg body weight (BW). In the test, body weights were measured daily. On day 15, livers, kidneys, lungs, hearts, and spleens were sacrificed to be weighed and analyzed histopathologically. The results of this study revealed no lethal effects at the tested doses indicating that $LD_{50} \geq 15$ g/kg BW. In this study, there was no significant difference in body weight ($p>0.05$), but a significant difference in female lung organ weight ($p<0.05$). Histopathological analysis of the kidneys and lungs showed that the male group's kidneys showed inflammation and necrosis at doses of 5000 and 15000 mg/kg BW, whereas the female groups were normal. Males had normal lungs at doses of 2000 and 15000 mg/kg BW, while females had inflammation. Thus, ethanolic extracts of rodent tubers produce inflammatory effects at high doses. The extract of rodent tubers has exhibited mild toxic effects on mice.

Keywords: Rodent tuber, acute toxicity, LD_{50}, histopathology, *Typhonium flagelliforme*

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Optimization, Kinetics and Thermodynamics Study of Transesterification of Baoaba oil Using Homogeneous Catalyst as Biodiesel

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Abstract. Response surface methodology (RSM), based on central composite design (CCD) was used to determine the optimum condition for the production of biodiesel using Baobab seed oil the process variable were conducted and evaluated. At two level factorial (2^n experimental design) the parameters are methanol to oil molar ratio(3:1 – 12:1), the catalyst concentration (0.5%w/w - 25w/w), reaction time (30min – 120min) and reaction temperature(37 -87.5 ^{0}C). The physicochemical analysis result indicated that baobab oil has acid value 2.14mg NaOH/g, free fatty acid 1.07mg NaOH/g, density 0.916g/cm^3, specific gravity 0.91g/cm^3 saponification 209 KOH/g of oil. The optimum biodiesel yield obtained was 93.3 when, methanol to oil ratio 9:1, catalyst dosage 0.5, time 120 And temperature 75 ^{0}c was used. The kinetics confirm to be First Order , with the reaction rate constant as 7x10$^{-2,}$,8.3x10^{-2} 1.5x10^{-2} and 1.91 x10^{-2} at 37 , 50, 62.5 and 75^{O}C respectively with activition energy (AE) of 44.2kj/mol and Free exponential factor of 5.0x 10$^{5.}$ Thermodynamics parameters were calculated for the reaction process which shows the enthalpy and entropy as 42.4 KJ/mol and -140.7KJ/mol respectively and Gibbs free energy was found to be 3x10^4 Kj/mol.The fatty acid methyl ester composition of the baobab biodiesel was determined using gas chromatography couple with mass spectrophotometer (GC-MS). The FAME profile indicate that the dominants compound in biodiesel are ester compound. Fourier transform infrared spectroscopy analysis confirmed the cracking of a single glycerol backbone from the triglycerides and the substitution by methoxyl in the presence of a NaOH catalyst. the results showed that homogeneous base catalyst (NaOH) using Boabab seed oil (Adansonia digitata) under optimum reaction conditions provides high yield of biodiesel.

Keywords: Biodiesel, Transesterification, Optimization, RSM

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The Effects of Fermented Banana Peels in Agarose Hydrogel on the Growth of Mung Beans

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Abstract. Agar has been used as a plant growth medium for decades. Here, in this study, agar media was incorporated with fermented banana peels fertilizer as a slow-release fertilizer. The objectives of this study are to produce liquid fertilizer from banana peel fermentation with different ratios of banana peels and brown sugar (1:1, 1:5, and 5:1), incorporate Banana Peel-Liquid Fertilizer (BP-LF) to agar, and study the effect of developing Banana Peel-Agar (BP-Agar) with different ratio of fermented banana peels on the growth of the mung beans. The nutrient content in fermented BP-LF were tested using Inductive Coupling Plasma-Optical Emission Spectrometer (ICP-OES), and the result showed that the 5:1 ratio of fermented BP-LF contains higher potassium and phosphorus, followed by 1:1 and 1:5 ratio of fermented BP-LF. However, fermented BP-LF with 1:1 ratio shows the best growth on the mung beans in agar compared to 1:5 and 5:1 ratios. This fertilizer's nutrient content is not the highest but moderate, which is enough for mung beans growth. Nevertheless, the mung beans in agar media with 1:1, 1:5, and 5:1 ratios of BP-LF grow shorter than in the soil (reference). Fermented BP-LF is incompatible for plant development and growth when implemented in agar but not in soil media. Agar is proven to retain water for the plant growth and development as mung beans of T1 can grow higher in agar media. However, the fabricated BP-LF with optimum ratio could be the best method during germination due to the great water retention (compared to the soil). The germination is a crucial process that needs enough water, and BP-LF can sustain the water during the process efficiently. The medium hybrid (agar dan soil) would be the best way to maintain the rate of growth of the mung beans for all stages of the growth process.

Keywords: Banana peels, Fermentation, Agar, Mung beans, Slow-release fertilizer

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The Effect of the Hydrophobicity on the Electromechanical Performance of Dielectric Elastomer through various Technique of Compositing

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Abstract. Dielectric elastomers (DEs) are employed in a variety of applications, including actuator, generator and sensor. Due to its numerous advantages over alternative DE; such as acrylic elastomer, polydimethylsiloxane (PDMS) was chosen as the DE in this study. Low permittivity is one of the among the issues that prevents the PDMS from being used as the DE despite its many advantages. Despite having great electromechanical performances in the majority of technology applications, DE has electromechanical performances constraints due to its low relative permittivity. Multiple techniques to boost the relative permittivity of DEs have been proposed; such as adding permittivity-enhancing fillers to PDMS films. However, these approaches have implications for other parameters. This research's objectives were to evaluate the electromechanical properties of PDMS films and investigate how fillers' hydrophobicity affected those properties. This study also examined how different filler particle types and filler percentages affected the chemical composition, morphology, and mechanical and thermomechanical characteristics of PDMS-based composites. In this study, polydimethylsiloxane (PDMS) films were incorporated with three different fillers which are silicone oil, modified TiO_2 and hybrid. Fillers were prepared based on the types (soft or hard) and percentage concentration (3%, 6% and 9%) before they were added to the PDMS elastomer as high permittivity fillers. The 9% of modified TiO_2 filler is prepared by mixing it with an appropriate amount of Sodium Dodecyl Benzene Sulfonate (SDBS) that works as an ionic surfactant then the mixture is incorporated in PDMS films and showed the highest increased at breakdown strength. Besides that, the 9% of modified TiO_2 filler showed the hardness and uniform distribution in the PDMS that boosted the tensile strength and elongation at break values of the hard filler. Furthermore, the filler was evenly dispersed throughout the PDMS film, according to the morphology of PDMS combined with 9% modified TiO_2 filler, and the presence of lamella phase was also clearly visible. The modified TiO_2 filler composited with PDMS film give high electromechanical performances as comparison to the silicone oil and hybrid filler, as modified TiO_2 filler is more hydrophobicity than these two fillers.

Keywords: Dielectric elastomer, Fillers, Titanium Dioxide, Hydrophorbicity, PDMS

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Discrimination Of Oil Palm Cultivars Using Mass-Spectrometry Based Technology

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Abstract. Malaysia has the largest oil palm germplasm collections in the world. Characterization of agronomic traits of various cultivars is important for crop improvement. While the morphological appearance of the oil palm is similar, especially at the nursery stages, their agronomic traits are influenced by the biological component within. Five oil palm cultivars (Deli *dura* X Avros *pisifera*, Zaire *dura* X Cameroon *pisifera*, Dumpy *dura* X Dumpy *dura*, Ulu Remis *Dura* x Nigerian *Pisifera* and Ulu Remis *Dura* x Ekona *Pisifera*) were screened via high resolution accurate mass spectrometry for fast and robust classification. These oil palm cultivars were planted in an open nursery and maintained via standard practice and a random block experimental design was implemented with ten biological replicates for each tested cultivar. At the age of 12 months, primary oil palm roots were collected and proteins were extracted from the root samples. The proteins were fractionated with one-dimensional electrophoresis. Tryptic digestion was conducted, and the peptide was further analyzed via the EASY-nLC 1000 coupled to Q-Exactive Plus Hybrid Quadrupole-Orbitrap mass spectrometer. Protein identification was performed using the Proteome Discoverer software and the oil palm protein database derived from
NCBI and in-house collections. A total of 2938 proteins were identified. The protein abundance was clustered by principal component analysis (PCA) and the plots showed that the five oil palm cultivars can be discriminated by their abundance value. Heatmap analysis showed several proteins high in abundance ($p < 0.05$) in each cultivar. The finding confers the possibility of applying mass-based technology to distinguish the cultivar of interest.

Keywords: Oil palm cultivars, mass spectrometry, proteins

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The Importance of Eurycoma Longifolia (Tongkat Ali) in Boosting Testosterone in Aging Men

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Abstract. Eurycoma longifolia or Tongkat Ali Putih is often associated with aphrodisiac properties in men. The aphrodisiac properties of E. longifolia is due to its ability to elevate testosterone. Even though both men and women can potentially benefit from the use of Tongkat Ali, it is more focused on men due to the higher blood testosterone levels in men rather than women. An important misconception of Tongkat Ali is that it is notoriously regarded merely as an aphrodisiac without being aware testosterone is beyond its aphrodisiac properties. Especially for aging men, the testosterone level is known to decrease after the of age 40 each year by 1 to 1.5%. This decline can affect men's mental and physical health. Studies have proven the ability of E. longifolia to boost serum testosterone levels and its impact on mental and physical health. This article is based on reviews of selected scientific articles published to determine the relationship between E. longifolia in boosting testosterone levels and health in aging men. Based on a study, the supplementation of extract E. longifolia increases the serum total testosterone, reduces fatigue and improves the quality of life in aging men within 2 weeks' time. E. longifolia extract is also believed to prevent male osteoporosis and can be considered as an alternative approach to testosterone replacement therapy (TRT) for the treatment of male osteoporosis. These reviews showed the importance of E. longifolia in boosting testosterone levels in men and the necessity for men to be aware of the decline of testosterone levels and its repercussions on their health.

Keywords: Eurycoma longifolia; aphrodisiac; testosterone; aging; men

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Detection of Pathogenic *Leptospira sp*. from Body Surface of Cockroaches by Real Time PCR.

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Abstract. Leptospirosis cases in Malaysia are increasing each year and are typically related to peridomestic rodents, specifally rats. They are the most important reservoirs of *Leptospira sp.* and have been significantly found sharing the same habitats with the cockroaches. Their interaction with humans is more or equal compared to the rats. Habitats that were contaminated with urine of infected rats may contaminate the body of cockroaches with *Leptospira spp.* and probably their digestive tract too. This study has therefore attempted to demonstrate the potential role of cockroaches as carriers of pathogenic *Leptospira spp*. In this study, Real Time PCR (RT-PCR) method based on LipL32 gene was used to detect pathogenic *Leptospira spp*. One hundred thirty-seven cockroaches were captured using commercial cockroach traps from a wet market in Beranang , Selangor. Samples were taken from body surface of each cockroach and cultured individually in EMJH media, then incubated in the dark condition for 2 months at 28°C, observed under x40 dark-field microscope in order to detect the present of *Leptospira spp*. Nine isolates from the body wash of the cockroaches produced Ct values ranging from 17.12 to 37.56, therefore were positive and pathogenic for *Leptospira spp*., whereas 6 isolates (LS3, LS25, LS45, LS78, LS 87 and LS113 produced undetermined Ct values, therefore were free from any for pathogenic *Leptospira spp*. Cockroaches have the potential to be the mechanical carrier for *Leptospira spp*. RT-PCR utilizing the mentioned set of primers and probe can be used to identify pathogenic *Leptospira spp*. from local cockroaches.

Keywords: *Leptospira sp*, cockroach, RT-PCR, body surface and pathogenic

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A Study On The Synthesis of 2,5-Furan Dicarboxylic Acid And Its Copolymerization

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Abstract. Oil palm empty fruit bunch (OPEFB) is one of the major biomasses produced by the oil palm industry in Malaysia and Indonesia, and the availability of this material led to many studies on its application as a source of renewable energy. Among the various derivatives that can be produced from biomasses, furan-2,5-dicarboxylic acid (FDCA) synthesis has been widely investigated due to its potential as a green substitute for polyethylene terephthalate (PET) plastic. In this study, methods to produce FDCA from OPEFB were scrutinized, including a pathway involving the conversion of OPEFB to cellulose, glucose, HMF, and FDCA stepwise. It is then used in copolymerization to develop biodegradable copolymers with enhanced mechanical and thermal properties. This is facilitated by EDC/NHS coupling mechanism through the diamine groups to form a polyamide. The incorporation of FDCA into the polyamides changes the crystallinity, thermal properties, and mechanical properties due to the distinctive asymmetry of the furan ring.

Keywords: Furan-2,5-dicarboxylic acid, oil palm empty fruit bunch, biodegradable polymer, polyethylene glycol, copolymerization

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Different Qualities of Combed Silk Sliver in Industrial Process of Spun Silk Yarn Derived from Fiber Biomaterials of Eri and Mulberry Silks

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Abstract. Silk protein fiber is produced from the body fluid of the silkworm. It is the natural fiber of
fine filament. These fibers are composed of polypeptides containing four different amino acids. Different types of silkworms and their feeding leaves affected the biosynthesis quality of Eri and Mulberry silk fibers. These synthesized fibers are directly affected on spun silk yarn industrial processes because they are used in producing high value and luxury fabric products. Therefore, this
research aims to inspect the different types of silk fibers (Eri and Mulberry) which affect the sliver quality in spun silk yarn production process using industrial equipment, scales, and conditions. The silk fiber biomaterials were carded and converted to card silk slivers using a carding machine and then, removed nep, impurity substances and short fiber using combing machine. After the combing process, combed silk sliver was achieved. Both combed silk slivers were inspected for physical qualities based on fiber length using in-house fiber diagram method, unevenness (U%) using Uster Tester 4 machine, nep and impurities values using Mesdan NATI Nep and Trash tester machine. The
result showed that Eri silk combed sliver has longer fiber length in Max, Min, and Med values than Mulberry silk comb sliver. Eri silk combed sliver had lower number in nep and impurities values than
Mulberry silk comb sliver. Mulberry silk combed sliver has lower unevenness (U%) values than Eri silk combed sliver. These results inform that types of silk fibers directly affected the quality of the sliver in spun silk yarn industrial process.

Keywords: Eri, Mulberry, Silk fiber, Silk sliver, Silk sliver quality, Industrial process, Spun silk yarn

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Industrial Wastewater is a Sustainable Culture Medium for Microalgae Cultivation for High Value Biomass, Livestock Wastewater Treatment, Biodiesel Production and Carbon Sequestration: A Comprehensive Review

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Abstract. Microalgae are known for containing high value compounds and its significant role in sequestering carbon dioxide. Besides, microalgae produce high amount of biomass feedstock in a short time with less amount of land capacity by using wastewater as the medium to grow. Malaysia is producing variable wastes from both agro-industrial and industrial sectors that can be recycled as a nutrient supply for microalgae. Wastewater that is available in Malaysia comprises high nutrient value compounds that have high amount of nitrogen and phosphorus. This article review explores the various ways microalgae are used in Malaysia to treat wastewater for biodiesel production. It aims to comprehend the state of microalgal-driven processes at the moment and their potential to lessen environmental pollution while generating useful byproducts like biochar, biofuel, biohydrogen, bioethanol, and biofertilizer. This study highlights the benefits and difficulties of establishing microalgae-driven processes, as well as potential approaches for expanding their deployment in Malaysia, by synthesising the existing literature. Researchers, decision-makers, and members of the industry will find this review useful as they look into opportunities to lessen the negative economic and environmental effects of wastewater.

Keywords: Wastewater, Microalgae cultivation, Algal biodiesel, Algal biomass

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Optimization and Exploration of Biological Activities of Mycelium Biomass and EPS from P. Ostreatus

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Abstract. Pleurotus ostreatus, a mushroom species enjoyed worldwide, is highly sought after for its distinct taste and numerous bioactive compounds. This study focuses on exploring the biological properties of P. ostreatus cultivated in a submerged environment. To optimize the cultivation process and achieve high yields of biomass and exopolysaccharides (EPSs), various parameters such as pH, temperature, inoculum density, and cultivation time were adjusted, along with different carbon and nitrogen sources. Biological activities of various bioactive metabolites have been studied and the results showed a high antioxidant activity for mycelium biomass. Moreover, mycelial growth kinetics was investigated by different kinetic models. Therefore, the results obtained from this study possesses antioxidant and prebiotic compounds, which have the potential to be utilized in the production of functional foods and nutraceuticals.

Keywords: Exopolysaccharides, antioxidants, growth kinetics, bioactive compounds

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A Critical Review on High-throughput Monitoring of Pathogenic Microbes and Antibiotic Residues: from Hospital Bedside to Landfill.

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Abstract. Antimicrobial resistance in pathogenic microorganisms continues to be a global healthcare concern owing to the widespread of antibiotic residues from healthcare setting to the environment. The emergence of antibiotic-resistant bacteria has implicated difficult-to-treat diseases and driven the evolution of microorganisms towards drug resistance. The unprecedented pandemic of COVID-19 elevated the risks of nosocomial infections, notably in intensive care units, as well as bacteraemia in hospitals. The population of pathogenic microorganisms in the hospital environment was frequently underestimated due to the lack of early detection and the complexity of clinical diagnostics to detect the presence of causative agents, resulting in prolonged hospitalization, unnecessary deaths, and burdening the health care system. Rapid and accurate pathogen identification is crucial for clinical diagnostics and infectious disease surveillance. Traditional cultivation-based bacterial detection methods are time-consuming, labor-intensive, and selectively detect pathogenic bacteria due to unfavorable growth conditions. Metagenomics, a non-culture-based approach, characterizes microorganisms at the molecular level through sequencing, enabling quick and comprehensive analysis of microbial populations. Next-generation sequencing platforms, such as Illumina technology have significantly improved microbial identification by producing high-throughput sequencing data with high sensitivity and specificity. Amplicon sequencing is often used to detect bacteria and fungi populations by targeting the 16S ribosomal RNA gene and Internal Transcribed Spacer rRNA region, respectively. Meanwhile, whole genome sequencing examines an organism's complete DNA sequence and provides detailed information on virulence and antibiotic resistance genes. The recent development of portable long-read sequencer by Oxford Nanopore Technologies has overcome the limitations of Illumina short-read sequencing for real-time and comprehensive analysis of microbial communities. This helps to expedite pathogen detection and improve clinical decisions, thus further enhancing the quality of healthcare delivery and reducing use of antibiotics.

Keywords: antibiotic, healthcare, pathogen, resistance, waste

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Metagenomic Assessment of Indoor Air Microbiome as a Potential Source of Nosocomial Infections Among Healthcare Workers: A Short Review Based on Current Evidences

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Abstract. Nosocomial infections, also known as healthcare-associated infections, pose a significant threat to patient, healthcare practitioner safety and can be a burden on healthcare systems. While much research has focused on identifying the sources of nosocomial infections within healthcare settings, the role of indoor air microbiome as a potential reservoir and transmission route remains poorly understood. This review aims to provide an overview of current evidence on the metagenomic assessment of indoor air microbiome as a potential source of nosocomial infections among healthcare workers. Indoor air serves as a complex microbial ecosystem, influenced by various factors such as building design, ventilation systems, occupancy, and human activities. Recent advances in metagenomic sequencing technologies have enabled a comprehensive analysis of the microbial communities present in indoor environments, including healthcare facilities. Several studies have investigated the composition and diversity of the indoor air microbiome in different areas of healthcare settings, highlighting the presence of pathogenic and opportunistic microorganisms. Metagenomics involves the high-throughput sequencing and analysis of DNA extracted directly from environmental samples, bypassing the need for culture-based methods. Metagenomic approaches enable the comprehensive analysis of microbial diversity, functional potential, and community composition within a given sample. When applied to indoor air microbiome characterization, metagenomics allows characterisation of the microorganisms present in the air, including bacteria, fungi, viruses, and other microbial entities. In conclusion, this review highlights the importance of metagenomic assessment of indoor air microbiome in understanding the potential role of airborne transmission in nosocomial infections among healthcare workers. A better understanding of the indoor air microbiome and its impact on healthcare-associated infections can guide the development of targeted strategies for infection prevention and control in healthcare settings, ultimately improving patient and healthcare worker safety.

Keywords: indoor air microbiome, nosocomial infections, healthcare workers

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Herbal Medication and Non-Hospital Utilization in Malaysia during Covid-19 Pandemic

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Abstract: Herbal medication (HM) is a popular choice; however, it is not known if the dependence on HM somehow effected conventional medical practices including hospital utilization during COVID-19 pandemic. The objective of the study was to examine the usage of HM during pandemic and its association with non-hospital utilization. It is a cross-sectional study conducted on Malaysian population age ≥18. A total 393 respondents from diverse ethno-religious background (Malay 26.5%, Chinese 34.1%, Indian 34.6%, Indigenous origin 3.3%, others 15%) participated in the study and 59% of them were female (n = 232). Majority (n = 286, 72.8%) of these respondents claimed they were afraid of visiting hospital during pandemic, therefore, as alternative choice had consumed HM (n=202, 51.4%) as it was readily available (n = 53, 13.5%) and cost effective (n = 62, 15.8%). Although, consumption pattern of HM was found to be significantly ($p<0.001$) associated with knowledge. Most of the consumers preferred products certified by Kementerian Kesihatan Malaysia (KKM) (n =133, 33.8%) and purchased HM from pharmacy retailers (n =114, 29%). There was significant ($p<0.05$) association found between HM consumption and non-hospital utilization. A number of the respondents (n=35, 43.2%) claimed HM reduces the severeness of symptoms; a fraction of the respondents also claimed HM is effective to the extent no need hospital utilization (n= 67, 36%). In conclusion, HM consumption during pandemic was based on relevant knowledge and was significantly associated with non-hospital utilization and fear of covid-19 was a reason behind this predisposition.

Keywords: herbal medication (HM), non-hospital utilization, COVID-19

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Air Pollution and Real Time Hospital Admissions for Eczema and Asthma in Kuala Lumpur, Malaysia

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Abstract. Air pollution disease burden is a major global health concern. Epidemiological findings on its adverse effects on human respiratory and skin remain limited with regards to disease burden assessment in Malaysian. This study aimed to compare ambient air PM2.5 concentration association with real-time hospital admission rates for eczema and asthma in a single specific healthcare facility. An 18-month cross-sectional study was conducted. Daily ambient $PM_{2.5}$ concentrations at 5-minute intervals were collected using a DustTrakTM Aerosol Monitor Model 8520. Patient demographics and admission case profiles of eczema and asthma patients were extracted from the Hospital Information System (HIS) of the University Malaya Medical Centre. Admission of patients outside the geographical region of interest was excluded from this study. A total of 44 eczema and 674 asthma cases were extracted from the hospital database. A major proportion of patients admitted were of the age category below 20 and above 60 for both conditions. A moderate negative correlation (r=-0.539) was reported between ambient $PM_{2.5}$ concentrations with admission due to eczema. As for admission due to asthma, a negligible negative correlation (r=-0.127) was reported against $PM_{2.5}$ concentration. When analyzed by asthma subtypes, unspecified and predominately allergic asthma established negligible correlation of r=-0.229 and r=-0.250 respectively. However, a weak negative correlation (r= -0.446) was reported for status asthmaticus admission cases. Findings are suggestive of a potential relationship between $PM_{2.5}$ concentration and hospital admission cases of eczema and asthma that could serve as evidence for future studies though a causal link could not be established.

Keywords: Air pollution, Dryness, Itchiness, Eczema, Asthma

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Solid Content Analysis of RDF Quality-Related Waste Resources

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Abstract. The most important environmental issue in urban areas worldwide is solid waste management due to the increasing amount of waste. Land areas are introduced to solve the problem by landfilling. However, landfilling of municipal solid waste has limitations and is undesirable due to environmental impact. Managing landfills of solid waste back to its original condition for the benefit of maximizing the use of landfill space. It has a positive effect on people in the community and the environment, as well as bringing solid waste to good use. The purpose of this research was to analyze wastes recycled from 2 types of waste resources. Five kgs of municipal solid waste and recovered landfill waste were collected and identified the waste compositions. The two types of wastes listed are mainly composed of soft plastics. However, municipal solid waste contains almost twice as much soft plastic than recycled landfill waste. Hard plastic has little content in both wastes but the amount of recycled landfill waste is more than twice that. Both wastes contain biological material contents, approximately 30% of all waste. Landfill waste management has the effect of reducing the number of soft plastics and biomaterials due to microbial fermentation. These waste resources, with different major compositions, will affect the quality of the refuse-derived fuel (RDF) product when it enters the solid waste management plant. These waste resources which differed in their main compositions are affected on the quality of refuse-derived fuel (RDF) products after flowing into solid waste management plant.

Keywords: Landfill, municipal solid waste, RDF, waste, waste management

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Investigating the Feasibility of Native Wood Substitutes for Imported Wood in the Wooden Pallet Industry

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Abstract. Freight transport in various business types is increasing all over the world. It affects the logistics system of the supply chain, coordinate storage and delivery of goods and services across the supply chain. Wooden pallets play an important role in supporting and stabilizing cargo during transportation. The global wood pallet industry has expanded dramatically in recent years and thus has resulted in the wood pallet industry becoming more competitive. The demand for wood and wood products is increasing exponentially across the world. The purpose of this research was to study the use of native wood to replace imported wood. In this experiment, imported and native wood timbers were used as a bio-based material for making pallets. The imported and native woods were cut and assembled into the pallet with same type of wood and mix wood. This pallet size is an industrial standard size. These prefabricated pallets are heat treated by raising the temperature in an industrial heat chamber to 70°C to destroy microscopic organisms and remove wooden moisture. The physical characteristics of each type of pallet wood in relation to the biological substances contained in imported and local timbers are analysis. The results showed that each type of pallet has different properties depending on the composition of the biomaterials in the wood. These pallets have been tested for industrial use and have been found to be useful in logistics.

Keywords: Biomaterial, Industry, Process management, Wooden pallet, Wood substitute

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Protective Effect of Taxifolin Chitosomes on Myocardial Infarction Induced by Isoproterenol in Mice

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Purpose: Taxifolin (TAX) is a flavanol compound with a cardioprotective effect, but its application is severely limited by its poor water solubility and low oral bioavailability. Therefore, it is important to urgently find a method to improve the oral bioavailability of TAX. liposome, a promising delivery system with phospholipid bilayer, could overcome those drawbacks. However, the instability of lipos limits its development in application. In this study, the chitosan was used to protect the structure stability of phospholipid bilayer of TAX-Lipos and control the sustained release rate of TAX further.
Methods: In this study, TAX encapsulated in chitosan-coated liposomes (TAX-Chitosomes) were prepared by an ethanolic injection method, and a series of physicochemical properties of the liposomes (Lips) were studied. The cumulative in vitro release rates of free TAX, taxifolin liposomes (TAX-Lips), and TAX-Chitosomes in the simulated gastrointestinal fluid were measured by in vitro release experiments, and the effect of TAX-Chitosomes on the mice cardiac muscle (HL-1) cells was detected by MTT assay. Finally, the cardioprotective mechanism of TAX-Chitosomes was explored through in vivo experiments.
Results: The results showed that the particle size of TAX-Chitosomes was 180.72 ± 2.85 nm, the zeta
potential was +35.31 ± 0.57 mV, the PDI was 0.272 ± 0.088, and the EE was 80.9 ± 3.73%. The in vitro release results showed that the cumulative release rates of TAX-Lips and TAX-Chitosomes in simulated gastric fluid for 24 h were 88.60 ± 5.31% and 62.91 ± 1.20%, respectively. The cumulative release rates in simulated intestinal fluid for 24 h were 69.61 ± 4.38% and 49.94 ± 3.2%, respectively.
The results of cytotoxicity experiments proved that TAX-Chitosomes had a significant inhibitory effect on HL-1 cells. In vivo experiments further showed that TAX-Chitosomes significantly improved the survival rate of Isoproterenol induced acute liver injury mice and exerted cardioprotective effects by regulating the expression of autophagy proteins and inhibiting the activation of toll-like receptor 4 (TLR4)/nuclear factor kappa B (NF-κB) signaling pathway.
Conclusion: This study proved the significant cardioprotective effect of TAX-Chitosomes and provided a new idea for the application of TAX.

Keywords: Taxifolin; Chitosan; Myocardial infarction; Isoproterenol; Cardioprotective; Liposome

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Impact of Oven Drying on the Nutritional Composition, Antioxidant Activity, and Physicochemical Properties of Black Soldier Fly (Hermetia illucens) Prepupae.

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Abstract. The Black Soldier Fly (Hermetia illucens) prepupae have gained attention as a potential sustainable source of protein and other valuable components. In this study, the effect of oven drying on the nutritional composition, antioxidant, and physicochemical properties of Hermetia illucens prepupae was investigated. The prepupae were subjected to oven drying at a temperature range of 60 to 80°C and drying duration of 24 to 72 hours. The results revealed significant changes in the nutritional composition of the prepupae following oven drying. The protein content ranged from 37.44% to 45.23% which was significantly different at $p < 0.0005$, while the lipid content varied from 36.25% to 48.27% which significant differences at a high level of significance ($p < 0.0001$). Moisture content decreased at highly significant differences ($p < 0.0001$) during the oven drying process, ranging from 63.84% to 67.68%. However, the chitin content remained relatively stable, ranging from 9.27% to 12.08%, indicating the stability of chitin during the drying process. Furthermore, oven drying led to a significant decrease in the antioxidant activity of the prepupae at $p < 0.0005$, as indicated by the DPPH free radical scavenging activity, which ranged from 52.3 to 87.5%. The browning index of the oven-dried prepupae increased significantly at $p < 0.05$, ranging from 131.61 to 452.47, indicating the occurrence of Maillard reactions. However, the drying process had no significant effect on the physicochemical properties such as water absorption and solubility index. These findings demonstrate that oven drying of BSF prepupae at temperatures between 60 and 80 degrees Celsius for up to 72 hours can effectively reduce moisture content without substantial changes in chitin content, making it a promising method for preserving essential nutrients (lipid, protein and antioxidant). Further research is warranted to optimize drying conditions and explore potential applications of dried prepupae in food and feed industries.

Keywords: Black Soldier Fly prepupae, Hermetia illucens, oven drying, nutritional composition, lipid, protein, chitin, antioxidant activity

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Harnessing Waste Phyllosilicate Mineral from Oil Palm Mill as a DualFunction Soil Adjuvant and Plant Biostimulant: Synergistic Effects with Beneficial Microbes for Enhanced Plant Growth and Rejuvenation Therapy

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Abstract. The effective utilization of waste materials from various industries is crucial for sustainable development. In this study, we explored the formulation of phyllosilicate mineral (PM), derived from waste generated by oil palm mills, in conjunction with beneficial microbes combination (Mycorrhizae spp., rhizobium spp., Bacillus subtilis, Pseudomonas fluorescens, and Trichoderma spp.) abbreviated as BMC, to develop a dual-function soil adjuvant and plant biostimulant for enhancing plant growth and rejuvenation therapy. Formulation of PM and BMC include structural investigation of PM, BMC selection and compatibility testing, ratio and concentration of PM:BMC optimization, and nursery and pre-field trials. The formulated PM-BMC as adjuvant and biostimulant exhibited synergistic effects, leading to enhanced root development, increased shoot biomass, and improved nutrient uptake in treated plants ($p<0.05$) compared to controls. Furthermore, key physiological parameters, including chlorophyll content, photosynthetic efficiency, and antioxidant activity, showed significant enhancements ($p<0.05$), indicating improved plant health and stress tolerance. In conclusion, this research demonstrates the potential of repurposing waste PM from oil palm mills as a sustainable solution for soil adjuvancy and plant biostimulation. By harnessing this waste material, we contribute to waste reduction and resource optimization in the agricultural sector. The combination of PM-BMC offers a promising strategy for sustainable agriculture, promoting efficient nutrient utilization, and reducing environmental impact.

Keywords: Phyllosilicate Mineral, Beneficial Microbe, Soil Rejuvenation, Soil Adjuvant, Plant Biostimulant

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Development and assessment of pellet formulation with MD2 pineapple peel inclusion for local Red Hybrid Tilapia fish, *Oreochromis* spp.

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Abstract: Agriculture waste in Malaysia remains a big issue when the solution and action upon it were not really taken seriously by the authorities and public. Agriculture waste with high nutritional value is in demand because it is inexpensive and can improve livestock health. Fruit waste such as pineapple peel can be applied as feed additives for the value-added fed. Unrestrained use of antibiotics to maintain the health of aquaculture has implicated resistance pathogenic aquaculture bacteria towards the antibiotics and somehow leaking into food chain. Therefore incorporating prebiotic in aquaculture as feed additives could be a harmless and better option to promote aquaculture well-being. The aim of this study is to formulate fish feed for Red Hybrid tilapia, Oreochromis niloticus with the inclusion of 5% MD2 pineapple peel (PAP) as a prebiotic supplement and to study the nutritional diet and physical characteristics of the pellet. The tilapia fish will be fed with the formulated pellet containing soybean meal, fish meal, corn, corn gluten meal, casava tubers meal, palm oil, mineral premix, vitamins, and pineapple peel. The formulation comprises calculated values of digestible energy;14MJ/kg and digestible protein at 32%. The bulk density, floatabilty, and expansion ratio were recorded at 385.28kg/m-3, 95%, and 2 respectively. It can be concluded that the nutritional and physical properties of the formulated pellet met the requirement diet needed for local tilapia fish with the additional prebiotic supplement from the inclusion of the value-added MD2 pineapple peel that would significantly improve the growth performance and health of the local Red hybrid Tilapia fish.

Keywords: agriculture waste,environmental pollution,waste management, recycling, pineapple peel, prebiotic,animal feed, feed formulation

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Effects of PGRs Applied Singly or in Combination on Micropropagation of *Solanum lasiocarpum* Dunal

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Abstract. *Solanum lasiocarpum* Dunal. or commonly known as Terung Asam is a Sarawak indigenous fruit that belongs to family Solanaceae. The fruit is typically consumed as a vegetable and used in Asian traditional medicine. Conventional technique of asexual propagation of the plants tends to be susceptible to pest and disease infestations. To address this concern, the micropropagation method was employed as an alternative approach. Hence, this study aimed to develop a protocol for micropropagation of *S. lasiocarpum*. In this study, healthy *in vitro* seedlings age of two-month-old were sectioned into approximately 1.0 cm, whereby the nodal segment was selected as an explant. The explants were cultured into culture containers containing 30 g/L of sucrose and MS medium supplemented with different concentrations (0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5 and 5.0 mg/L) of PGRs either BAP alone or BAP and IAA in combination. The cultures were maintained in the culture room at 25 ± 2 ˚C under 24-hours florescent light. The data were recorded on the effects of plant growth regulators (PGRs) on shoot multiplication, root formation and callus induction after 35 days of culture. The findings of this study will enhance the micropropagation techniques for *S. lasiocarpum* and potentially make a noteworthy contribution to the cultivation of this plant species.

Keywords: BAP, Callus formation, IAA, IBA, Root formation, Shoot induction, Terung Asam.

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Effective Nano-Emulsion Fungicide to Control the Growth of *Aspergillus* Flavus in Grain Corn Storage

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Abstract. Grain corn (*Zea mays* L.) is the world's third most important cereal grain because of its nutritional value, which has led to its use as livestock feed. Corn contains roughly 70 percent starch, and other essential components include protein, fiber, minerals, and antioxidants. Before being stored, grain maize must be thoroughly dried to less than 15% moisture content. However, grain corn is classified as hygroscopic and has a propensity to absorb or release moisture. Thus, in some cases, even after proper drying, the hygroscopic mechanism involved might increase the moisture content of the grain corn kernel. This condition will finally lead to the proliferation of *Aspergillus flavus*, a fungus responsible for the production of the carcinogenic toxin Aflatoxin B1 (AFB1) in humans and animals. AgroZIDE™, a nano-emulsion containing natural anti-fungal ingredients, has been developed to control the growth of *A. flavus* in stored grain corn. In addition, grain corn sprayed with AgroZIDE™ during the drying process also forms a water-impermeable structure that reduces water transfer and minimizes grain corn's hygroscopic mechanism during storage. In this study, the effectiveness of AgroZIDE™ in controlling *A. flavus* and the water content of grain corn were tested for 6 months of storage. The results obtained showed that the grain corn treated with AgroZIDE™ was able to control the growth of *A. flavus* by 100 percent and minimize the hygroscopic mechanism by controlling the grain corn kernel's moisture content, which increased by only 0.76 percent from 13.0 to 13.1.

Keywords: grain corn, *Aspergillus flavus*, aflatoxin, nano-emulsion, fungicide

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Simple Ration Formulation For Carbon And Nitrogen Content In Grey Oyster Mushroom Cultivation Substrate Using Pearson Square Method

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Abstract. Rubber sawdust is one of the most common materials used as mushroom substrate in Malaysia and its depletion is becoming one of the challenges in mushroom cultivation. A quest for alternative resources was rigorously conducted by using various biomass such as paddy straw, spent
mushroom substrate, boxes, and river tamarind sawdust (Leucaena leucocephala). A conventional method in determination alternative materials amount is based on yield analysis at different mixing
composition. This method took too much time for invesments and experiment. Thus, the goal of this
study is to find out the effectiveness of using Pearson Square method for mushroom substrate preparation with desired nutrient level based on calculation. To begin, carbon and nitrogen content
of all materials used was determined by dry combustion and Kjeldahl method respectively. Next, the desired carbon-to-nitrogen ratio was formulated based on the carbon-to-nitrogen ratio of the common substrate that consist of rubber wood sawdust, rice bran and calcium carbonate (limestone) at 100:10:1 ratio which act as control. Four different substrate combinations with similar C/N ratio were calculated by Pearson Square method and prepared. These combinations including control were inoculated by the spawn of grey oyster mushroom (Pleurotus pulmonarius). Parameters of spawn running rate, height of stipe, diameter of pileus and biological efficiency (BE) were measured and analyzed. The mushroom yield obtained shows that there is no significant difference between the substrate combinations according to one-way ANOVA, indicates all substrate combinations have the similar nutrients content and application of Pearson Square method is verified. In summary, Pearson Square method was proven can be applied in preparing mushroom substrate from different resources with desired nutrient level.

Keywords: carbon nitrogen ratio, grey oyster mushroom, cultivation substrate, Pearson Square Method

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Effect of AKD Concentration as Crosslinker in PVA/ZnO Film for Food Packaging Application

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Abstract. The aim of this study is to analyze the incorporation of alkyl ketene dimer (AKD), a non-toxic and environmentally friendly chemical, in combination with polyvinyl alcohol (PVA) and zinc oxide (ZnO) nanoparticles. The PVA/ZnO/AKD films were synthesized at varied concentrations of AKD (1 – 3 wt.%) and fabricated by using solution casting method. The prepared films were analyzed using Fourier-transform infrared spectroscopy (FTIR), Xray diffraction (XRD), and scanning electron microscopy (SEM). The presence of AKD in the PVA/ZnO films was confirmed by strong XRD peaks at 32.08º, 34.7º, and 36.8º. Compared with PVA/AKD, a new FTIR band at 1710 cm^{-1} was observed for the PVA/ZnO/AKD films, and its intensity increased with increasing AKD content. Moreover, the addition of AKD altered the morphology of the PVA/ZnO matrix. Higher magnification images revealed the accumulation of flake-like structures on the rough surface substrate (Figure 3d–e). The effects of varying AKD concentration on water resistance, water vapor transmission rate (WVTR), UV barrier properties, and soil burial degradation were also examined. The combination of PVA, AKD, and ZnO nanoparticles resulted in enhanced properties, making these films highly promising for food packaging applications.

Keywords: biodegradable polymer, food packaging, water vapour barrier, ZnO nanoparticle.

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Optimizing Fig Tree Callus Induction: Unveiling the Potential of Low Cytokinin Concentration

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Abstract. *Ficus carica* is a fruit-bearing fig tree which has high nutritional and medicinal values. Micropropagation is the *in vitro* approach used for the regeneration of fig trees. For successful micropropagation, surface sterilization protocol and plant growth regulators (PGRs) in the culture medium are the key factors. Hence, this study attempted to determine the surface sterilization protocol for *F. carica* and to optimize the callus induction in *F. carica* using a combination of different auxins (NAA and 2,4-D) and cytokinin (kinetin) at different concentrations. Four surface sterilization treatments were tested for their efficiency in minimizing the contamination rate while enhancing the survival rate of *F. carica*. Results showed that ethanol treatment (M3) gave a remarkable outcome, demonstrating the lowest contamination rate (20.8%), with leaves survival rate and callus induction scoring 66.7 %, respectively. For callus induction, MS media supplemented with kinetin + 2,4-D proved to be the best for callus induction, as compared to the NAA + 2,4-D. Using both auxin combinations for callus induction, 1.5 mg/L NAA + 1.5 mg/L 2,4-D was suggested as the optimum concentration. Meanwhile, for the combination of cytokinin and auxin, a lower concentration of kinetin (0.2 mg/L) + 2.0 mg/L 2,4-D has surprisingly found to induce better callus, with callus induction effect up to 100 %, and has successfully surpassed the callus induction effect when using higher concentration of kinetin (1.5 mg/L) + 2,4-D (1.0 mg/L), which gave only 94.44 %. As conclusion, we deduced that of a low cytokinin concentration can induce maximum callus induction when combining with auxin.

Keywords: Auxin, cytokinin, *Ficus carica*, micropropagation, surface sterilization

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Comparative Study of Antioxidant and Antimicrobial Properties on Pink and Purple Flower *Impatiens Walleriana*

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Abstract. *Impatiens walleriana* is an ornamental plant which is rich in antioxidant and antimicrobial properties. This study aimed to elucidate the effects of different dehydration treatments (microwave, oven-, and conventional air-drying) on the antioxidant compounds of the pink and purple flower *I. walleriana.* Furthermore, the antimicrobial activity of microwave-dried leaf extract against Gram-positive and Gram-negative bacterial strains was also tested. Different dehydration treatments showed significant effects on the phenolic compounds. Total phenolic content was obtained in the following decreasing order: microwave-drying> oven-drying > conventional air-drying. Besides, the highest total flavonoid content was found in leaf extract as compared to stems extracts. As compared to the pink flower (0.528-0.541 mg QAE/100g), the purple flower *I. walleriana* has relatively low total flavonoid content probably because of the variation in color petals. Microwave-dried leaves extract was tested for its antimicrobial activity against Gram-positive and Gram-negative bacteria, using the Kirby-Bauer method. Results revealed that both pink and purple flowers *I. walleriana* can inhibit the growth of Gram-positive and Gram-negative bacteria. Nevertheless, pink flower *I. walleriana* exhibited a greater antimicrobial effect than purple flower *I. walleriana*. Both pink and purple flowers *I. walleriana* showed a higher inhibitory effect against *Escherichia coli* (5.3-6.6 mm) while the least inhibitory effect against *Pseudomonas aeruginosa* (0.8-1 mm). The antimicrobial effect of *Impatiens walleriana* against *E. coli* was also found superior to synthetic antibiotics, with its antimicrobial effect nearly two times stronger. In conclusion, *I. walleriana* is a potent source of natural food preservatives because of its excellent antioxidant and antimicrobial activity.

Keywords: Antioxidant, antimicrobial, dehydration, *Impatiens walleriana*, pink, purple

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Identification of Bacterial Activity on Banger River Pekalongan, Indonesia: Study Case of Lead Resistence

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Abstract. Pekalongan City is known as the largest Batik industrial area in Central Java. However, most of the batik production waste is directly disposed of into the rivers around the production site, one of which is the Banger River. Several streams of the Banger River have exceeded the standard for lead metal with an average of 0.05 - 1.46 mg/L. The diversity and resistence of bacteria to high lead content in tropical waters has not been elaborated. This study aims to isolate, identify and test the activity of bacteria against lead from the Banger River, Pekalongan. The method used is the isolation and identification of bacteria from the Banger River Pekalongan on Zobell Marine Agar media. The lead resistance test was carried out by growing and selecting isolates on NA enriched media ($Pb(NO_3)_2$) at a concentration of 10 – 30 mg/L. The results of the study obtained 25 isolates of bacteria from the Banger River, Pekalongan. The selected isolate was able to live at lead concentrations up to 30 mg/L. Morphological and molecular identification of lead resistant bacteria has the highest similarity with Lysinibacillus sphaericus MN335313.1 of 96.17%.

Keywords: Resistence, Lead, Indonesia

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Exploring Research Trends in Bovine Anaplasmosis: A Bibliometric Approach

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Abstract. Bovine anaplasmosis is an infectious disease caused by *Anaplasma* spp. in cattle that leads to anaemia, jaundice as well as rapid loss of milk and bodyweight. Consequently, the disease causes significant economic losses in the global bovine industry. A bibliometric analysis was conducted to study the research and publications on bovine anaplasmosis globally. The relevant publications were extracted from the Scopus database in December 2022. The studies were carried out with the help of bibliometric tools and R software version 4.2.2. The bibliometric investigation comprised 1015 publications covering eight document types and published between 1911 and 2022. The data revealed a significant spike in bovine anaplasmosis research, primarily in the United States of America and Brazil, with average article citations of 35.16 and 10.33, respectively. The most significant publication source was the American Journal of Veterinary Research, which accounted for 64.76% of all publications, followed by Infection and Immunity (30.4%) and Veterinary Parasitology (22.91%). Notably, Infection and Immunity had the highest h-index (34), followed by Veterinary Parasitology (19) and American Journal of Veterinary Research (18). However, despite the frequency of bovine anaplasmosis in these regions, the study revealed a scarcity of research and publications in the ASEAN countries although publications on bovine anaplasmosis are increasing worldwide. In conclusion, the bibliometric analysis provides insights into bovine anaplasmosis research landscape, emphasizing prominent countries and significant publication sources. Establishment of future cooperation between researchers from established and non-established institutions is also important to improve the control approaches of bovine anaplasmosis.

Keywords: bovine, anaplasmosis, bibliometric analysis, *Anaplasma*

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Effects of BAP and GA_3 on Micropropagation of *Vanilla planifolia*

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Abstract. *Vanilla planifolia* Andr. is an orchid species belonging to the family Orchidaceae, valued for the pleasant fragrance of its fruits or pods that are widely utilized in the food industry, beverages, tobacco, handicraft, cosmetics, perfumery, and pharmaceutical. Typically, the propagation method of *V. planifoli*a via stem cuttings is considered inefficient for planting materials production on an industrial scale due to limited planting supplies, time-consuming and labor-intensive. Hence, this research focuses on the rapid multiplication of *V. planifolia in vitro* to enhance the planting sources. A nodal segment with one node of approximately, 1.0 cm from six months of healthy plants was selected as an explant. The explants were cultured into media containing MS medium supplemented with 30 g/L sucrose with different concentrations of BAP and GA_3 applied singly (0.0, 0.5, 1.0, 1.5, and 2.0 mg/L). The cultures were maintained in the culture room at 25 ± 2 ˚C under 16-hour photoperiod of fluorescent light. The data including the percentage of explants forming shoots (%), shoot length (cm), percentage of root formation (%), and percentage of callus induction (%) were recorded after 30 days of culture. The present findings would provide significant knowledge on establishing the optimum procedure for micropropagation of *V. planifolia* and thus, increasing the planting materials for cultivation of the plant species.

Keywords: Callus induction, *In vitro* propagation, Nodal segment, Root formation, and Shoot initiation.

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Evaluation of Antimicrobial Properties and Safety Profile of Saponins from *Nephellium Lappaceum* (Rambutan) Leaf Extracts

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Abstract. Saponin, a naturally occurring glycosides, are found in many plant species. These compounds, with high surface activity, also show various pharmaceutical activities. This study was carried out to identify the cytotoxicity and antibacterial activities and of saponin extracted from Rambutan leaves. Saponin was extracted using maceration and liquid-liquid extraction method. The antibacterial activity was conducted using agar disc diffusion method on Bacillus subtilis, Serratia marcescens and Escherichia coli The inhibition zone for B. subtilis started at 20 mg/ml to 50 mg/ml, while for S. marcescens and E. coli, the inhibition zone formed at 30 mg/ml to 50 mg/ml. Cytotoxicity study was carried out using Brine Shrimp Lethality Assay (BSLA). For BSLA, the saponin extract was found to started the lethality effect against the brine shrimps at 0.02mg/mL concentration. In conclusion, saponin showed antibacterial effect against bacteria that were tested and can be promising as pharmaceutical compound as high concentration is needed to start showing toxicity effect.

Keywords: Antibacterial activity, Rambutan, Nephellium Lappaceum, cytotoxicity assay.

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Unveiling The Synergistic Potential: Palm Vitamin E and Cytarabine Combination Therapy in Acute Myeloid Leukaemia Cell Models

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Abstract. Acute myeloid leukaemia (AML) is a malignant disease of the bone marrow in which hematopoietic precursors are arrested in an early stage of development. The main treatment for most types of AML is chemotherapy, along with a targeted therapy drug and stem cell transplant. Tocotrienol were proven to demonstrate high antioxidant performance in chronic myeloid leukaemia (CML) hence we chose to test it with AML. In this study, we used single isomers of palm tocotrienol and the mix fraction called tocotrienol-rich fraction (TRF) with combination therapy of leukemic drug, cytarabine to produce synergistic effect in treatment of AML. The single and combination group was tested for cell viability using water soluble tetrazolium (WST) assay. Result showed that TRF is highly effective in inhibiting cell growth of THP 1, HL 60 and Kasumi 6 at different cell percentage ($p<0.05$). The best inhibition was found in Kasumi 6 with TRF treatment followed by HL 60 and THP 1. For combination study, the best inhibition was also found in Kasumi 6 with combination treatment ($p<0.05$). We also examine caspase 3, caspase 8 and caspase 9 activity using commercial kit. The results showed all caspases activity in Kasumi 6, THP 1 dan HL 60 are significantly increased compared with control group in 72 hours of incubation. The expression of MIG-6 gene, a tumour suppressor gene was upregulated while the expression of API-5, an apoptosis inhibitor gene was down-regulated in all three AML cell lines treated with the various forms of T3 with or without cytarabine. The highest effects were observed in AML cells treated with δ-T3 followed by combination of cytarabine and TRF, TRF and lastly cytarabine alone. In the Next Generation Sequencing (NGS) analysis, the highest fragments per kilobase of exon per million mapped fragments (FPKM) was used to compare the gene expression levels under different experimental conditions. The highest FPKM value was observed in the HL-60 cells treated with the combination of cytarabine and TRF, followed by HL-60 treated with cytarabine alone. A higher FPKM value observed in the combination group may indicate that there were more genes and interactions involved. Results from the NGS study also showed many key genes essential for cell viability were differentially regulated (oncogenes and tumour suppressor genes).

Keywords: Acute Myeloid Leukaemia, Palm Tocotrienol, Tocotrienol Rich Fraction, Cell Toxicity, Caspase Activity, Next Generation Sequencing

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TRF Adjuvant Enhances Dendritic Cell Vaccine Efficacy in a Murine Breast Cancer Model

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Abstract. Dendritic cells (DCs) are immune cells that can present antigens to T-cells and stimulate immune responses. Tocotrienol-rich fraction (TRF) from palm oil has been reported to have anti-cancer and immune-enhancing effects. In this study, TRF was used as an adjuvant to enhance the effectiveness of DC vaccines in treating mouse mammary cancer. The results of the study revealed that early treatment significantly improved the prognosis of the mice with cancer. They also found that the tumours in the animals that were treated at the G1 stage had lower volume compared to those in the other groups. Interferon-gamma (IFN-γ) and interleukin-12 (IL-12) productions showed the highest level in the group exposed to the earliest vaccine therapy and combination with TRF. Similar pattern for tumour inhibition was observed in other groups. Furthermore, PD-1 and PD-L1 were found to be significantly down-regulated in the early treatment groups, compared to the delay treatment groups. The higher interactions of cell surface proteins (PD1 and PD-L1) elevate the progression of tumours in the tumour microenvironment. Therefore, early treatment inhibited the interaction of cell surface proteins in the tumour microenvironment. In conclusion, TRF can be used as an adjuvant to enhance tumour-specific immune response induced by DC-based vaccines in a syngeneic mouse model of breast cancer. Earlier treatment modality exposure to the mouse model warranted the best inhibition in tumour-bearing mice and increased higher anti-tumour immune response. Hence, DC-based vaccines together with TRF as an adjuvant may be clinically useful as a new immunotherapeutic approach towards cancers

Keywords: Tocotrienol-Rich Fraction (TRF), Adjuvant**,** Dendritic cell vaccine, Breast cancer, Immunotherapy, Tumour

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Preparation Strategy and the Application of Chitin Nanowhiskers

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Abstract. Chitin is a natural and renewable biological macromolecule found in the shells of crustaceans, insect exoskeletons, and fungal cell walls. Chitin chains comprise crystalline and amorphous regions. Different treatments can remove the amorphous region, enhancing the crystallinity of chitin. Chitin nanowhiskers are highly crystallinity and nanoscale chitin derivatives. Chitin nanowhiskers have a high aspect ratio, a large surface area, modifiable surface morphology, and biocompatibility. As a result, they are widely used in biomedicine, environmental treatment, food packaging, and biomaterials. Note that the chitin nanowhiskers can be prepared either via chemical, enzymatic hydrolysis, biological, or physical methods. Thus, this mini-article will provide a
comprehensive overview of the many chitin nanowhiskers procedures and their shortcomings. Furthermore, the extensive use of chitin nanowhiskers in numerous industries has also been discussed.

Keywords: Chitin; Chitin nanowhiskers; Preparation; Application.

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Techno-functionality Properties of Protein Extracts Derived from Two Popular Durian Cultivars in Malaysia

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Abstract. Malaysia is one of the main exporters of durian in the world. Down streaming of durian products is slowly gaining attention, however, the techno-functionality and taste active compound in durian is not well understood. This study is divided into two phases. In the first stage, the techno-functionality of two local durian cultivars was studied: D24 and D197. Then, the taste-active amino acids were determined. Results showed that the foaming ability in the two cultivars were compatible with the soy protein isolate (SPI, a reference) at pH 6. Significantly greater amounts of foams were obtained from both extracts at higher pH (pH 7-8) but the foams were not stable. However, the D197 foams produced at acidic conditions (pH 3 & 5) were more stable than SPI. In terms of oil holding capacity, both cultivars were able to bind more than 1.5 times oil per gram, and D197 showed a significantly higher oil holding capacity than SPI. Whereas the taste-active amino acids found in D197 was greater than D24. This indicates D24 and D197 have different techno-functionality characteristics and can be applied in food matrices that are acidic and foamy.

Keywords: Durian, techno-functionality, protein, amino acids.

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Characterization of Physicochemical Properties of Malaysian Fermented Foods: *Tapai Pulut* and *Tapai Ubi*

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Abstract. *Tapai pulut* and *tapai ubi* are among the famous traditional fermented foods in Malaysia which are consumed without further processing as a dessert or snack. These fermented products are compact, partially liquid mass with a moderately alcoholic and sweet acid flavor. The development of this taste is contributed by the presence of lactic acid bacteria (LAB) and other beneficial microorganisms. The purpose of this research is to enumerate the total microorganism content and to characterize the physicochemical properties such as pH, lactic acid content, and reducing sugar content of both *tapai ubi* and *tapai pulut*. The growth of fungi and bacteria was cultivated and enumerated as CFU/g for 18 days of fermentation. The fermentation process was predominated by yeasts and bacteria which gradually increased during the first week of fermentation but decreased thereafter. For the physicochemical properties of *tapai pulut*, the pH value is decreased from day 0 to day 20 which is 4.9 to 3.9. Besides, the titratable acidity of *tapai pulut* is rising from 0.06 % to 0.54 %. For the reducing sugar content of *tapai pulut*, the result showed an increment from day 0 to day 6 which is 5.0 mg/mL to 12.0 mg/mL, and lastly increased again from 12.2 mg/mL to 12.8 mg/mL for day 12 to day 20. While for *tapai ubi* the overall pH ranged from 6.175 to 3.96. The overall titratable acid ranged from 0.3% to 1.0%. As for the reducing sugar content of *tapai ubi* fermentation, it was started with 5.88 mg/mL on day 0 of fermentation. The reducing sugar increase until day 6 of fermentation. Nevertheless, the reducing sugar started to decrease until day 15 of fermentation which was 15.92 mg/mL then increased until the last day of fermentation which was 18.66 mg/mL

Keywords: Malaysian fermented food, *Tapai Ubi*, *Tapai Pulut*, physicochemical properties

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The Importance of the Lesser Known Tongkat Ali Plants of *Stema Tuberosa* and *Polyathia bullata* for Aging Men

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Abstract. Tongkat Ali, a popular name in Malaysia and worldwide. Tongkat Ali is synonym to a number of plants traditionally used as aphrodisiacs. Other than the most popular Tongkat Ali plant of Eurycoma longifolia (or Tongkat Ali Putih), not known by many people are the two other Tongkat ali plants of Stema tuberosa (Tongkat Ali Merah) and Polyalthia bullata (Tongkat Ali Hitam). Their names have been assigned due their root colours i.e. white, red and black. E. longifolia has been extensively sold and studied for its pharmacological activities, including aphrodisiac, antimalarial, anticancer, and antimicrobial properties. While the two lesser-known Tongkat Ali plants have not been well documented on their botanical features and pharmacological benefits hence given in this review a comprehensive literature compilation to fill the knowledge gaps. All of the three types of Tongkat Ali plants are with claims of many traditional uses and identified to exhibit pharmacological activities such as antimalarial, anticancer and antimicrobial activities. However, to date their most distinctive pharmacological activities are their aphrodisiac capabilities shown due to their potentials to boost testosterone. Testosterone, a crucial hormone for human health, is responsible for various bodily functions such as sexual function, muscle mass, bone mass, and brain function. Treatments for low testosterone levels include testosterone replacement therapy, which can cause liver damage, jaundice, elevated haemoglobin levels, sleep apnea, and skin reactions. Some aging men experienced lower than normal serum testosterone levels and often resort to more natural testosterone boosters of consuming Tongkat Ali plants instead. This review emphasizes the values of S. tuberosa and P. bullata with scientific evidences as aphrodisiac plants worthy to be used similar to the more popular Tongkat Ali of E. longifolia.

Keywords: Tongkat Ali Merah; Tongkat Ali Hitam; aphrodisiac; testosterone; aging; men

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Zinc Oxide Nano-Priming for Germination Performance of Chilli (*Capsicum Annuum* L.)

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Abstract. Seed germination is a critical stage in plant life, and recent practices use nanomaterials for the improvement of plant seed germination indices. This study was conducted to assess the effect of laboratory prepared zinc oxide nanoparticles on the seed germination and seed vigor in chili. Chili seed were soaked with suspension of zinc oxide nanoparticles at five different concentration (10 ppm, 20 ppm, 30 ppm, 40 ppm and 50 ppm) and treated seeds were stored for 1–2 weeks, at ambient conditions and then tested for germination in petri dishes. Germination was observed on daily basis and seedling length was measured. The results showed that the effect of ZnO nanoparticle was significant on germination percentage, root length, shoot length and seedling length. Seed treated with 10ppm of ZnO NP demonstrated the highest germination percentage. Seed germination has been found to be correlated with an increased in higher ZnO nanoparticle concentrations, however increasing the concentration upper than 40 ppm caused an adverse effect on seed. The root, shoot and seedling length were found to be maximum in lower concentration whereas in higher concentrations it showed decreased values. Chili seeds primed with ZnO nanoparticles were found not only to maintain seed viability but even to exhibit a detectable level of germination enhancement compared to the control seeds. Overall, the promoted response of chili seeds during early stages of seed growth is encouraging for the application of ZnO NPs for seed priming for better germination indices.

Keywords: chili, germination, nanoparticles, treatment, vigor

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Isolation of Lactic Acid Bacteria (LAB) from *Melastoma malabathricum* Linn. (senduduk) for Bacterial Cellulose Production

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Abstract. Bacterial cellulose (BC) is known as microbial cellulose produced by certain bacteria from glucose monomers as the primary substrate for BC production. BC has unique structural morphologies and is high in mechanical strength, purity and crystallinity compared to plant cellulose, which consists of hemicellulose, pectin and lignin. This study aimed to isolate potential lactic acid bacteria (LAB) from different *Melastoma malabathricum* Linn. (senduduk) tissues using MRS broth and agar as selected medium. The LAB isolates were grown in a modified herbal medium (*Strobilanthes crispus*) for BC production with agitation at 130 rpm for 14 days. FTIR analysis revealed that most of the BC produced in this study had the peak of absorption mainly in 1023-1034 cm^{-1}, 1620 cm^{-1}, 2800-2970 cm^{-1} and 3000-3700 cm^{-1} regions, which assigned to C-O stretching, H-O-H bending, C-H stretching and O-H stretching, respectively. XRD analysis indicated that the BC produced can be categorised into type I cellulose. FESEM exposed the BC samples exhibited as ribbon-shaped fibre, interfacial and interconnected structure adhesion among each other. The overall width of BC fibres was between 0.7 – 2.1 µm in diameter. TGA analysis revealed that the highest weight loss during the thermal degradation occurred at 220 ºC to 400 ºC for all the BC samples. 16S rRNA gene sequencing on all the LAB isolates shows their highest similarity to *Lactobacillus plantarum*. Based on the characterisation studies, the LAB isolates from *M. malabathricum* have potential in BC production and future applications.

Keywords: Bacterial cellulose; LAB; *Melastoma malabathricum*; herbal medium; sequencing

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Prevalence of Antibiotics in Wastewater Treatment Plants

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Abstract Antibiotics have been widely consumed by humans and animals as antibiotics aid in combatting infections and diseases caused by bacteria. However, long-term consumption has impacted the existence of antibiotic resistance in the environment including wastewater treatment plants (WWTPs) which have been identified as a point source for antibiotic resistance. The objective of this study was to present an overview of the antibiotics in a wastewater treatment plant (WWTP) of a municipal and hospital in Kuantan. Water samples from different sampling points were collected. Various physicochemical parameters such as pH, temperature, dissolved oxygen, chemical and biological oxygen demand, and total phosphate were measured, and the presence of antibiotics was analyzed by LC-QToF-MS. Some physicochemical parameters of the effluent exceeded the Malaysian Standard A. Tetracycline, penicillin and macrolides were found in the effluent of the hospital WWTP meanwhile no antibiotics were detected in the municipal WWTP. This study is to give baseline research on antibiotic resistance in Kuantan. Since there are some traces of antibiotics in the wastewater, further work such as detecting the antibiotic resistant bacteria and antibiotic resistance genes can be proposed.

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Anticancer Activity and MRNA Expression of Rodent Tuber Mutant (*Typhonium flagelliforme*) Extract Against Breast Cancer Cell Line MCF-7 In Vitro

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Abstract. The rodent tuber, Typhonium flagelliforme (Araceae), is an essential ingredient in many herbal remedies recommended for cancer treatment in Malaysia, Indonesia, and other Asian countries. The extract of rodent tuber mutant KB 6-1-1-2 was tested in vitro for its cytotoxic and pro-apoptosis activities on MCF-7 and MCF-10A cell lines. A cytotoxic test was conducted on themother plant using MCF-7 breast cancer cells. MTT assay was used to evaluate the effects of rodent tuber mutant KB 6-1-1-2 on MCF-7 breast cancer and MCF-10A as non-cancerous cell lines in vitro. Various concentrations were used to test proliferation inhibition (62.5-1000 µg/mL). As compared to the IC50 value for the mother plant, KB 6-1-1-2 had the lowest IC50 value against MCF-7 breast cancer cell lines at 2.38 µg/mL, which was the highest cytotoxic activity. KB 6-1- 1-2 extract induces apoptosis in MCF-7 cancer cells within 24 h. As a non-cancerous cell, MCF- 10A, tested with rodent tuber mutant KB 6-1-1-2 extract, showed no cytotoxic effects and an IC50 value of 422.54 µg/mL. MCF-10A cells were not shown to undergo pro-apoptosis after treatment. The expression of mRNA in MCF-7 cells was determined by Real-Time PCR following treatment with KB 6-1-1-2 extract. The electrophoresis gel visualization demonstrated that caspase-9, a gene related to apoptosis, and GADPH, an internal control, were both expressed. After 12 h of treatment with KB 6-1-1-2 extract, caspase 9 expression was observed at 190 bp and GADPH expression at 240 bp. This result showed that the early stage of apoptosis occurred in MCF-7 cancer cells that treated with KB 6-1-1-2 extract. Based on the results, KB 6-1-1-2 extract induces apoptosis through intrinsic mechanisms. According to these findings, the rodent tuber mutant KB 6-1-1-2 can be utilized as a new potential source of standard herbal medicine.

Keywords: *Typhonium flagelliforme*, mutant somaclonal, cytotoxic activity, MTT assay, RT-PCR.

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Development and Assessment of Pellet Formulation with MD2 Pineapple Peel Inclusion for Local Red Hybrid Tilapia fish, *Oreochromis Niloticus*.

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Abstract. Agricultural waste in Malaysia remains a big issue when the solution and action upon it are not really taken seriously by the authorities and public. Agriculture waste containing high nutritional value is in demand because it is inexpensive and can improve livestock health. Fruit waste such as pineapple peel is cost effective, halal and can be applied as feed additives for the added value. Meanwhile, unrestrained use of antibiotics in aquaculture to maintain the health of fishe has caused the apperance of antibiotic- resistant bacteria that are somehow leaking into the food chain. Therefore incorporating prebiotics in aquaculture as feed additives could be a harmless and better option to antibiotics. The aim of this study is to formulate fish feed for Red Hybrid tilapia, Oreochromis niloticus with the inclusion of 5% MD2 pineapple peel (PAP) as a prebiotic supplement and to evaluate the nutritional diet and physical characteristics of the pellet. The tilapia fish diet contains soybean meal, fish meal, corn, corn gluten meal, casava tuber meal, palm oil, mineral premix, vitamins, and pineapple peel. The formulation possesses 14MJ/kg of calculated digestible energy; and digestible protein at 32%. The result for moisture content, bulk density, floatability, expansion ratio and hardness were recorded at 25.06%, 385.28kg/m-3, 98%, 1.09 and 3.65 N respectively. It can be concluded that the inclusion of pineapple peel did not negatively affect the physical quality of the pellets, and the quality was comparable to that of commercially available fish feed.

Keywords: agriculture waste, pineapple peel, prebiotic,animal feed, feed formulation

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Algae Nanoparticle as Ecofriendly and Natural Antimicrobial and Bioreductant of Metal Pollution in Aquatic Environment

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Abstract. Algae play an important role in aquatic environments because determining fertility and waters quality. Nanoparticles from algae from the Cyanophyceae, Chlorophyceae, Phaeophyceae and Rhodophyceae classes have been synthesized using gold, silver and several other metal nanoparticles. Its antimicrobial activity and ability to be used as a bioreductant has been proven to reduce metal pollution in waters and is safer for the environment, especially due to the presence of pigments and antioxidants in the cell extract which act as cell protectors and compatible bioreductant. This review will examine the research of algae to trap metal nanoparticles, its safety as a natural food, and its potential as an antimicrobial and bioreductor which is supported by various other related research. The research that has been carried out is the manufacture of silver nanoparticles from *Dunaliella* and *Chlorella* microalgae to be used as natural and antimicrobial food for *Penaeus monodon* shrimp larvae and their effect on the growth and survival of shrimp larvae. Furthermore, other research that has been carried out shows the ability of the microalgae *Chlorella* and *Dunaliella* to trap the heavy metal silver. Research in metal-polluted aquatic environments has also shown the ability of both microalgae to trap metal polluting waters. The results of various studies that have been obtained show the potential of microalgae nanoparticles to be used as natural antimicrobials that are not harmful to the environment. Apart from the research that has been carried out, we will also explain various other studies that also use algae in the form of nanoparticles for use as an antimicrobial and for the ability to reduce pollution in the aquatic environment. In this way we will get a comprehensive understanding of the role of algae nanoparticles in the aquatic environment and their safety for organisms and the aquatic environment and their enormous potential if they are used for antimicrobial production on a mass scale.

Keywords: algae, nanoparticle, metal, waters, antimicrobial

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The Formulation and Effects of Ocimum Sanctum Extracts on Skin Cells for Anti-ageing Properties

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Abstract. The fact that the skin is the most visible organ makes the ageing process apparent. Over the last decade, there has been an increase in scientific interest in reducing the appearance of ageing. Chronological ageing is due to the passage of time, whereas premature ageing occurred due to environmental factors. The purpose of this research is to incorporate the essential oil from herbal plants, Ocimum sanctum in semisolid cream formulation for anti-ageing purpose. The bioactive compounds of essential oil were analysed and a semisolid cream with three different conditions comprising of essential oil, Vit E and HA are formulated. These ingredients and essential oil can act as an antioxidant and synthesise collagen giving the skin back its elasticity and resilience. The DPPH assay generated a low IC50 value that indicates high radical scavenging activity by the essential oil of Ocimum sanctum, and this could be due to the numerous terpenoids and some terpenes and phenolic compound found in the essential oil bioactive profile. The cytotoxicity effect of the essential oil of Ocimum sanctum on the growth of human skin fibroblast cells showed non-toxicity results correlated with the concentration of essential oil added in the samples. The collagen fibers detected in the collagen synthesis assay showed the product's potential as an anti-ageing cream.

Keywords: Essential oil, *Ocimum sanctum*, cream formulation, cosmetics, Gas Chromatography-Mass Spectrometry (GCMS).

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Determination of Ethanol Content in Selected Food Colourings by Using Gas Chromatography with a Flame Ionization Detector for Halal Authentication

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Abstract. Food colouring has been widely used in food industry to deliver colour to food and beverage. However, hidden ingredients such as ethanol have become an issue. Thus, the aims of study are to identify and determine ethanol content in food colourings by using gas chromatography with flame ionization detector and to determine whether the ethanol content in food colourings meet Halal requirements set by Jabatan Kemajuan Islam Malaysia (JAKIM). Firstly, 5 mL of acetonitrile and ethanol absolute were diluted separately with deionized water into a 100 mL of volumetric flask as an internal standard solution and standard stock solution, respectively. Then, 50 µL of both solutions were pipetted directly separately into a 15 mL of vial and diluted with 1 mL of deionized wateras working check solution. From the stock solution, six different concentrations of ethanol and 100 µL of acetonitrile internal standard solution were prepared to plot the calibration curve. Next, 100 µL of each food colouring were pipetted separately directed into a 15 mL of vial and diluted with 1 mL of deionized water. A 100 µL of acetonitrile internal standard was added into each labeled vials and analyzed per GC-FID conditions described. The chromatogram result showed all brands except brand B contained the ethanol content in it and only brand D was not meet Halal requirements set by JAKIM as its percentage of ethanol was more than 1%.

Keyword: Ethanol, food colouring, GC-FID, Halal authentication

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Segregating Determinants, Barriers, and Antecedents of Food Safety Certification Using Fuzzy Delphi Method in Malaysian Agriculture

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Abstract. Food Security problems are an emerging issue globally. As a way to address this issue, farmers use excessive amounts of pesticides and fertilizers to meet the market demand. However, this caused an increase in health issues making the food safety certification is important tool to ensure safe food produced by farmers. This study aims to identify the elements of food safety certification adoption among farmers in Malaysia using the Fuzzy Delphi Method (FDM). This study was conducted with 50 experts using an online survey approach and standardized questionnaire among farmers with different agricultural backgrounds. 35 elements were gathered from the literature search, 13 elements were identified as determinants, 10 were considered as barriers and 12 were highlighted as antecedents. Based on the findings, 20 elements were identified as factors affecting Malaysian farmer's adoption of food safety certification, experts came to an agreement that, among these agreedupon elements, there are ten determinants, five barriers, and five antecedent elements that influence Malaysian farmer's adoption of food safety certification. Based on the hierarchy, premium price offers from the market were selected as the main element followed by the farmer's future direction, more market access or channel, farm size, and consumer awareness regarding food safety. It is hoped this study will enhance the understanding of the elements that influence the adoption of food safety certification in the Malaysian agricultural sector and will assist in enriching the body of knowledge on food safety procedures, certification processes, and agricultural supply chains.

Keywords: Food Safety Certification, Food Security, Fuzzy Delphi Method, Determinants, Barriers, Antecedents

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Technological Risk and Management: Towards Raising Community Resileince in Pasir Gudang, Malaysia

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Abstract. Malaysia is more susceptible to technological disasters and natural hazards due to the lack of a comprehensive disaster management act. Following the tragic Sungai Kim Kim chemical releases, this research employed qualitative research methods to investigate the perceptions of the local community regarding technological hazard threats. In addition, the research aimed to assess the potential of the disaster framework and disaster management act in enhancing community preparedness. Pasir Gudang's community resilience index was calculated utilizing the Climate Disaster Resilience Index (CDRI) framework. Field observation surveys, focus group discussions, and interviews with subject matter experts were conducted to acquire research data for analysis. There was a total of 65 participants in the focus group discussion. The CDRI score revealed urgent issues requiring immediate attention; the average score was an alarming 2.80. This necessitates prompt action from all parties involved, especially the local government and regulatory agencies responsible for monitoring hazardous chemical substances. Comprehensive reforms, a re-evaluation of the legal framework, and open and accountable communication regarding potential technological hazards to the local communities are required. The development of a local disaster framework should be based on a community-based strategy that fosters public, private, and academic collaboration.

Keywords: Disaster, Community Preparedness, Chemical, Hazard, Partnership

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Integrated Lean Principles for Fire Safety Engineering of Private Al-Quran Memorization (Tahfiz) School in Malaysia

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Abstract: The growth in demand for religious learning-based education among the Malaysian Muslim population drives a greater number of Private al-Quran Memorization (Tahfiz) Schools (PTS). It has been reported by the Malaysian Fire and Rescue Department that the fire safety management system practiced by the PTS currently is more individual and 50 percent of TPS are not safe from fire risk. This emerging development has created another challenge that requires fast-growing attention to the PTS infrastructure and its infrastructure envelope performance in fire safety protection systems. Fire safety implementation needs to be carried out effectively to safeguard people, PTS infrastructures, and property from fire's catastrophic impacts very well-known fact, including the phenomena and effects of fire. In response to these challenging and crucial statistics, fire safety engineering continues to evolve by adopting Lean Principles, leading to this study of PTS infrastructure performance as a prevention approach. The approach of adopting Lean Principles is often discussed in the concept of Lean Manufacturing Principles and moving forward to Lean Construction which has been readily accepted by many professionals worldwide. This principle may be applied through Prevention through Design (PtD) and implementation of various types of Lean Tools during pre-construction, construction, and post-construction stages which include PTS occupying, demolishing, and the modification process of the PTS infrastructures. The integration framework of the Lean Principle into fire safety engineering in Malaysia, however, is yet to be studied and introduced as effectively as it could be beneficial to the rising need for improvement in the fire prevention system of PTS.

Keywords: Fire Safety Engineering; Lean Construction Principles; Lean Principles; Prevention through Design; Private Tahfiz School

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A Preliminary Evaluation on the Effect of Low Concentration Rhamnolipid in the Biological Pretreatment

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Abstract. The need to enhance the performance of a biological pretreatment is critical to promote the use of biological pretreatment at large scale. Biological pretreatment provides various benefits, including specificity of the enzyme reaction, elimination of toxic compound generation, mild reaction conditions and considered a green approach to support the world wide's sustainable development goal. The study focuses on the use of the surfactant during the biological pretreatment of oil palm frond (OPF) and empty fruit bunch (EFB). Rhamnolipid (0.4% w/w) was introduced prior the submerged and solid-state pretreatment process. The effect of addition of rhamnolipid was evaluated through changes in chemical compositions including lignin, holocellulose, alpha-cellulose and hemicellulose content. Approximately 39% and 45% of lignin reduction was recorded from SSF treated OPF and EFB, respectively, compared to those of control, indicating the positive effect of surfactant during the pretreatment process. The output of this study is important to gauge the potential of surfactant in increasing the overall efficiency of biological pretreatment process.

Keywords: Rhamnolipid, Surfactant, Biological Pretreatment, *P. Chrysosporium,* Lignocellulosic Biomass

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Prediction of Water Level at Sungai Kuantan, Bukit Kenau by Using Artificial Neural Network (ANN)

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Abstract. Floods are the main disaster affecting Malaysia as the country is influenced by seasonal monsoon floods (the most serious) as well as flash floods and tidal floods. Flood disasters have brought severe impacts on the people affecting livelihoods, damaging properties and infrastructures, also killing lives. The real-time prediction system of river water level can provide early warning information to the decision makers of relevant departments in time, which plays an important role in reducing flood risk. Therefore, to improve weather radar estimates of rainfall, an Artificial Neural Network (ANN) was approached in this study. Feed-forward neural network method and back propagation network method is used to model the weather radar data measurements. The network accepts radar data as an input and is trained to predict the water level as measured by the weather data.

Keywords: Articial Neural Network (ANN), river, water level

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