2nd ICAFT'21

INTERNATIONAL CONFERENCE ON AGRICULTURE, ANIMAL SCIENCES & FOOD TECHNOLOGY

"Agricultural Innovation for Prosperity and Food Security"

ABSTRACT BOOK

Fully virtual Via WEBEX

2 & 3 MARCH 2021

Live from Universiti Sultan Zainal Abidin
Terengganu, MALAYSIA

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UNIVERSITI SULTAN ZAINAL ABIDIN

BOOK OF ABSTRACTS
INTERNATIONAL CONFERENCE ON AGRICULTURE, ANIMAL SCIENCES & FOOD TECHNOLOGY 2021

(ICAFT 2021)

2nd - 3rd March, 2021

Edited by

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Dr. Zalilawati Mat Rashid
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Terengganu, Malaysia

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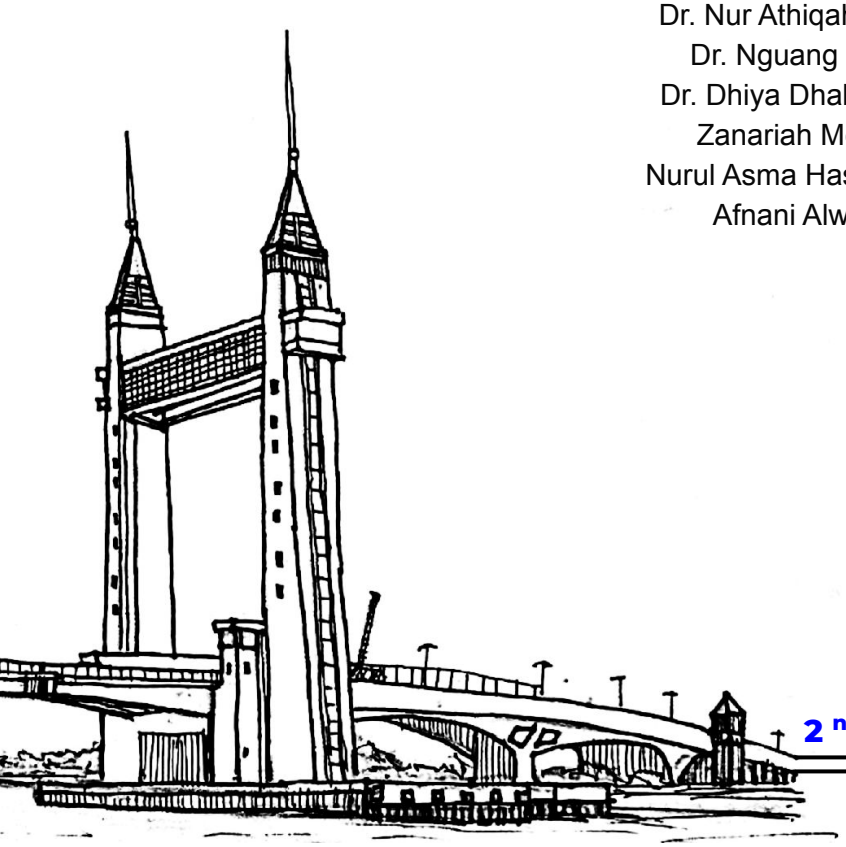

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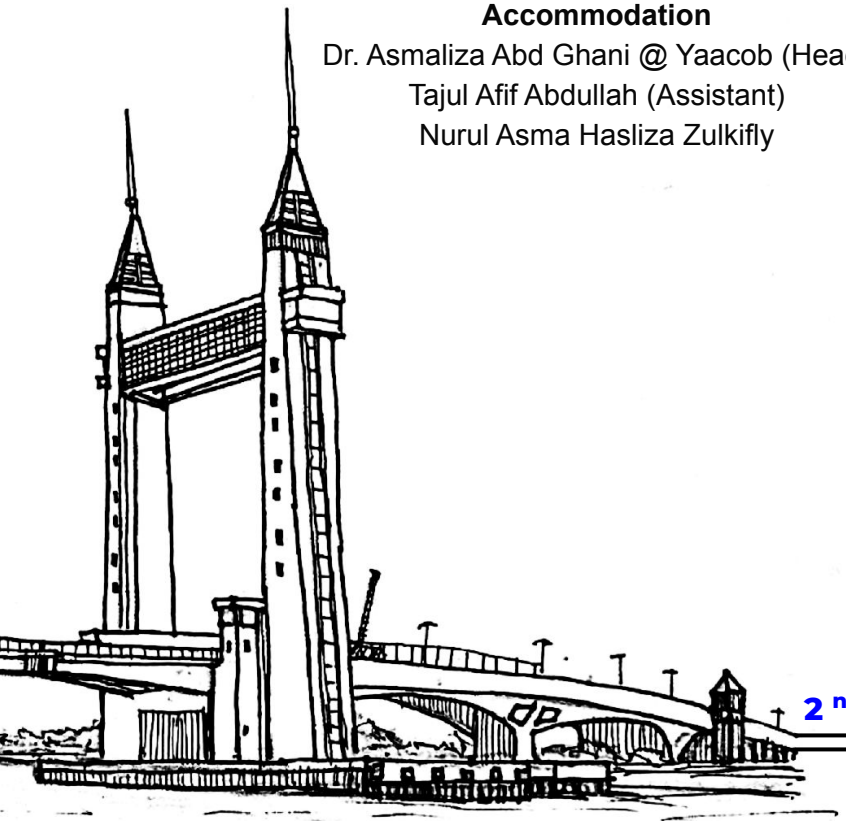


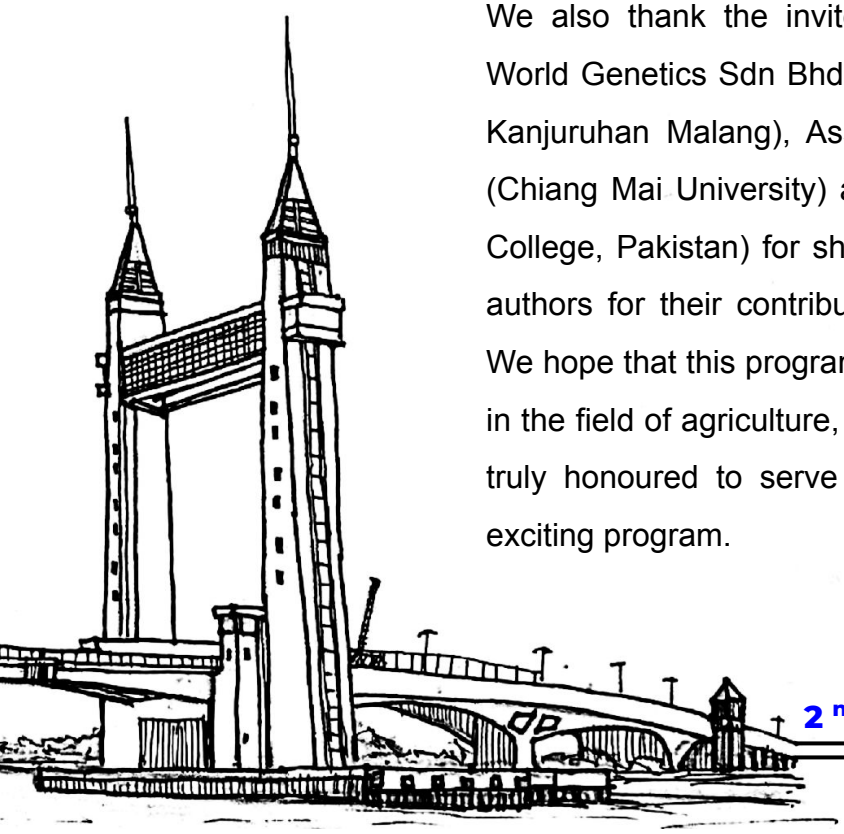
CHAIRPERSON ICAFT 2021

Assoc. Prof. Dr. Khamsah Suryati Mohd

We welcome you to the Second International Conference on Agriculture, Animal Sciences & Food Technology (ICAFT 2021). ICAFT 2021 provides a highly competitive platform for reporting the latest developments in the research of agriculture, animal science and food technology. We are pleased to present the proceedings of the conference as its published record. For the second time, ICAFT 2021 is organized by this faculty for research, yet it has already witnessed significant interests among the researchers.

As evidence of that, ICAFT received a record of 141 participation and the authors of submitted papers come from various countries and regions. The conference program represents the efforts of many people. We would like to express our gratitude to the members of the program committee, the internal and the external reviewers for their hard work in reviewing submissions. The conference advisor, Prof. Dato' Dr. Hassan Basri bin Awang Mat Dahan, have also helped us in many ways, for which we are grateful.

We also thank the invited speakers, Mr. German Mingram (Green World Genetics Sdn Bhd), Dr. Ir. Ernike Dwi Kusumawati (Universitas Kanjuruhan Malang), Associate Professor Dr. Niramon Utama- Ang (Chiang Mai University) and Professor Dr. Zahid Iqbal (Swat Medical College, Pakistan) for sharing their insights with us. We thank all the authors for their contributions and their participation in ICAFT 2021! We hope that this program will stimulate further research and networks in the field of agriculture, animal science and food technology. We feel truly honoured to serve the best recent developments through this exciting program.



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DR. IR. ENIKE DWI KUSUMAWATI

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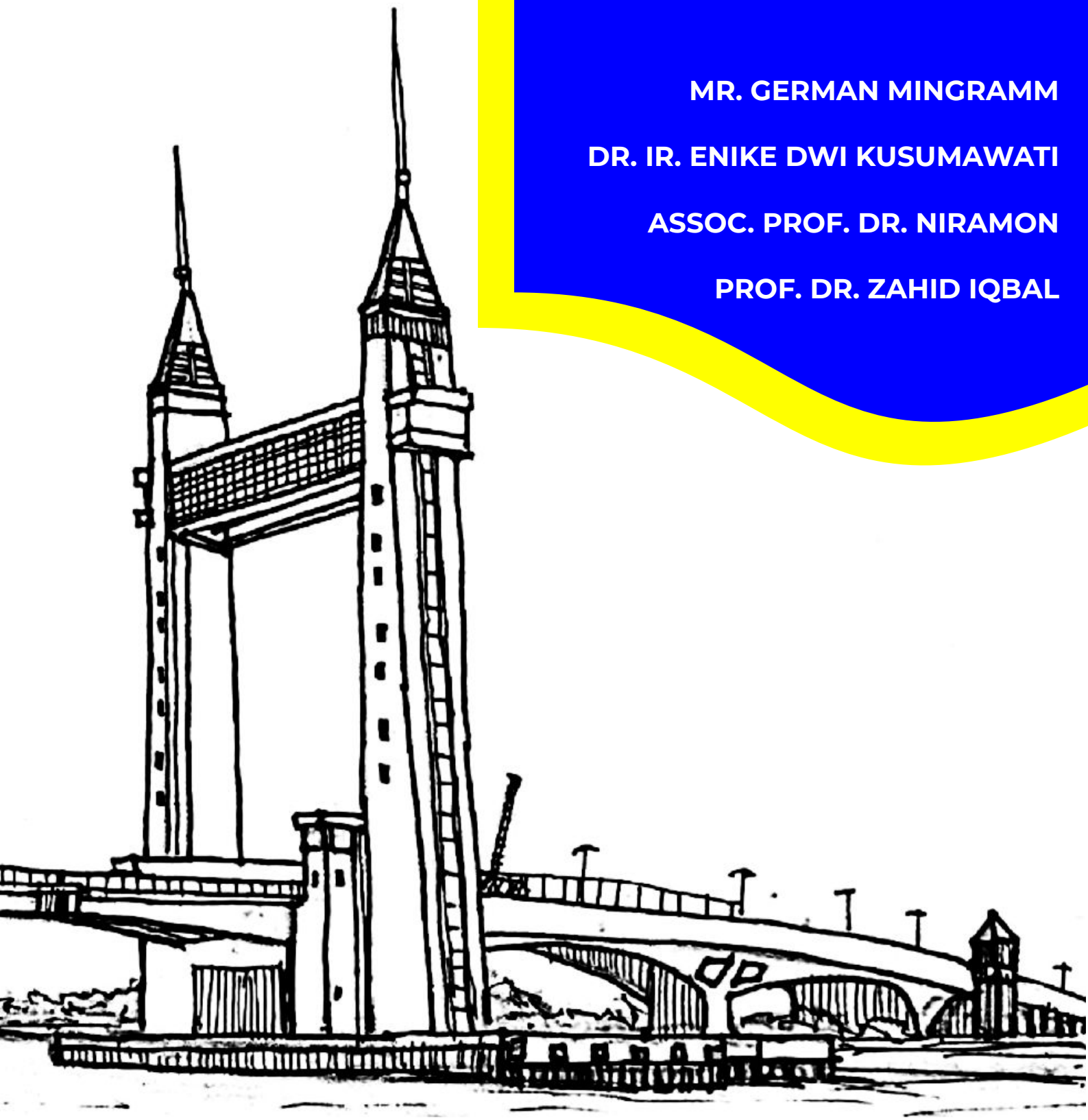
PROF. DR. ZAHID IQBAL



KEYNOTE 1

Importance of Plant Breeding During Pandemic Times

Germán Mingramm

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ABSTRACT

After dealing with COVID-19 pandemic for one year approximately; we have modified our lives significantly. In terms of food systems, there have been several effects in the supply, in the demand; as well in the food prices; but also, in the dynamics of commercialization. For instance, many restrictions have appeared, as a strategic way to reduce the number of covid cases locally and worldwide. Nonetheless, the Food System sector involves many different areas; starting from the farmer up to the final consumer. One fundamental area of the Food System, is the Seed Industry and the Plant Breeding programs that develop seeds for farmers. Likewise, understanding this pandemic situation, we should also comprehend, the importance of strengthening this area (plant breeding), to keep supporting the most affected farmers with good and potential plant materials so they can keep producing and supplying the market with quality produce. Moreover, in order to give a real support to these affected farmers, breeders need to work close with the farmers, understand their problematic, their conditions, limitations and struggles so they can develop something appropriate to their realities and to what they need. Helping them achieve higher yields, better disease resistances, better adaptability to extreme conditions; and even, by providing materials that require less inputs (fertilizer, water, etc)

KEYNOTE 2

Effectiveness of Sperm Separation Technology Using Locally Based Materials in Supporting Food Security

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ABSTRACT

Artificial insemination has an important role in increasing the livestock population. Population increase will be more effective if livestock are produced according to the expected sex. One of the steps to make this happen is sperm separation technology. The accuracy of the sex of the livestock to be produced in accordance with the expectations will certainly greatly assist in realizing food security. Sperm separation technology has been widely used to obtain the sex of livestock which is expected to support food security. One of them uses egg white albumin to separate X and Y sperm. This method is easy to apply, easy to obtain and affordable. Sperm separation using the egg white sedimentation method is based on differences in X and Y sperm motility. Egg white contains antibacterial substances so that the results of separation using egg white sedimentation are able to maintain sperm motility and viability in addition to preventing decreased motility of sperm produced, namely by lipid peroxidation in the sperm membrane. The diluent used during separation also affects the quality of the separation. Many diluents also use developed local resources, one of which is to support the technology of X and Y sperm separation. The success of artificial insemination by sexed semen shows encouraging results that the sex of the livestock produced is in line with expectations. So it can be concluded that the separation of X and Y sperm using local resources can be effective in supporting food security.

KEYNOTE 3

Innovative Products from Thai Rice

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ABSTRACT

Thai rice is the main agriculture productivity of Thailand and being the way of Thai life for a long time. Thai people consume rice everyday as glutinous rice and non-glutinous rice including white rice and color rice. The aim of my research is to develop the innovative products from Thai rice. We started with the investigation of physical, chemical and sensory properties of ten varieties of Thai rice. Thai consumers rated the most of overall liking of Jasmine rice (7.06 +0.87) but non-significant different form black sticky rice (7.33+1.41) ($p>0.05$). The study of germinated brown rice found that soaking temperature and time affected to GABA content. The process development of instant rice from Jasmine rice and purple rice were coated with 1.0% of spirulina as a functional rice product. We added the nutritive value to rice noodle with Thai herbals such as sweet basic, lemon grass and turmeric for creating new flavor rice. As well as, we created the instant fermented noodle from riceberry rice. For meat products, Thai sausages were made from rice with yellow turmeric. Moreover, we develop the snack food from colored rice such as sweet crispy black rice using microwave for children and rice jelly from riceberry for elderly. Finally, the research of functional rice drink was investigated the hypoglycemic effect in vitro and in vivo studies. In conclusion, the innovative rice products need more research and development for functional food to medical food.

KEYNOTE 4

Alternative Medicine: A South Asian Perspective

Zahid Iqbal

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ABSTRACT

Alternative medicine is healing-oriented medicine that takes account of the whole person, including all aspects of lifestyle. It emphasizes the therapeutic relationship between practitioner and patient, is informed by evidence, and makes use of all appropriate therapies. In this approach, all factors that influence health, wellness, and disease are taken into consideration, including mind, spirit, and community, as well as the body. Appropriate use of both conventional and alternative methods facilitates the body's innate healing response. In integrative medicine, patient and practitioner are considered partners in the healing process and effective interventions that are natural and less invasive are used whenever possible. Integrative medicine neither rejects conventional medicine nor accepts alternative therapies uncritically and it is inquiry-driven and open to new paradigms because good medicine is based in good science. Alongside the concept of treatment, the broader concepts of health promotion and the prevention of illness are paramount in integrative medicine. Practitioners of integrative medicine should exemplify its principles and commit themselves to self-exploration and self-development. Our commitment to live the values of Integrative Health should include educating and actively supporting a community that embodies the philosophy and practice of healing-oriented medicine.

PLENARY SPEAKERS

Dr Dikky Indrawan

Prof Madya Dr. Nalini Arumugam

Prof. Dr. Abdul Shukor Juraimi

Prof Madya Dr. Ts. Ma Nyuk Ling

Prof Madya Dr. B.A Venmathin Maran

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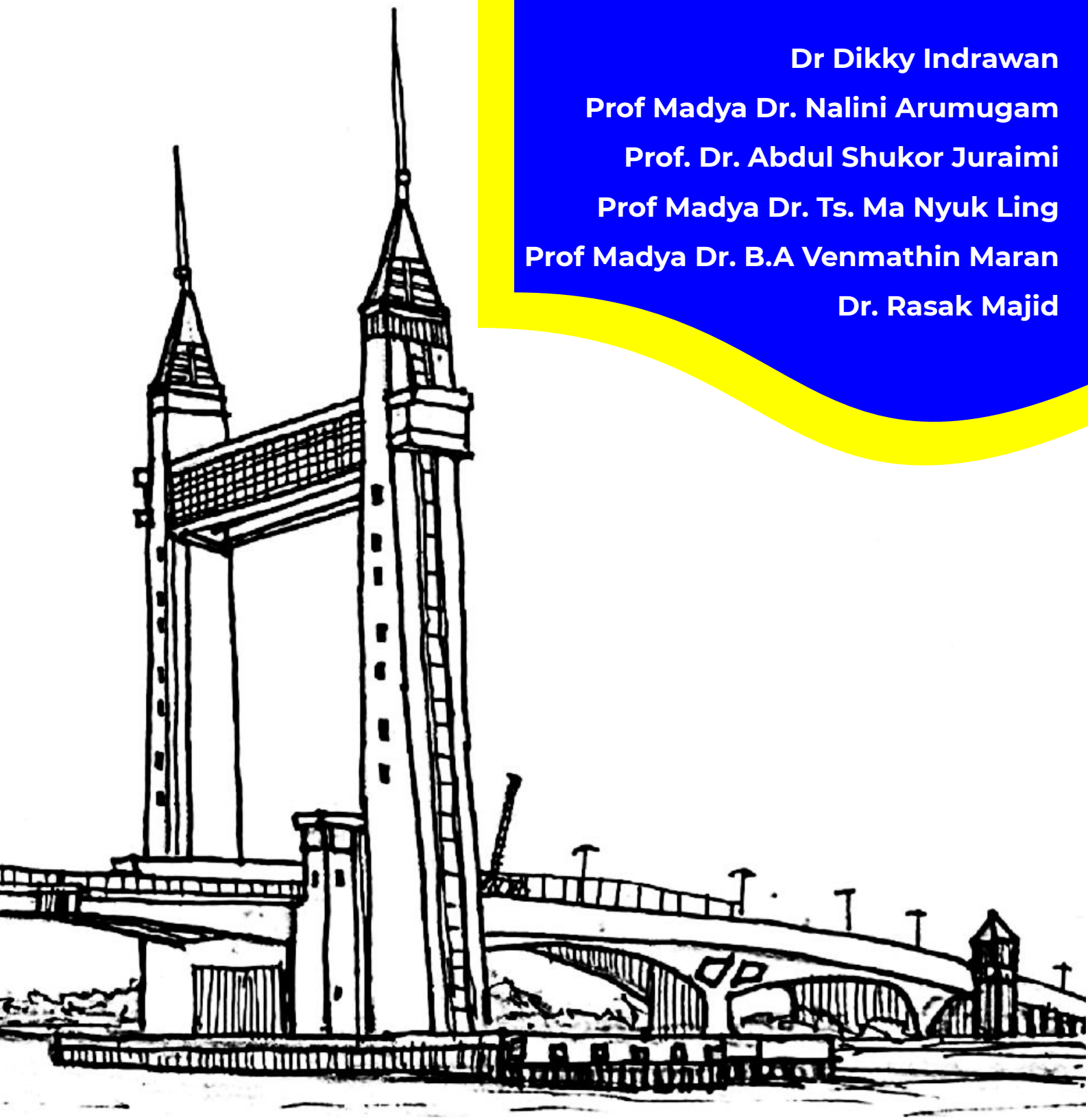

PLENARY 1

Business Model Innovation in Agri-Food Business

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ABSTRACT

Innovation is a key determinant for competitiveness for any business including the Agri-Food sector. Innovation process via knowledge creation mostly seen as improved product or service in Agri-food supply chains. However, innovation in the Agri-Food business may exist in the form of process, marketing, organizational governance, and the workplace. These forms come from companies' efforts to innovate their business models in meeting their business objectives. To our knowledge, many studies are available that explain the innovation based on business model canvas in the Agri-Food chain. The Business Model Innovation in Agri-Food Business topic aims to discuss theoretical perspectives and the practices of business model innovation, by focusing on the agri-food business companies' efforts in combining profit-making and innovation investment in the Agri-Food Business. In general, the business ecosystem is important in supporting the development of business model innovation. The business ecosystem constitutes opportunities and challenges in Agri-food innovation. It will affect the Agri-food companies' value proposition in their current businesses and their execution. This includes the opportunities for formulating new activities that can lead to a new market that follows the value creation in Agri-Food Business. The discussion explores the practices of the Agri-Food business by focusing on the relationship between investments for-profit and innovation impacts based on the value chain. The business model canvas was used to enable fact-finding and linkage between profit-taking action and innovation in the Agri-Food business.

Keywords: Business models innovation, Business model canvas, Supply Chain, Value chain, Agri-Food business

PLENARY 2

Adoption of Big Data in Agripreneurship

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ABSTRACT

The United Nations projected the need for more than 60% increment on the current global food production to feed the growing population that would reach to 9.8 billion by 2050. Nevertheless, agricultural land is being taken away by rapid urbanisation and climate change. In Malaysia, the government is making efforts to promote small-scale agriculture through the adoption of technology. However, the small-scale farmers lag in the application of technological farming devices or Big Data (BD) farming devices. In contrast, the devices play a crucial behind-the-scenes role in increasing agricultural production on existing farmland. The devices can be an essential pathway for Malaysia's small-scale farmers to increase food production. In this regard, agripreneurship, which is the inculcation of entrepreneurship into agriculture has a significant role to play. It is a factor that can equip small-scale farmers with the ability and skills to handle environmental dynamism and optimism towards BD farming devices. When fully equipped, agripreneurs can then tackle the challenge of feeding the growing population without wrecking the planet. This study reviews the current state of the art on the efficacy of BD devices for agriculture among agripreneurs, especially in Malaysia. It also focusses on how the inculcation of entrepreneurship into farming can avail agripreneurs with the capability and mindset to adopt and use BD devices for agriculture.

Keywords: Big Data, Agripreneurship, Entrepreneurship, small-scale Farming, Agribusiness, Malaysia

PLENARY 3

Food Security Issues in Malaysia: Way Forward

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ABSTRACT

Food security refers to the availability of safe, nutritious and adequate food access by the people of a country at all times for an active, productive and healthy life. Food and Agriculture Organization (FAO) has identified three (3) important components of food security namely; adequacy in food production, stability in food supplies and physical and economic access to food by the population of a nation. In 2016, 815 million people were hungry, that is 11% of the world population, or one of every 9 people alive. Malaysia was ranked 40 out of 113 countries by the Global Food Security Index (GFSI) 2018 considers the core components of availability, affordability, and quality and safety. It is reported that 13.4% of adults Malaysian had both reduced the size of meals and skipped main meals because of financial constraints (Rusidah et al., 2015). Global food security issues are due to a growing population demanding more food at a time when food production facing many challenges including agricultural land being increasingly used for other activities, yield reductions due to adverse weather conditions, depleting resources, environmental degradation, and pests and diseases problem. These issues may worsen the scenario if there are multiple factors involved. Moreover, external factors play an important role in rapid rise in global food prices due to increases cost in agriculture input and limited access to labour. Climate change issues that is more prevalent nowadays is aspect to put many people at risk of hunger in coming years. Malaysia produces around 70% of its food products, while the balance is imported from other countries. Report shows that the agri-food trade deficit increasing every year, from around RM 16.76 billion (2013) to more than RM18.6 billion (2018) and is projected to further increases in the future. In order to reduce the food insecurity problem, a comprehensive food security strategy framework could be developed that addresses the food availability, accessibility, utilization, and stability. Among them includes to transform food production sector into a modern, competitive and commercially vibrant sector integrated with the latest farming set of technologies (e.g. mechanization and robotic systems, drone, Artificial Intelligent (AI), Internet of Things (IoT), bigdata, plant factory, vertical agriculture etc.), private sector driven, agri-entrepreneurship program, agriculture land-use policy, and urban farming. It is also important to secure food supplies through improvement of adequate inventory of food, distribution of food, access to work opportunities and food safety and quality through education. Food security involves responsibility from all sectors of the population and is not only a simple matter of to increase food supply and lowering prices, but it is also fundamentally linked to the challenge of increasing purchasing power and reducing poverty.

PLENARY 4

Application of Biotechnology in Mushroom Industry for Circular Economic

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ABSTRACT

Food waste and diaper waste represent almost 90% landfill waste. Landfill waste has become a major problem in the urban city as wastes occupy more and more lands. Nevertheless, many have not known that all of these waste can cash into the zero-waste industry. This study reveals the utilization of biotechnology and mathematic modelling in the formulation of food waste combined with diaper waste that generates almost 3 fold increments in mushroom production. The new formulation also enables significantly shorten the growing period to harvest, which provide massive profit for mushroom growers. The mycelium produced during the cultivation excreted enzymes to degrade the weight of the formulated culture block, in turn, almost 40% reduction of initial weight were recorded. In addition, the rest of spent mushroom block was used to produce a high-performance composite that can be used as construction materials. This novel study provides a solution for effective waste management and is expected to create a green and sustainable economy for mushroom growers.

Keywords: Bioboards, zero farming, advance biotechnology

PLENARY 5

Natural Products: A Novel and Effective Approach to Control Fish Parasites in Aquaculture

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ABSTRACT

Parasitic infestation is a serious problem for different types of fish species such as groupers, hybrid groupers, snappers, seabass, etc. reared in open floating net-cages in Malaysia. Some of the commonly found parasites are monogeneans (Benedenia spp., Neobenedenia spp.), sea lice (Caligus epidemicus, C. rotundigenitalis, etc.) and leech, Zeylanicobdella arugamensis. Recently, the infestation of parasitic leech Z. arugamensis (Annelida: Hirudinea: Piscicolidae) spread rapidly in South-east Asian countries and caused economic losses. The control is vital for the management of aquaculture industry hence, chemicals such as formalin have been used. However, the best alternative is the application of natural product as a biocontrol agent since it has various metabolites with less or zero toxicity. Our recent studies aimed to elucidate the anti-parasitic efficacy of the solvent extracts of different plants from Sabah. Herbal plants found in Sabah have been selected in our experiments to kill the leeches in a natural way. The leech-infested hybrid groupers were challenged against the various concentrations of solvent extracts of the selected plants. For ex. a herbal plant, taken the average time to kill the leeches at concentrations of 25, 50 and 100 mg/ml was 25.11±3.26, 11.91±0.99, and 4.88 ±0.50 min., respectively. Further, at various low concentrations 2.5, 5 and 10 mg/ml, the infested hybrid groupers were disinfested in an average time of 108.33±12.65, 65.83±9.70 and 29.16±5.85 min., respectively. Those plants showed significant antiparasitic activity against Z. arugamensis with complete mortality. The biochemical composition of the extract via GC-MS and LC-Q Exactive HF orbitrap mass spectrometry indicated different antiparasitic bioactive compounds. We found some hits such as terpenoids (ivalin, isovelleral, brassinolide, and eschscholtzxanthin), flavonoids (alnustin, kaempferol 7,4'-dimethyl ether, and pachypodol), phenolics (piscidic acid, chlorogenic acid, and ankorine), and aromatics (3-hydroxycoumarin). Thus, it could be revealed that some of the Bornean herbal plants could be a good source of metabolites and contain vital antiparasitic phytochemical compounds to disinfest the fish for an eco-friendly aquaculture.

Keywords: natural products, chemistry, plants, leech, groupers, aquaculture, agriculture, GCMS and LC-QTOF-MS, biocontrol agent

PLENARY 6

Antibiotics-Free Farming System: Innovative Steps Towards Success

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ABSTRACT

Antibiotic-Free Farming System (AFFS) is an innovative animal farming system with the ultimate goal of refraining from using any antibiotics and synthetic drugs during the entire farming process. This trend towards reducing antibiotics use in food producing animals has started, particularly in European and major food animal exporting countries since the last decade. Increased cases of antimicrobial resistance and the lack of new and efficient antibiotics fuel a mainly consumer-driven demand for fewer antibiotics in the food chain. As an integrator known for supplying safe and high quality chicken products to Malaysian consumers, Ayamas Integrated Poultry Industry Sdn. Bhd. (AIPI) committed to adopt AFFS as part of our practice and mission. Ensuring strong immunity is the key towards a successful 'antibiotics free' broiler production. When flocks are raised with few or no antibiotics, they're naturally more susceptible to diseases caused by primary or secondary infections. Due to high challenge of implementation, management and administration from all sections must adequately support Antibiotics-Free Farming and ensure the success of the implemented system.

ORAL PRESENTERS

AGRICULTURE

Agriculture-Biotechnology-Agribusiness

ID: AG-O-05 GQMQX
Category: Agribiotechnology

Eurycoma longifolia Extracts Induced Penile Erection and Ergogenic Effect

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ABSTRACT

Eurycoma longifolia Jack or locally known as tongkat ali has long been claimed to improve the strength of male virility and sexual prowess. The word "ergogenic" refers to the substances used to enhance energy production. Nowadays, numerous plant-based products been introduced into market as performance drink and herbal medicine to increase the energy level as well as sexuality. However, lack of scientific evidence proving this plant enhances sexuality in male and energy level. This study evaluated the ergogenic effects of stem and leaf extracts by using forced swimming and penile erection test. A total of six types of extracts were prepared from stem and leaf using different methods; leaf water extract (maceration), leaf water extract (reflux), leaf 50% ethanol extract (soxhlet), stem water extract (maceration), stem water extract (reflux) and stem 50% ethanol extract (soxhlet). *In vivo* study of penile erection using conscious male while rabbit showed that stem maceration significantly ($p<0.05$) prolong the erection as compared to leaf extract. While swimming test using mice revealed that higher dosage of 625 mg/kg of stem maceration extract significantly ($p<0.05$) increased the swimming time. Screening of free amino acid showed stem maceration extract has high content of L-arginine, L-methionine and glycine, which reported to be correlated with ergogenic effect. The finding in this study showed that stem water extract has high potency to induce penile erection as well as enhance energy production.

Keywords: *Eurycoma longifolia*, tongkat ali, ergogenic, forced swimming test, penile erection

ID: AG-O-07 WGLVQ
Category: Agribiotechnology

Antifungal Screening of the Selected Plants from Besut Beach Forest (Tembila) for Controlling Postharvest Pathogen

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ABSTRACT

The plant pathogenic fungi are major problems in agricultural sector in Malaysia. During storage, fruits and vegetables are often subject to varying levels of microbial decay, mainly due to pathogenic fungi, which usually infect the host through wounds sustained during harvest, handling and processing. Besut coastal area have a beach forest which content plants that has growing on BRIS (Beach Ridges Interspersed with Swales) soil with the characteristic of sand, low fertility status, excessive leaching and high surface. The aim of the present study was to evaluate antifungal properties of the selected plant that has growing on BRIS soil at Tembila beach forest in controlling postharvest pathogen. Seven plants were selected: *Melaleuca cajuputi* (Gelam plant), *Baeckea frutescens* (Cucur atap plant), *Anacardium occidentale* (Gajus plant), *Carallia suffruticosa* (Sisik puyuh plant), *Chromolaena odorata* (Kapal terbang plant), *Garcinia nervosa* (Manggis hutan plant), and *Catunaregam tomentosa* (Badang plant). Various concentrations of leaf extracts were evaluate using Well Diffusion method and Diffusion method against *Curvularia* sp., *Colletotrichum* sp., *Fusarium* sp., *Negrospora* sp., *Phytium* sp., and *Rhizopus* sp.of pathogenic fungi. Experimental results indicated that mycelial growth of most of selected microorganisms was reduced in all culture media contain the selected plants extract. Furthermore, through two antifungal test method, plant extract from *Baeckea frutescens* shows highest antifungal activity among others plant extracts with MIC of 100mg. Inhibition zone for *Colletotrichum* sp, by well diffusion method *B. frutescencs* (29.8%)> *M. cajuputi* (12.3%)> *C. suffruticosa* (11.5%)> *C. tomentosa* (9.0%)> *A. occidentale* (9.2%) > *G. nervosa* (9.0%) > *C. odorata* (8.0%) conclusion the selected plants from Besut Coastal has antifungal properties in controlling postharvest pathogen.

Keywords: Pathogen, Antifungal, Postharvest, Coastal Forest

ID: AG-O-14 BHAWZ
Category: Agribiotechnology

Antioxidant Activity and FTIR Analysis of Malaysian Stingless Bee *Geniotrigona thoracica* Propolis From Different Locations

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ABSTRACT

Propolis is a complex resin bee product and consists variation of chemical compounds that related to the biological and pharmacological activity. The geographical origin of the propolis influenced the biological effects. The present study was designed to preliminary screen the chemical composition for the purpose of chemical profiling and to evaluate antioxidant activity of *G. thoracica* propolis from different locations which were Besut, Dungun, Lundang, Tanah Merah and Gua Musang. The chemical fingerprint of propolis were analysed using attenuated total reflectance Fourier transform infrared (ATR-FTIR) scan technique. The antioxidant activity of propolis were evaluated using 2, 2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) radical scavenging activity at concentration of 7.1825- 500 μg/mL. The FTIR spectroscopic analysis revealed that all sample demonstrated similar pattern of spectrum but with slight difference especially at fingerprint region. Generally, all propolis samples consisted of aromatic compounds such as flavonoids, phenolic acids, and aromatic acids with mainly functional group came from hydroxyl, amine, carbonyl and ester group. For antioxidant activity propolis from BST exhibited the lowest IC_{50} values with 13 μg/mL which showed that it had greater free radical scavenging and antioxidant activity. Overall findings suggest that *G. thoracica* propolis are not only an important source of natural antioxidants but they have potential to be exploit in other biological and pharmacological activities.

Keywords: Antioxidant, FTIR, ATR, propolis

ID: AG-O-25 CTYBZ
Category: Agribiotechnology

Influence of Spatial Variation on The Physicochemical Properties and Minerals Content of Stingless Bee Honey (*Heterotrigona itama*) in Terengganu, Malaysia

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ABSTRACT

The growing interest in the usage of stingless bee honey as functional food proceeds from its composition, which has been associated with bio-medicinal properties. However, the composition of honey is varies depended on the types and origin of bees' food; which are flower nectar and plant honeydew. Thus, this study was done to investigate the influence of spatial variation on the physichochemical and minerals content of stingless bee honey in Terengganu. Honey produced by *Heterotrigona itama* were collected from four stingless bee apiary which are Banggol Peradong, Kubang Jela, Benting Lintang and Tembila. All those location surrounded with different plant diversity; Banggol Peradong with fruits orchard, Kubang Jela with ornamental plants, Benting Lintang with coconut trees and Tembila with gelam trees. The physicochemical properties, antioxidant activity, total phenolic compounds, total flavonoid compound and minerals of stingless bee honey were evaluated. Results obtained shows that the pH of honey at all locations were acidic, ranging from 3.31-3.54. Honey from Benting Lintang is the sweetest (71.69 ± 0.075°Brix) followed Tembila (70.51 ± 0.028° Brix), Kubang Jela (69.77 ± 0.060°Brix) and Banggol Peradong (69.40 ± 0.052°Brix). Moisture content of honey ranged from 32.11 to 33.13% and electrical conductivity of 0.65 to 1.46mScm^{-}1 which show significant different between the four locations. For color, the L, *a** and *b** values ranged from 44.18 to 52.52, 0.04 to 2.15 and 10.36 to 14.82, respectively. The flavonoid content of honey samples ranged from 0.28 to 0.42 mg/ml as mg catechin equivalents (CEQ) per ml of honey while phenolic content gives the value from 39.38 to 78.44 mg/L as mg of Gallic acid equivalents (GAE) per L of honey. Antioxidants activity of this honey gives value from 77.26 to 85.54% which the lowest was Banggol Peradong and the highest was Benting Lintang. The major component of minerals as sulphur (S), calcium (Ca), magnesium (Mg) and sodium (Na) ranged from 63.929 to 118.902 mg/L, 12.197 to 29.342 mg/L, 5.816 to 27.364 mg/L and 18.095 to 40.170 mg/L, respectively. It can be concluded that the physichochemical and minerals content of honey by *H. itama* is differ between locations due to the variation of plant diversity at respective locations. Data obtained provide the information on the effect of spatial biodiversity variation on the quality of stingless bee honey in Malaysia.

Keywords: Stingless bee honey, physicochemical properties, minerals content

ID: AG-O-26 GKALA
Category: Agribiotechnology

Investigation on the Physicochemical Properties and Minerals Elements of Different Species of Stingless Bee Honey (Meliponinae)

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ABSTRACT

Flower constancy by the different species of stingless bee influence the quality of honey. This study aims to compare the physichochemical properties, antioxidant activity and minerals elements of stingless bee honey produced by *Heterotrigona itama, Geniotrigona thoracica*, *Lepidotrigona terminata* and *Heterotrigona erythrogastra* reared at Banggol Peradong, Manir, Terengganu, Malaysia. The pH of all honey is acidic and differs between bees species with *H. erythrogastra* (pH 2.98) is the most acidic. The Brix (ranges from 67.72 to 69.98 °Bx) and electrical conductivity (ranges from 555.2 to 784.8 mS cm^{-1}) exhibited the highest and lowest values both in *L. terminata* and *H. erythrogastra,* respectively. *Heterotrigona erythrogastra* honey possessed significantly highest moisture content (34.507%) compared to the other honey. The tristimulus values of colour indices *L*, a*,* and *b** showed significant difference between four types of honey. The value of *L** range from 49.449 to 64.006, *a** values range from -4.287 to 1.890 and *b** values range from 10.116 to 35.920. *Lepidotrogona terminata* had the darkest honey colour, while *G. thoracica* had the lightest honey colour. Both total phenolic content (TPC) and total flavonoid content (TFC) were the highest in *L. terminata*. Meanwhile, TPC and TFC were the lowest in *H. erythrogastra* and *G.thoracica* respectively. The highest antioxidant activities were found in *L. terminata* honey which is 80.26% of DPPH degradation while the lowest antioxidant activity was found in the *H. erythrogastra* honey which is 73.9% of DPPH degradation. *Heterotrigona itama* had the most abundant of major components of calcium, magnesium and sulphur with value 29.342 mg/L, 23.289 mg/L and 102.702 mg/L, respectively. The concentration of manganese was the lowest in all species when compared to other elements. Characterization of honey from the different stingless bee species of same locality showed variabilities that may due to different flower preferences of the different species.

Keywords: Stingless bee, honey, physicochemical properties, minerals element

ID: AG-O-35 VGUNU
Category: Agriculture

Soybean [*Glycine max* (L.) Merrill.] Seed Quality Produced Under Different Production Environments

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ABSTRACT

Soybean is an important crop in Sri Lanka, however increased production is needed to cater for the demand. The production is hindered by the non-availability of quality seeds. New areas for seed production are required, however, the influence of the environmental condition on seed development and maturation, and seed quality is not clearly understood. The objective of this study was to determine the effect of seed production environment on seed development, maturation and to assess the subsequent seed quality. The experiment was conducted at three locations (Mahailluppalama (M1), Polonnaruwa (POL), and Aluttarama (ALU)) over two planting cycle (P1, P2) during 2018 - 2019. Randomized Complete Block Design (RCBD) with three replications were used. Pod and seed development pattern and final seed germination % were obtained at five reproductive (R) maturity stages namely, R6 (full seed stage), R7 (beginning of mature stage), R8 (full mature stage), R8+5, R8+10 days). Analysis of variance was carried out and combined analysis was used to analyze the interaction using SAS version 9.4. The study infers that in all production environment it took 68±2 days from seed sowing to full seed stage (R6). However, days taken from full seed stage (R6) to full mature stage (R8) varied by 13-31 days. Seeds produced in environments with cumulative rainfall (RF) more than 150mm or more than 75% relative humidity (RH) during the late reproductive stage (R6-R8), were considered as wet environment and had prolonged seed maturation period of more than 3 weeks (P1 ALU, P2 ALU, and P2 POL). Whereas seeds lots of the crop which experienced drier environments matured faster (P1 POL, P1 MI, and P2 MI). At R8, above 75% final germination was obtained for all environments, however rapid reduction in germination was observed in wet environments. Only seed lots produced in dry environments had more than 75% germination after 6 months storage under ambient condition. In conclusion, the environmental condition in which the mother plant experienced late reproductive stage (R6-R8) directly influenced seed maturation duration and seed quality. If the late reproductive stage coincided with more than 150 mm of RF or 75% RH, those seed lots should be utilized immediately for planting and not stored for the following season.

Keywords: Soybean, maturity stages, production environments, seed germination

ID: AG-O-38 VANWE
Category: Agriculture

Establishment and Optimization of Plant Growth Media for the Propagation Of *Ficus deltoidea* var. Trengganuensis

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ABSTRACT

Mas Cotek (*Ficus deltoidea)* var. trengganuensis is normally propagated using tissue culture techniques, thus required long time and under sterilized condition. Therefore, this study was conducted to determine the formulation of the most suitable plant growth media for the propagation of Mas Cotek under field condition using different rooting media. Three different experiments were done: 1) to determine the effect of plant growth media on plant traits; 2) to determine the best ratio of cocopeat (CC) and rise husk biochar (RHB); and 3) to evaluate the effect of added rooting promoting materials into plant growth media; for *F. deltoidea* propagation. The parameters to measure the plant growth performance were total number of root, root length, plant biomass, root biomass, chlorophyll content, and stem diameter. Soil pH, soil electrical conductivity, and plant growth media biomass were also measured. All media produced 100% rooting but plant performance were differs after one month. In first experiment, the performance of Mas Cotek in six different growth media which is biochar, bris soil, cocopeat, peatmoss, sand and mixture of 70% cocopeat:30% biochar were compared. Result obtained shows that Mas Cotek was propagated best in rice husk biochar. Seedlings propagated in this plant growth media has the highest number of total root, longest root length, heaviest plant and root biomass, biggest stem diameter and highest chlorophyll content. In the second experiment, Mas Cotek was propagated in the different ratio of CC and RHB. The treatments were 100% CC : 0% RHB, 70% CC : 30% RHB, 50% CC : 50% RHB, 30% CC : 70% RHB and 0% CC : 100% RHB. Result shows that Mas Cotek propagated best in the combination of 30% CC : 70% RHB growth media. Seedlings propagated in this treatment has highest number of total root, heaviest plant biomass, and biggest stem diameter. Even though plant seedlings also propagated well in 100% RHB, but no significant difference were observed on the number of total root, root length, root biomass and chlorophyll content between plant seedlings in both growth media. In the third experiment, the growth media with the ratio of 70% cocopeat : 30% biochar were added either with control (no material added), effective microorganism (EM), Agromedia™, Indole-3-butyric acid (IBA) organic fertilizer, peatmoss and seasol. The result showed that Mas Cotek propagated best when planted in the growth media added with IBA. Seedlings propagated in this plant growth media has the highest number of total root, longest root length, heaviest plant and root biomass, biggest stem diameter and highest chlorophyll content. The findings indicate that Mas Cotek propagated best when planted in the growth media added with IBA to ensure their best performance.

Keywords: Mas Cotek, *Ficus deltoidea*, plant growth media, plant propagation

ID:AG-O-43 NSJBN
Category: Agribusiness & Agriculture

Performances of *shrunken-2* (*sh2*) Sweet Corn Hybrids in Malaysia

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ABSTRACT

There are continuous efforts in sweet corn breeding for good eating quality and better adaptability in different growing environments whether in temperate or tropics. However, there are very limited sweet corn hybrids suitable for the tropical region despite increasing demand in Asian countries including Malaysia. Temperate varieties are hardly adapted in the tropics due to susceptibility to a wide range of pests and diseases, ecological factors and short day length. The pests and diseases are abundant and constantly evolving in the tropics, among the most significant ones are fusarium, rust, and blight diseases. In this study, the performance of 1385 *shrunken-2* (*sh2*) corn hybrids derived from crosses between 192 inbred lines were evaluated at Batu Arang, Selangor, Malaysia. Initial screening based on the adaptability, agronomic, and ear performance narrowed down the number to 24 yellow, 17 bi-color, and two white hybrids. Experiments were conducted using Randomized Complete Block Design (RCBD) with three replications, meanwhile, 11 check hybrids were included. Data collected on agronomic traits, yield, and ear traits, were then subjected to statistical analysis by one-way ANOVA using SPSS software SPSS17. The significant difference was observed between the hybrids derived from parents of diverse genetic backgrounds. The yield of marketable ear ranged from 11.4 to 20.3 t/ha. For yellow hybrids, 1003Y and 952Y were chosen due to their good yield, disease resistance, more than 87% of the marketable ear, nice ear package, good eating quality, cylindrical ear shape, attractive bright yellow kernel color, and dark green husk. On the other hand, 6005BC and 952BC were chosen for bi-color hybrids for their performance, good colour contrast and eating quality. However, the white hybrids were too susceptible to tropical conditions with poor growth and less resistant to diseases, more effort in breeding process is needed to improve its adaptability by using different genetic materials. The observed performance could be used to decide the sweet corn hybrids with good adaptability and eating quality that have commercial value in the tropical region including Malaysia.

Keywords: Tropical sweet corn, adaptability, agronomy, fresh ear yield, eating quality

ID: AG-O-44 HQJFL
Category: Agribiotechnology

Influence of Biofertilizers with Reduced Rates of NPK Fertilizers on Vegetative Growth of Lemon (*Citrus limon*) Seedlings

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ABSTRACT

Lemon does not develop a powerful root system and fruit yield and quality of lemon decrease due to using high levels of chemicals during the vegetative growth and development period. This study aimed to investigate the effects of bio-fertilizers (*Trichoderma harzianum* and *Bacillus thuringiensis*) on Key lime seedlings growth and development under potted condition. The study started with an evaluation of the effects of bio-fertilizers and reduced rates of NPK on morphological and physiological properties of lemon seedlings. Eight (8) treatments were applied on same age and shape of 40 seedlings with five replicates, without fertilization (as control), NPK 100% , NPK 50 % + 50 g *T. harzianum*, NPK 50 % + 50 g *B. thuringiensis*, NPK 25 % + 75 g *T. harzianum*, NPK 25 % + 75 g *B. thuringiensis, T. harzianum* 100 % and *B. thuringiensis* 100 %. Morphological and physiological characteristics of Key lime seedlings measured and recorded. The range of seedlings height (80-95 cm), number of leaves (88-90), leaf area (29-47 cm2) and number of branches (9-13) were found for 3 months old lemon seedlings. The chlorophyll content (SPAD) and carotenoids content range were (58-65mg/g) and (5 to 7 mg/g). The chlorophyll a, b and total chlorophyll content in the leaves were (15-26 mg/g), (4-10 mg/g) and (27-36 mg/g), respectively. The range of lower, maximum and photosynthetic yield were (354-392), (2066-2199) and (0.81-0.825), respectively. The fresh and dry biomass per leaf were as (0.72-1.32 g) and (0.26-0.38 g). From this study, it can be concluded that morphological and physiological characteristics of lemon seedlings were affected by the two bio-fertilizers (*Trichoderma harzianum* and *Bacillus thuringiensis*) with reduced rates of NPK by 50%.

Keywords: *Trichoderma harzianum, Bacillus thuringiensis,* NPK, growth, development, lemon

ID: AG-O-46 MDMFV
Category: Agribiotechnology

Screening for Tolerant Genotype to Saline Water Submergence in Rice (*Oryza sativa* L.)

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ABSTRACT

Saline water submergence is a newly emerge abiotic stress jeopardizing rice production especially for the rice fields located nearby or alongside coastal areas. The stress was caused by the intrusion of sea water into those rice fields causing flash flood mainly during monsoon season. The present study was conducted as an attempt to screen for tolerant genotype against saline water submergence at seedling stage. There were six genotypes involved in the study mainly IR64-Sub1 as submergence tolerant control, Pokkali as salinity tolerant control, IR64 and MR297 as susceptible control, MR284 and MR253, a local rice cultivar respectively. The experiment was conducted using split plot design with eight replications. On 14 days after germination, the rice seedlings were totally submerged of about one-meter depth in a polyethylene tank containing saline water at 0, 4, 8 and 12 dS/m for 14 days while the non-submerged plant was control of the experiment. Seedling growth attributes, survival rate and recovery rate were recorded before and after de-submerged for three consecutive weeks. All genotypes however were susceptible to saline water submergence at 4, 8 and 12 dS/m. In contrast, submergence in non-saline water (0 dS/m), IR64-Sub1 recorded significantly higher at 83% as compared to MR284 (17%), MR297 (17%), Pokkali (8%), MR253 (0%) and IR64 (0%). Therefore, potential genetic resource of rice originated from coastal area in the future screening is crucial to increase the possibility of identifying tolerance genotype to saline water submergence stress which later will be used as a donor parent in the breeding program.

Keywords: Rice, saline water submergence, tolerant genotype

ID: AG-O-49 XPRVT
Category: Agriculture

Cadmium Toxicity and Tolerance in Pak Choi (*Brassica chinensis* L.) Under Hydroponic Condition

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ABSTRACT

Cadmium (Cd) is one of the highly toxic heavy metals that can be merely absorbed by plant, causes living things vulnerable to its toxicity mainly through the food chain. Likewise, Cd outwardly inhibits plant growth and development by prompting chlorophyll loss and affects photosynthetic activities. This study investigated the effects of Cd on Pak Choi seeds germination behaviour and plant growth and morphological characteristics of Pak Choi seedling under hydroponic condition. The seeds of Pak Choi were sterilized and germinated onto petri dishes containing moistened filter paper with seven (0, 0.01, 0.05, 0.1, 0.2, 0.3, 0.4 mM) different treatments of cadmium chloride ($CdCl_2$). The plant length was measured for 15 days. The hydroponic plantation was set up with Pak Choi seedlings transplantation. After fourteen days, $CdCl_2$ was introduced into plant media with four treatment (0, 25, 50 and 1.00 mg/L $CdCl_2$). The plants were left to grow for another two weeks before termination. The experiments were performed in Completely Randomized Design (CRD) with five replications. The plant length, fresh weight, dry weight, leaf area, relative water content (RWC) and chlorophyll content were determined subsequently. The finding shows that the shoot and root length of germinated seeds decreased as the concentration of $CdCl_2$ increased. The highest concentration, 0.4 mM $CdCl_2$ exhibited the lowest shoot and root length up to 67% and 78 % shorter than control, respectively. Under hydroponic condition, Pak Choi seedling has thrived without $CdCl_2$ treatment. Chlorosis symptom can be distinctly seen in Pak Choi grown in $CdCl_2$–nutrient solution. A declining pattern of plant length, fresh weight, leaf area, RWC and chlorophyll content has been identified as the $CdCl_2$ concentration increased. The 100 mg/L of Cd-treated Pak Choi demonstrated the lowest plant growth performance, followed by 50 and 25 mg/L $CdCl_2$. The same concentration also showed the lowest chlorophyll content compared to other treatment. The current study shows that Cd negatively influenced the growth of Pak Choi seeds and seedlings grown under hydroponic condition.

Keywords: Cadmium, *Brassica chinensis*, Pak Choi, seed germination, hydroponic

AG-O-51 UBGTH
Category: Agriculture

Effects of Cadmium Contamination on Pak Choi Growth and Development

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ABSTRACT

Cadmium is a highly toxic non-essential trace metal that is passively biosorbed by plants cultivated on contaminated land causing a detrimental effect on most living organisms through their food chain. Cadmium is deceptively impairing plant growth and development by affecting the photosynthetic pathway and triggers the production of reactive oxygen species (ROS), affecting protein DNA and cell membrane. The aim of this study was to assess the level of damage and amelioration process in Pak Choi under pot condition. The experiment was carried out in Randomized Complete Block Design (RCBD). Under ten (10) replications, 50 seedlings were grouped into five as T0 (control), T1, T2, T3 and T4 were treated with different cadmium concentration (0, 10, 25, 50 and 100 mg/kg soil) respectively. After forty days, chlorophyll content, total phenolics, malondialdehyde (MDA), ascorbate peroxidase and catalase were determined. In cadmium treated groups, a significant decrease in chlorophyll *a* and chlorophyll *b* contents at $P \leq 0.05$ were observed as Cd concentration increased. Whereas, the ascorbate peroxidase, catalase, total phenolic and malondialdehyde contents were progressively increasing ($P \leq 0.05$) as cadmium concentration increases. Cadmium affect both physiological and biochemical parameters of Pak Choi.

Keywords: Pak Choi, chlorophyll, ascorbate peroxidase, Catalase, malondialdehyde and total phenolics.

ID: AG-O-66 QAWKK
Category: Agribusiness & Agriculture

Effect of Silicon Nutrient on Fruit Quality of Strawberry Grown in A Rhizosphere Cooling System

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ABSTRACT

Silicon nutrients application in crops have shown promising results in improving fruit brix, reducing plant logging, increasing disease resistance and enhancing leaf cuticle thickness. Plants uptake silicon in the form of silicic acid which then acts as a biostimulant. However, studies on the use of silicon nutrients on strawberries (*Fragaria* x *ananassa* Duch) have mainly been on the use of stable silicon nutrients like the silicates, which may not be readily available for plant absorption. This study aimed to determine the effect of root application of 0.25% (v/v) silicon nutrient (Si) in the form of silicic acid on the fruit qualities of three strawberry cultivars (cvs Fortuna, Festival and Monterey) grown at tropical lowland conditions in a rhizosphere cooling system (RCS). The RCS was designed to cool the rhizosphere of the strawberry plants to a mean temperature of 18^0C. Six plants of each cultivar in three replications were used. Five weeks after transplanting, root application of 45ml Si was applied weekly for eight weeks. Results from this study showed that there was 12.66%, 12.58% and 2.14% increases in the fruit set percentage of cvs. Fortuna, Festival and Monterey respectively when treated with Si compared to the control plants. Significant differences ($P < 0.05$) were also observed in fruit total soluble solids of all the treated cultivars compared to controls. Classification of the harvested fruits according to the EU standard for strawberry fruit marketing showed that 85% or more of fruits of the Si treated cultivars reached the market standards, with significant difference ($P < 0.01$) observed in malformed fruits of Si treated Festival (31.9%) and its control (70.28%). This study suggests that Si significantly improved strawberry plants fruit set, strawberry sweetness and fruit size. These results also suggest that studies into Si on strawberry fruits nutritional quality may be necessary.

Keywords: cooling system, silicic acid, silicon nutrient, strawberry

ID: AG-O-82 DAZLG
Category: Agriculture

Allelopathic Potential Assessment of Root Exudates and Rhizosphere Soil of *Turnera subulata*

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ABSTRACT

The overuse of herbicides for weed control eventually leads to the evolution of herbicide resistant weeds as well as the impacts upon human health. Thus, the use of herbicide can be minimized by implementing the allelopathic concept in agriculture. Thus, laboratory experiments were carried out to evaluate the allelopathic potential of root exudates and soil rhizosphere under *Turnera subulata* (white alder) by using Plant Box Method and Rhizophere Soil Method, respectively. Each experiment was conducted in Completely Randomized Design (CRD) with three replicates. Both methods were tested on selected bioassay species which were mustard (*Brassica chinensis*), weedy rice (*Oryza sativa* var *sativa*), wheat grass (*Triticum aestivum*), and common Malaysia rice variety (MR303). Results show that the root exudates and rhizosphere soil of *T. subulata* exhibited different allelopathic activities on the growth of selected bioassay species. The linear regression coefficient (r^2) was found being the highest on the effect of root exudate of *T. subulata* on the radicle and hypocotyl length of wheat grass (0.7895 and 0.7946, respectively). The radicle and hypocotyl length of wheat grass were inhibited by 62.6% and 84.6% respectively compared to control. The radicle and hypocotyl length of all bioassay species were significantly decreased ($p<0.05$) when plants were grown with increasing amount of *T. subulata* rhizosphere soil. At amount of 50 mg soil rhizosphere, the highest inhibitory activities were exhibited by MR303, followed by weedy rice, wheat grass and mustard (where the inhibitory percentages were 28.6, 28.1, 7.5 and 6.5 compared to control). This proved that the root exudation of *T. subulata* have potential allelochemical released to the other plant and have promising allelopathic effect. These results provided the information on utilization of *T. subulata* in sustainable weed management.

Keywords: Allelopathy, allelochemicals, *Turnera subulata*, rhizosphere soil, root exudate.

ID: AG-O-85 RYKSD
Category: Agribusiness & Agriculture

Effects of Drying Temperature on Sweet Corn (*Zea mays saccharata* Sturt) Seed Quality Harvested at Different Maturity Stages

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ABSTRACT

As demand of sweet corn (*Zea mays saccharata*) grows, there is need to increase the production of seed as planting material. Currently, sweet corn seed is harvested late in the field usually at 35 days after pollination (DAP) increasing the risk of pathogen attacks. To reduce time of seeds in the field, the effects of drying at different temperature on the quality of sweet corn seeds harvested at different maturity stages is determined. A study was conducted by harvesting sweet corn cobs at five maturity stages (29, 32, 35, 38 and 41 DAP) followed by drying at 35°C, 40°C and 45°C using the oven. Time taken to reduce moisture content to 10% was recorded. Electrical conductivity of leachate and germination test was conducted to measure seed viability and vigor. The experiment was a randomized complete block design with factorial arrangement and replicated four times and statistical analysis was conducted using SAS 9.4 with 95% confidence interval. Seeds dried at 35°C required 112 hours to reach 10% moisture content, while drying at 40°C and 45°C was more rapid at 96 hours. There was no interaction between drying temperature and the maturity stages in seed viability and vigor. Assessment on the electrolyte leakage showed that drying at 40°C and 45°C affected seed coat integrity and seeds harvested at 29-35 DAP had higher conductivity reading. However, higher conductivity associated with lower membrane integrity was not reflected on the seed germination percentage. Seeds harvested at 29-35 DAP had better performance in mean germination time, germination rate index and coefficient velocity of germination, irrespective of drying temperature. Based on initial findings, seeds harvested early around 29-35 DAP performed equally well while drying at 40°C being superior in seed vigor. Further studies on seed storability should be conducted to know how drying temperature affects seed quality.

Keywords: sweet corn, seed drying, seed maturity stages, seed quality, seed performance

ID: AG-O-95 HBJAW
Category: Agribiotechnology

Morphological and Genetic Analysis of *Momordica cochinchinensis* Spreng From Different Accessions in Malaysia

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ABSTRACT

Momordica cochinchinensis also known as gac fruit is a 'superfruit' that is very popular in Vietnam. Gac is an orange-red fruit with ovoid in shape and has soft spiny texture. Nonetheless, gac is a new and less-known plant in Malaysia. This study aimed to characterize gac using morphological analysis involving both vegetative and reproductive parts and to characterize the genetic diversity in gac by using Inter-simpler sequence repeat (ISSR) analysis. Four different gac accessions were collected from different area and were cultivated under tropical condition. The DNA was extracted from young leaves of each four accessions using CTAB method. Total of 30 ISSR markers were used for application in genetic diversity of gac. Morphological characters revealed that code accessions (G-D, G-M) shared almost the same fruit morphology characters especially in fruit shape and colour. However, code accession (G-H) showed major differences in fruit shape and spike density compared to code accessions (G-D, G-M). The mean weight of fruits collected was 264.4 kg with a minimum value of 193.5 kg and maximum value 383.0 kg. The range of Nei's genetic distance coefficient was between 0.0 and 1.0 with the mean value of 0.41. Based on UPGMA analysis, the dendrogram has grouped the four gac accessions into two main groups. Conducting this research to identify the diversity of gac fruit using morphological and molecular studies and data complemented each other very well and has been confirmed by clear molecular differentiation on the gac accessions.

Keywords: Gac, Genetic diversity, Inter simple sequence repeat (ISSR), *Momordica cochinchinensis*, Morphological characteristic.

ID: AG-O-96 MYTZP
Category: Agriculture

Morpho-Physiological Response of Rice (*Oryza sativa* L.) Genotypes to Salinity Stress at Seedling Stage

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ABSTRACT

Salinity stress would significantly reduce seedling growth and yield performance of rice. In addition, salinity also affects physiological and metabolic process mainly the osmotic and ionic balance of the cells. Hence, the present study was conducted to evaluate morpho-physiological and biochemical response of selected rice genotypes to salinity stress at seedling stage. Twelve rice genotypes were used in the pot-trial experiment including two checks namely Pokkali (tolerant) and MR297 (susceptible). The experiment was conducted in a split plot design with three replications. Three salinity levels involved were L1 (normal fresh water), L2 (saline water at 12 dSm^{-1}), and L3 (saline water at 24 dSm^{-1}) as the main plot while rice genotypes as the sub-plot. Salinity stress was imposed for 14 days starting from 21 days after sowing. In overall, L3 salinity stress significantly reduced 47.41% of all seedling growth attributes for all genotypes except for Pokkali (V11) as compared to control condition. Meanwhile, Haiboq (V9) and Basmati 370 (V3) recorded statistically similar response as the MR297 (V10). The trend of chlorophyll content reduction could be seen in all genotypes under L2 and L3 salinity stress with average of 77.72% reduction over control condition. In contrast, proline content was increased over seven folds in all genotypes as level of salinity increases except for V11. Proline may function as a signal metabolites thus higher proline content indicates that the plant is under stress. In conclusion, chlorophyll and proline content may be used as indicators of sensitivity to salinity stress in rice cultivars along with the morphological growth responses.

Keywords: Chlorophyll, Proline, Salinity stress, Rice

ID: AG-O-97 TFJPE
Category: Agriculture

Effects of Betaine-rich Nano Fertilizer on Chemical Properties of Salt-stressed Sweet Corn (*Z. Mays* Var. *Saccharata*) and *A. Thaliana*

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ABSTRACT

Climate change is causing salt stress that is detrimental to crop ecosystems including lowering nutrient availability and affecting crop growth and production. Moreover, the salt stressed soil induces physiological disorder and chemical properties in plants which influence the growth and development of plants. Therefore, the aim of this study was to examine the effects of betaine-rich Nano fertilizer (B1N1) on chemical properties of salt-stressed sweet corn (*Z. mays* var. *saccharata*) and *A. thaliana* under salt stress. In this study, plants were grown in a controlled plant growth room. Different salinity levels (S0: 0 dS/m, S1: 2 dS/m, S2: 4 dS/m, S3: 6 dS/m and S4: 8 dS/m), two betaine levels (B0: 0 mM and B1: 50 mM) and Nano fertilizer (N0: without Nano fertilizer and N1: with 3 mL/L Nano fertilizer) were arranged in a Randomized Complete Block Design (RCBD) with three replicates. Data for chemical properties were recorded. The results were analysed using One-way analysis of variance (ANOVA) followed by Duncan post-hoc test. B1N1 improved NO_3^- and pH of sweet corn and *A. thaliana*, EC and Ca^{2+} of sweet corn and *A. thaliana*, respectively. Therefore, it is anticipated that B1N1 could reduce salt stress by improving the chemical properties in sweet corn as well as in *A. thaliana*.

Keywords: Betaine-rich Nano fertilizer, salt stress, *Z. mays* var. *saccharata*, *A. thaliana*, chemical properties

ID: AG-O-105 KPVZD
Category: Agribusiness & Agriculture

Adoption of New Agricultural Technologies Level of Awareness Among Plantain and Banana Growers in Oyo State, Nigeria

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ABSTRACT

The main hindrance affecting the unbroken production of plantain in Nigeria includes; insufficient storage facilities and high cost of transportation (input materials and output), credit facilities, inadequate labor, the old method of production (local varieties of suckers). Therefore, since these obstacles prevent many farmers to adopt new technologies so, this study focus on the level of new agricultural technologies adoption among plantain and banana growers in the study area. A multistage sampling procedure was set about in selecting sample. Total of 150 farmers were randomly selected utilizing the stratified sampling method. Face to face interview were carried out using structured questionnaires. Out of ten items of the economic factors 'Farmers have no money to purchase new technologies' recorded the highest mean (M = 6.57, SD = 0.717) while 'I feel that household size plays a major role in the adoption of technology' has the lowest mean (M = 4.41, SD = 2.186). The eight items out of ten recorded a high level of the mean score, whereas, two items recorded a moderate mean score. "I feel that danger associated with the technology may result in low adoption" recorded highest mean score (M = 6.45, SD = 0.856) on social factors. The highest mean score of items for institutional factors is "I feel that farmers have enough information concerning the new technology" (M = 6.49, SD = 0.865). Therefore, the three highest items characterized economic factors, social factors and institutional factors activities in Oyo state agriculture.

Keywords: Level of adoption, awareness, technologies, plantain and banana growers, Nigeria

ID: AG-O-111 SZURA
Category: Agribusiness & Agriculture

Do Beliefs and Behaviors of Dairy Farmers Play A Role Towards the Adoption of Good Hygiene Practices?

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ABSTRACT

Dairy is a good source of income specifically to small and marginal farmers since consumers purchase fresh milk on a daily basis. The rising awareness on the nutritional benefits of milk has increased consumer's preferences towards milk and dairy products and such demand has grown over the years. To meet milk demand, the Malaysian government geared up efforts towards increasing local milk production. However, good hygiene practices are never emphasized in the call to increase milk production, although previous studies demonstrated that lack of adoption of good hygiene practices resulted in mastitis infection among dairy cows. The aim of this study was to offer insights concerning the role of beliefs and behaviors among smallholder dairy farmers in adopting good hygiene practices. Theory of Planned Behavior was employed in this study to explain beliefs and behaviors, focusing on attitude, subjective norm and perceived behavioral control of smallholder dairy farmers' intention to adopt good hygiene practices. This study was carried out in the Southern Zone, the largest producing milk zone in Peninsular Malaysia. Data was collected among 67 smallholder dairy farmers through the utilization of a research instrument. The data was analyzed using Partial Least Square-Structural Equation Model. This study finding demonstrated that attitude and perceived behavioral control influence dairy farmers' intention of adopting good hygiene practices. This study is the first to be undertaken among smallholder dairy farmers in Malaysia. The findings of this study offer policy makers and extension agents practical insights on tackling the promotion and adoption of good hygiene practices among dairy farmers in Malaysia.

Keywords: Good Hygiene Practices, Dairy, Belief, Behavior, PLS-SEM

ID: AG-O-116 MUXRJ
Category: Agribusiness & Agriculture

The Impact of Relationship Marketing on Paddy Farmers' Loyalty in Bangladesh

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ABSTRACT

Bangladesh economy profoundly depends on Agriculture. About 75% of total cultivable land is covered by paddy production. Most of the farmers are small and marginal and their living standard is poor. They are financially disorganised, not efficient in economic return and have less knowledge about marketing. The study focused on relationship marketing that could underpin strategic marketing to minimize economic problem and enhance producer's loyalty. Loyalty is essential to encourage long-term investment and facilitate building, developing and maintaining long-term relationship between producer and buyer. The objective of the study is to determine the relationship between relationship marketing and paddy farmer's loyalty in Bangladesh. A validated survey instrument was used for data collection and 356 paddy farmers were interviewed from the plentiful paddy production district of Mymensingh in Bangladesh. 25 items in the survey instrument were measured by a seven-point Likert- scale. Partial Least Square Structural Equation Modeling (PLS-SEM) assessed the impact on farmers' loyalty of five key constructs of relationship marketing (trust, commitment, communication, power and satisfaction). The findings revealed that relationship marketing components such as trust, commitment, communication and satisfaction established direct relationship with loyalty. One the other hand, power failed to establish direct relationship with loyalty. Based on the results this study offered a strategic insight into academicians, practitioners and government of Bangladesh interrelated to agriculture context regarding the enhancement of farmers' loyalty in business relationship through embedded concept of relationship marketing. The farmers' loyalty can be created, reinforced and retained by marketing plans aimed at building trust, demonstrating commitment to relationship, communicating with preferred buyer in a frequently and trustworthy information and experiencing overall satisfaction in fairly treatment from preferred buyers.

Keywords: Bangladesh, loyalty, paddy farmers, PLS-SEM, relationship marketing

ID: AG-O-122 KVMUD
Category: Agribusiness & Agriculture

Mental Models Growers for Adoption of Terengganu Sweet Melon Using Fertigation System

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ABSTRACT

Terengganu sweet melon (MMT) and fertigation systems are agricultural technologies with high prospects of improving farming practices and quality production. Nevertheless, only a few growers adopted these farming technologies in Terengganu. The mental model can be used to understand their adoption decision. The extracted information can be translated into practical strategies to recruit and retain more new growers to venture into modern farming. Hence, this study explored MMT growers' mental model on their adoption decision on MMT fertigation system. This study used qualitative research design with the semi-structured interview to explore mental model components that explained growers' adoption decision on MMT fertigation system, specifically, prior knowledge and experience, belief, thinking pattern, values, goals, and concepts. Thirteen active MMT growers from four districts in Terengganu voluntarily participated in this study and they were identified through the purposive sampling. The most significant result generated from the thematic analysis was that all growers' prior knowledge and experience influence their adoption of the MMT fertigation system. In terms of concept, growers predominantly (100%) identify the MMT fertigation as modern agriculture with an automatic system using simultaneous fertilization and watering that help improve and optimize their farming operations with reduced cost and optimal yield. Their belief system (~60%) on the MMT fertigation system's adoption was influenced more by extrinsic than intrinsic motivations. Thinking patterns, values, and goals were three components that relatively less able to explain their mental model on adopting the MMT fertigation system. In conclusion, there were similarities and differences in growers' mental model trends in MMT fertigation systems adoption decisions. To increase and retain a much higher number of growers adopting the MMT fertigation system, the relevant government agencies must provide a continuous extension educational program package that incorporates systematic experiential learning and coaching concepts.

Keywords: Technology Adoption, Mental Model, Adoption Decision, Fertigation System, Sweet Melon.

ID: AG-O-123 KVMUD
Category: Agribusiness & Agriculture

Terengganu Sweet Melon Using Fertigation System: Needs for High Production Among Terengganu Growers

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ABSTRACT

Terengganu government needs 100 more fertigation growers of Terengganu Sweet Melon or locally known as MMT, to meet the European market demand. Unknown local growers need on MMT fertigation farming hinders Terengganu government efforts to attract new local growers. Hence, this study's objective was to explore the needs of MMT growers using fertigation systems for high production in Terengganu. This study employed a qualitative approach with the case study design. The semi-structured interview and Participatory Research Appraisal tools were used as the study instruments. Based on the purposive sampling, 13 MMT growers from three districts in Terengganu volunteered as the study informants. The thematic analysis of the interviews with the growers extracted several themes. Almost all growers (92%) acknowledged MMT has promising prospects for its high market price and cost-effective fertigation system for increased production. However, they expressed several needs to support technology adoption and retaining the MMT fertigation practice for high production. All growers iterated top urgent need was the advisory services to control pests and diseases at different planting stages (e.g.: white powdery mildew, trips), the technical operation, and high-quality MMT fruits. Financial support to initiate and operate the high-cost farming system, particularly the infrastructure, was identified as their second urgent need to realize the MMT fertigation prospect. The Terengganu government may incorporate these study findings to formulate an attractive policy to solicit new growers' participation and support upscaling among existing MMT fertigation growers to ensure European market demand is met. Appointing relevant agencies or experts for the continuous advisory service on the technical support on MMT fertigation complemented with growers' Community of Practice will facilitate them advancing high production. Friendly financial aids or government subsidy for beginners and existing small-scale growers, particularly on the fertigation infrastructure and agricultural inputs, ascertain their advancement in this modern farming.

Keywords: Technology Adoption, Advisory Services, Participatory Research Appraisal, Fertigation System, Sweet Melon.

ID: AG-O-124 LWFLS
Category: Agriculture

Influence of NAA Concentrations and Illumination on Somatic Embryo Development in Two Cultivars of Date Palm (*Phoenix dactylifera* L.)

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ABSTRACT

Naphtalene Acetic Acid (NAA) is able to promote *in vitro* regeneration in date palm cultures when embryos are cultured under optimum illumination condition. Embryogenic callus of two date palm cultivars: Ajwa and Khalas were cultured in hormone-free MS medium (Murashige and Skoog, 1962) and media supplemented with NAA (0.02, 0.04, 0.06. 0.08, and 0.1 mg L^{-1}) and incubated under total darkness and light (intensity 3000 lux for 16 h photoperiod all at 25 ± 2°C) for 6 months. The experiment followed a Completely Randomized Design (CRD) with four replicates. Data were documented on number of survived-initial embryos (NSE), number of newly-formed embryos (NFE), number of growing shoots (NGS), number of rootlets (NR), and number of dead embryos (NDE). Significant variance of cultivar, light and their interaction were recorded for all traits except for NR. NAA by light treatment interaction was however significant for NR. The number of survived-initial embryos (NSE) and number newly formed embryo (NFE) occurred after 6 months of incubation on MS medium supplemented with 0.06 and 1.00 mg L^{-1} NAA with 8.50±0.42 and 2.06±0.66 respectively, while NDE (2.38±0.47) was found in 0.04 mg L^{-1} NAA. Ajwa cultivar was the highest in NFE and NDE with 8.94±0.31 and 3.17±0.24 respectively. Light incubation encouraged higher NFE (8.33±0.20) and NDE (2.15±0.32). Across all the NAA concentrations, Khalas cultivar showed higher NFE than Ajwa, but less in other traits. It is recommended that 0.06 to 1.00 mg L^{-1} NAA should be used to obtain high NFE, and low NDE of embryos for *in vitro* organogenesis of date palm embryo. Khalas cultivar showed greater performance compared with Ajwa was due to higher NFE, meanwhile dark incubation resulted in high NFE and low NDE.

Keywords: NAA 1, Ajwa 2, invitro 3, Saudi Arabia 4, Date palm 5

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Category: Agribiotechnology

HPTLC Analysis and Cytotoxicity Activity of *Heterotrigona itama* Propolis from Various Locations

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ABSTRACT

Propolis is a resinous material that bees collect from various plants to protect their hive. It has pharmacological activities (antibacterial, antitumor, anti-inflammatory, antioxidant & anti-cancer. High Performance Thin Layer Chromatography (HPTLC) analysis and antitumor activity were performed on Malaysian stingless bee (*Heterotrigona itama*) propolis samples collected from ten locations in Terengganu and Kelantan state of Peninsular Malaysia, coded as PC-1, JPL-1, KTRH-1, TM-1, TM-2, GM-3, GM-4, J-1, BST-1 and DGN-1. HPTLC analysis showed that all locations have different chemical composition in terms of number of bands and intensity of the bands, indicating the variation of chemical composition. Antitumor activity was evaluated by using 3-(4,5-Dimethylthiazol-2-YI)-2,5-Diphenyltetrazolium Bromide (MTT) assay against on SK-UT-1. *BST-1 (location: Besut, Terengganu)* extract showed the highest cytotoxicity effect among the localities (IC_{50} of 3 μg/mL), but less then that of standard DOXO (IC_{50} of 1 μg/mL). Findings from this study showed that location play role in quality of propolis and BST-1 is the most active extract to inhibit tumor.

Keywords: Propolis, location, HPTLC analysis, antitumor activity

ID: AG-O-141 NHRSK
Category: Agribusiness & Agriculture

Consumers' Knowledge, Attitude and Practice Towards Medicinal Plants in East Coast Economic Region

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ABSTRACT

Medicinal plants (MP) are commonly used by the local people as an alternative for health purposes, however the extent of consumer knowledge about the benefits of MP cannot be ascertained as there is a lack of social research being carried out to access the level of knowledge and poor transmission of knowledge about MP by verbal from one generation to another. Besides that, there is a lack of documentation of the traditional knowledge from regular consumer of MP and the consumption factors among people in this country. This study aims to assess the knowledge, attitude and practice of consumers towards MP and to classify the factors affecting the practice. Furthermore, this research is conducted to determine the association between demographic profiles and MP practice. A survey was carried out over 300 MP consumers at East Coast Economic Region (ECER) using self-administered questionnaire. The findings indicated that 52% of consumers are female, and most of the consumers are Islam and Malay in line with the major population of East Coast. The respondents consist of 67% from rural and urban (33%). The result from Chi Square analysis showed that education level and locality has significant relationship with the level of knowledge while marital status is significant towards practice. Factor Analysis had justified the items under knowledge and attitude as the factors towards practice of medicinal plants. There is also significant difference between the knowledge and attitude towards practice using Multiple Regression analysis. Pearson Correlation Analysis indicates moderate relationship of knowledge and practice whereas attitude and practice has a strong relationship. The consumers have good knowledge and positive attitude towards the practice of medicinal plants. The people shifting to natural by using medicinal plants. Therefore, it is a good approach if the information on medicinal plants in layman language for better understanding.

Keywords: knowledge, attitude, practice, medicinal plant, consumers

ID: AG-O-142 QGTKS
Category: Agriculture

Allelopathic effect of different solvent extract from *Turnera subulata* leaves on selected bioassay species

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ABSTRACT

The allelopathic approach in controlling weeds with less environmental effect can enhance the agricultural sustainability. It was found that Passifloraceae exhibited allelopathy, but *Turnera subulata* was observed with minimal allelopathic research. This research was done to investigate the allelopathic effect of *T. subulata* leaves extract using different solvent, which were methanol, ethyl acetate, hexane and distilled water on the bioassay species growth (which were mustard, wheat grass and weedy rice) under laboratory condition. There were various concentrations (100, 50, 10, 1 and 0.1) mg/mL were tested in this research in five replicates. Results indicated that *T. subulata* leaves significantly suppressed (p<0.05) the plant growth when exposed to the increasing concentrations and different types of solvents. 100 mg/mL of distilled water extract showed the highest inhibition of radicle length in weedy rice followed by wheat grass and mustard, which were 92.8%, 89.6% and 86.5% compared to control. At similar concentration, distilled water also showed the highest significant inhibitory effect (p<0.05) on the radicle length of weedy rice in comparison with other solvents. The result of radicle inhibition at the radicle length of weedy rice, were found in the order of distilled water > ethyl acetate > hexane > methanol. However, there was significant stimulatory effect (p<0.05) on the radicle length of weedy rice when tested at 0.1 mg/mL of *T. subulata* leaves methanolic extract. Whilst, 100 mg/mL of hexane extract exhibited the highest suppression of hypocotyl length in the wheat grass and weedy rice, which by 89.3% and 83.4% compared to control respectively. Overall, the allelopathic activities of *T. subulata* leaves extract were depending on the extract concentrations, bioassay species and types of solvents used. These results can be utilized as the benchmark information for future weed management strategy.

Keywords: Allelopathy, solvent, extract, *Turnera subulata*.

ID: AG-O-157 ADDTT
Category: Agriculture

Effects of Gamma Irradiation on Morphology and Protein Differential of M1V1 Plants of *Vanilla planifolia* Andrews

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ABSTRACT

Vanilla planifolia Andrews is known for its aroma and flavour. However, it takes about 3 to 4 years for the plants to bloom and limited germplasm available for hybrid production. To overcome this limitation, induced mutations are highly effective to enhance natural genetic resources for vegetative propagated crops. The five cuttings each were exposed to five doses of gamma radiation (10 Gy, 20 Gy, 30Gy, 40 Gy and 50 Gy) in December 2018. After 44 weeks, the results showed that the growth of M1V1 (mutation 1 in vegetative 1) plants at 0 Gy is highest compared with other doses of gamma radiation in terms of plant height and number of leaves. However, the highest measurement for root length is at 10 Gy. The slowest growth rate was obtained from 40Gy and 50Gy. SDS-PAGE banding patterns of M1V1 plants proteins were compared. Based on the unique band of protein appear on the SDS-PAGE gel, 10Gy has three unique bands at loci 0.105 RF, two bands lies at loci between 0.164 RF and 0.234 RF and 30 Gy absence a unique bands at loci 0.234 RF compared to 0Gy (control). To our knowledge, this is the first report of the protein variation in M1V1 plants of irradiated vanilla.

Keywords: Vanilla planifolia Andrews, mutation breeding, SDS-PAGE.

ID: AG-O-168 EPBZB
Category: Agribusiness & Agriculture

An Exploratory Factor Analysis to Develop Measurement Items for Small Farmer's Proactiveness and Risk-Taking in Agricultural Technology Adoption

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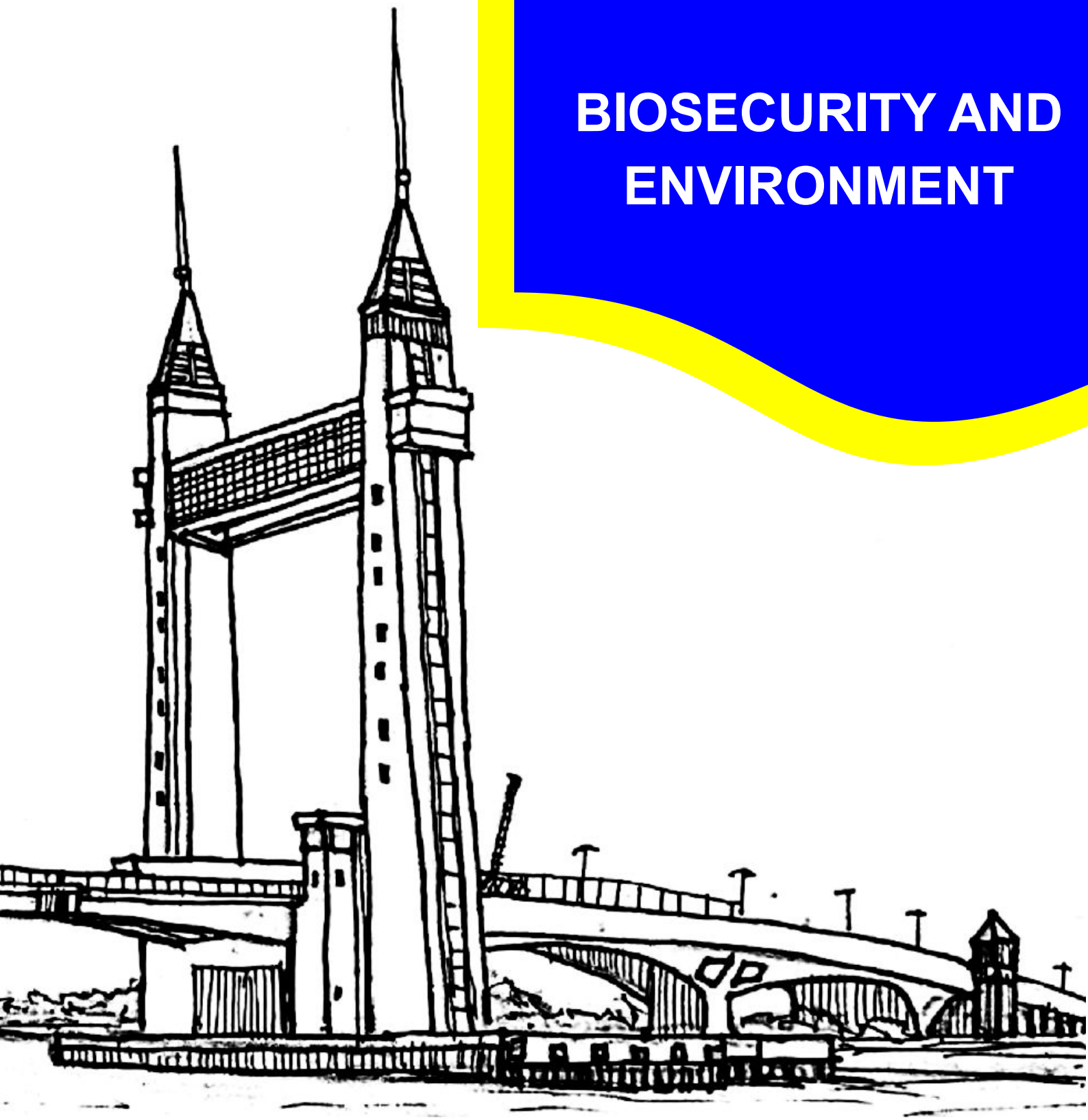
ABSTRACT

Precision agriculture is a promising approach to ensuring food security despite the environmental challenges of climate change. However, small farmers who are the major agri-food producers in Malaysia lag in the adoption of such technology. Therefore, proactiveness and risk-taking are constructs that can influence small farmers toward the adoption of precision agriculture. This study is conducted to develop a reliable and valid instrument for measuring proactiveness and risk-taking constructs through the process of Exploratory Factor Analysis (EFA). Questionnaire items were developed on a scale interval of one (strongly disagree) to ten (strongly agree). Data was collected from 250 small farmers in Malaysia. The researchers used IBM SPSS statistic version 25.0 to performed EFA on items using the extraction method of the Principal Component with Varimax Rotation. The results of the analysis presented factor loadings for all items were above 0.6 and eigenvalues were all greater than 1 which explained variance of 71.746% for proactiveness and 79.170% for risk-taking. All constructs extracted two components each with Cronbach alpha values between 0.937 and 0.881. The sphericity measure Bartlett's Test was significant (sig. 000). Besides, the sufficiency of the sample was outstanding (KMO=.0882 and 0.808The development scale and validation have demonstrated accuracy and reliability for the instrument. Thus, this study contributes significantly to items measuring the construct of proactiveness and risk-taking, especially in small farming in Malaysia. Therefore, the result revealed that the items are fit for further analysis.

Keywords: Exploratory Factor Analysis (EFA); Proactiveness, Risk-taken, Reliability, Validity

ORAL PRESENTERS

BIOSECURITY AND ENVIRONMENT



ID: BE-O-37 TRNXJ
Category: Biosecurity and Environment

Assessment of Environmental and Human Health Risk for Contamination of Heavy Metals in Freshwater Fishes: A Case Study in Kuantan

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ABSTRACT

Heavy metal contamination of the aquatic environment remained urgent and has attracted public attention. The present study was aimed to determine the concentrations of heavy metals and to assess health risks in edible tissues of commonly consumed freshwater fish in Kuantan province. Both water samples and fish samples were collected in Sungai Kuantan, Sungai Riau, and Sungai Pinang. The fish samples were digested using a microwave digestion system (Multiwave 3000). Heavy metal concentrations were analyzed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The heavy metals concentrations in 50 sample freshwater fish from different species were found to be dominated by Fe followed by Al>Zn> Cu>As>Ni>Pb>Cd dry weight. Among the investigated fish species, *Hampala macrolepidota* (Sebarau) caught from Sungai Kuantan demonstrated the highest concentration for Al(17.996±0.975mg/kg), Fe(35.252±0.413 mg/kg), and Zn (6.675±0.253 mg/kg) compared to other species. Most heavy metals concentrations were below the permissible limit values except Al (0.3mg/kg standard limit) and Fe (1.4mg/kg standard limit) in fish samples from Sungai Kuantan. Concentration of Al, and Fe in tissues at all rivers were above the standard permissible limit (0.20 and 1.00) respectively. Concentration of Fe is the highest in water compared to other heavy metals but still in natural level except for Al and Fe which exceeded the permissible limit of authorities. Water Quality Index (WQI) of Sungai Kuantan, Sungai Riau and Sungai Pinang were classified in Class III which are slightly polluted. The calculation of metal pollution index (MPI) was carried out to classify the study area according to the level of contamination and the order of stations from highest to lowest MPI values was Sungai Kuantan (4.21)> Sungai Pinang (1.05)> Sungai Riau (1.03). The metal pollution index (MPI) analysis revealed that the fishes from the selected rivers are currently not seriously impacted by heavy metal pollution. Risk assessment results showed that the hazard quotient (HQ) for Al(8.22) and As(24.75) were higher than 1 in all fish species. The highest HI value of heavy metals were in *Hampala macrolepidota*(34.14) . The results indicate that exposure to the studied metals poses a low non-carcinogenic risk.

Keywords: freshwater fishes, heavy metals, health risk

ID: BE-O-53 TXTKA
Category: Biodiversity

Diversity and Abundant of Insects in Forest of Bukit Keluang, Besut, Terengganu

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ABSTRACT

Bukit Keluang is one of the famous tourism activities cause their beautiful sandy beaches and outstanding landscapes in Besut, Terengganu. Tourism activities like hiking and recreational activities would negatively affect to flora and fauna, particularly on insects. A study was conducted to determine the diversity and abundance of insects in the coastal and inland forest of Bukit Keluang. There were three sampling methods employed as Malaise traps, yellow pan traps, and pitfall traps. The sampling methods were employed and left for seven days before the insects were collected. A total of 455 individuals of insects consisting of 10 orders (Diptera, Hymenoptera, Lepidoptera, Coleoptera, Collembola, Homoptera, Orthoptera, Dermaptera, Isoptera and Blattodea) were successfully collected with order of Hymenoptera dominated the number of individuals collected. The insect's individuals were slightly higher in the coastal forest with 271 individuals (9 orders) than in the inland forest with 185 individuals (8 orders). However, Shannon-Weiner Diversity Index (H') showed that the diversity of insects in the inland forest was higher with H'=1.52 than coastal forest with H'=0.86, respectively. We conclude that the insects' diversity and abundance in Bukit Keluang is relatively high in inland forest but low in coastal forest. As no other insect survey has been conducted in this study area in the past, this research provides a basic information and dataset of insects' diversity and abundance which may useful for further ecological research at Bukit Keluang in the future.

Keywords: Insects, diversity index, Bukit Keluang, forest, tourism

ID: BE-O-56 UHMEN
Category: Biosecurity and Environment

Site Directed Mutagenesis of Carbohydrate Binding Module Family 40 (CBM40) Domain from *Vibrio cholerae* Non-01 Sialidase

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ABSTRACT

The location of sialic acid at the termini of various carbohydrate complexes often exploited by microbial pathogens (influenza and parainfluenza viruses) to bind and gain entry to the host cell during the initial stages of pathogenesis thus mediating specific role in human health and diseases. Carbohydrate-binding modules (CBMs) help target the main enzyme to appropriate substrates and increase their catalytic efficiency. However, proteins with weak binding affinity often use site-directed mutagenesis approach to enhance protein affinity via an avidity effect. In this study, a wild-type Family 40 Carbohydrate Binding Module (WT-CBM40) was genetically modified by site-directed mutagenesis to form a stable mutant CBM40 (M-CBM40) to improve domain affinity towards sialic acid. In this study, a gene encoding for Family 40 Carbohydrate Binding Module (CBM40) from *Vibrio cholerae* Non-O1 sialidase was cloned in pET22b(+) and successfully expressed in *E. coli* BL21 (DE3) strain. The CBM40 encodes for 195 amino acids with 585 bp of nucleotide sequence. Mutation of Thr200 to Asn200 was successfully performed using the QuikChange II Site-Directed Mutagenesis Kit (Agilent). This study also deals with the generation of a 3-D model of the mutant CBM40 with 2w68.1.A as a template. The validation of mutant CBM40 brings to 0.99 Global Model Quality Estimation (GMQE) scores and 1.14 Quality Model Energy Analysis (QMEAN) Z-scores. Both results indicate the reliability of the mutant model. The analysis visualization of mutant CBM40 by UCSF Chimera proved by MatchMaker sequence alignment score of 1005.9 and RMSD score of 0.08 Å demonstrated both wild type CBM40 and mutant CBM40 structure were closely related. The results gained by Arpeggio web server revealed that the affinity of mutant CBM40 higher than wild type CBM40. For the protein expression study, mutant CBM40 was successfully expressed at 25 ˚C when induced with 1 mM IPTG whereas for wild-type CBM40 was successfully expressed at 18 ˚C, the best IPTG concentration used was 1.5 mM. Maximum expression was achieved at 20 hours after post-induction time. SDS-PAGE analysis of the expressed wild-type and mutant CBM40 proteins displayed a protein band with a molecular mass of 21 kDa. This contruct has a big potential to be developed as therapeutics agent especially as biologics to prevent harmful pathogens gain entry through sialic acid binding present on human and mammalian cell surfaces The optimum characterization conditions established would further lead to the discovery of the true potential of CBM40 protein in enhancing substrate binding affinity, protein-carbohydrate recognition which underpins its broad applications in biotechnology and protein engineering fields.

Keywords: Carbohydrate-Binding Module Family 40 (CBM40), Site-directed mutagenesis, Sialidase, Binding affinity, Protein expression.

ID: BE-O-65 GHUYN
Category: Environment

The Impact of Artificial Light on the Ecosystem of Nocturnal Insects: A Review and Synthesis

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ABSTRACT

The use of artificial light has been increasing in the past few years due to human's development. The study regarding the effect of artificial light also has been increasing started with the effect of artificial light to the sky brightness which then followed by the effect of artificial light to the ecosystem. The effect of artificial has been thoroughly studied worldwide yet, in Malaysia, the exposure of light pollution the public is very scarce. The lack of studies regarding light pollution in Malaysia may be the cause of it. Therefore, this paper compares the trend of research regarding light pollution to insects in general and in Malaysia specifically. Artificial light has been widely used in many countries and many researches have been done to see the effect of light pollution to the ecosystem. With meta-data analysis, using keywords "light pollution", "insect" and "Malaysia" in Web of Science, the trend of research regarding light pollution can be analysed. The number of researches regarding the light pollution is expected to be increasing throughout the last 10 years. However, research regarding the same topic is expected to be very scarce in Malaysia. Therefore, more future research regarding light pollution and insect needs to be done in Malaysia as some insects play important role in agriculture and eco-tourism.

Keywords: light pollution, nocturnal insect, ecosystem

ID: BE-O-119 XHMDL
Category: Biosecurity & Environment

PCR Detection of Entamoeba using Genus-Specific Primers from Orang Asli School children in Perak

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ABSTRACT

Amoebiasis, one of the intestinal parasitic infections (IPI) caused by protozoan parasite, *Entamoeba histolytica* is still considered as the major cause of high morbidity and mortality particularly in tropical countries. In Malaysia, the IPI is endemic among Orang Asli communities due to their low socio-economic status and personal hygiene practices. However, there has not been comprehensive prevalence study on *Entamoeba* distribution among children in rural communities throughout the nation. Thus, a cross-sectional survey was carries out to detect the genus *Entamoeba* among schoolchildren in Perak. A total of 457 schoolchildren from selected primary Orang Asli schools were participated in this study. Each voluntary participant was given a wide-mouth screw-capped sterile container pre-labelled with code a day before sample collection together with questionnaires and consent forms. The stool sample was then thoroughly checked to determine the sufficiency of the sample and stored at -20 °C to proceed for further analysis. All samples were subjected to molecular detection and analysed using genus-specific PCR that amplify small subunit rRNA gene sequence of *Entamoeba* spp. The results showed 57.5% (263/457) samples were positive for *Entamoeba*. Sekolah Kebangsaan (S.K) Ulu Geruntum recorded with the highest detection of *Entamoeba* spp. followed by S.K Pos Tenau, S.K Batu 14, S.K Pos Raya and S.K Pos Bersih; 81.3% (39/48), 63.6% (14/22), 63.2% (84/133), 49.7% (75/151) and 49.5% (51/103), respectively. In conclusion, the present of *Entamoeba* species is still high among children especially in Orang Asli population in Perak. In order to determine the accuracy of the species infection, positive samples from *Entamoeba* genus-specific PCR should be further investigated using species-specific PCR primers develop for differential diagnosis of *E. histolytica*, *E. dispar* and *E. moshkovskii*.

Keywords: Polymerase chain reaction, *Entamoeba* species, intestinal parasitic infections, schoolchildren

ID: BE-O-148 HYBGH
Category: Environment

Chicken Eggshell as Bioflocculant in Harvesting Biofloc for Aquaculture Wastewater Treatment

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ABSTRACT

Implementation of biofloc technology (BFT) system in aquaculture industry shows high productivity; low feed conversion ratio; and a stable culture environment. This study focused on two phases with the first phase involving the formation of bioflocs and the second phase focusing on the harvesting of bioflocs. An optimal C/N ratio and pH are required for effective formation of biofloc. The condition of C/N 15 and pH 7 to 8 showed the best biofloc performance with high removal percentage of ammonia (98%). The second phase of this study was performed to determine the optimal formulation and conditions of using eggshells as a bio-flocculant in harvesting excess biofloc. The use of eggshell showed high harvesting efficiency of more than 80% under the following treatment conditions: 0.25 g L^{-1} of eggshell dosage; with rapid and slow mixing rate of 150 rpm and 30 rpm respectively; 30 min of settling time; settling velocity of 0.39 mm s^{-1} and pH of 6 to 7. The results show that eggshell is an organic matrix that potential to be used as a coagulant to control the nutrient in aquaculture wastewater.

Keywords: Aquaculture, Bioflocs, Water quality, Eggshell, Harvesting,

ID: BE-O-150 HYBGH
Category: Environment

Phycoremediation of Shrimp Aquaculture Wastewater, *Macrobrachium rosenbergii* Using Freshwater Green Microalgae, *Chlorella* sp. at Different pH

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ABSTRACT

Aquaculture industry is one of the most important industry around the world. However, the development is restricted due to the undesirable environmental impact associated with the effluent discharge that is rich in inorganic nitrogenous compounds and organic matters. This situation could be improved by introducing the phycoremediation process using green microalgae. Thus, the objective of this study was evaluating the growth of green microalgae, *Chlorella* sp. as well as monitoring the nutrient reduction during phycoremediation process of aquaculture wastewater at different pH condition. The isolated *Chlorella* sp. was cultivated in a growth medium, BBM at pH 7 ± 0.2 without any adjustment before used as phycoremediation agent. Phycoremediation was performed by *Chlorella* sp. that grew in different pH of aquaculture wastewater (pH 4 – pH 10) and used as a nutrient-reducing agent. The results showed that the *Chlorella* sp. well adapted to grow in unusually pH environments and the nutrients; ammonia, nitrite and phosphate gradually reduced throughout 14 days treatment period. The *Chlorella* sp. displayed the ability to adapt at a wide range of pH, producing a growth performance higher than 90%. For the nutrient reduction, control treatment (pH 6) and pH 7 were recorded the highest reduction percentage with more than 80% at Day 10. In conclusion, the results of this study show that the microalgae cultivation at different pH conditions promising phycoremediation process with high nutrient reduction.

Keywords: Microalgae, Phycoremediation, pH, Nutrient, Water Quality

ID: BE-O-155 LRBGV
Category: Biosecurity

Effect of Different Concentration of Propolis Extract Coating on Banana (*Musa acuminata)* with presence of Anthracnose (*Colletotrichum gloeosporioides*) Disease

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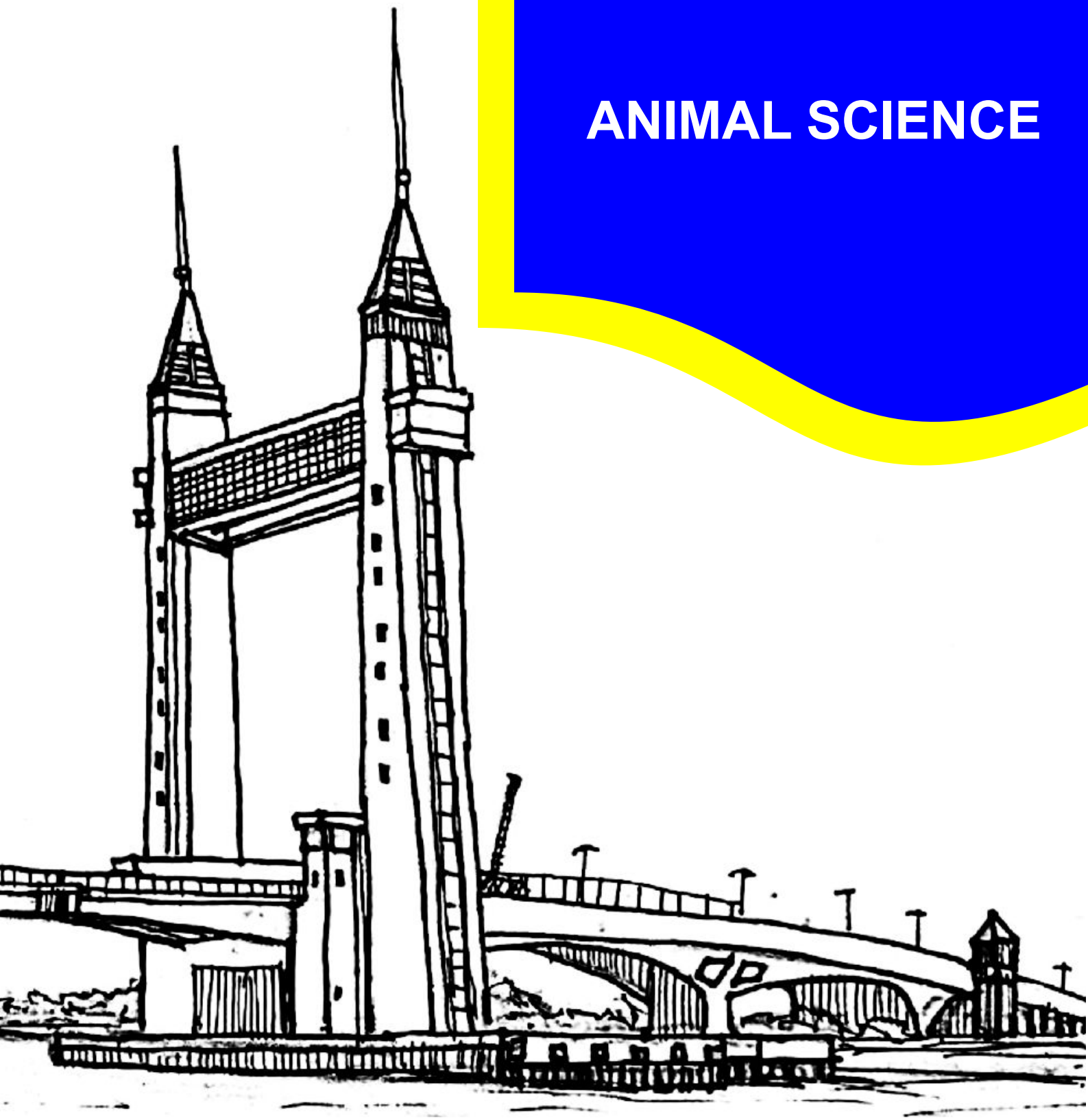
ABSTRACT

Coating is one of the methods to prevent postharvest loss in food industry. There are a lot of different fruit coating material in the market and propolis seems to be promising as coating due its waxy properties, high antifungal activity and less toxicity compared to other fungicide. In this study, propolis ethanol extract coating were tested for the antifungal activity against *Colletotrichum gloeosporioides* that normally caused anthracnose disease on banana (*Musa acuminata*). All samples were inoculated with *Colletotrichum gloeosporioides* and the disease severity index (DSI) was measured followed by grading scale which is 1 (fruits with no symptoms), 2 (1-10% of fruits with symptoms), 3 (11%-25% of fruits with symptoms), 4 (26%-50% of fruits with symptoms), 5 (51%-75% of fruits with symptoms) and 6 (more than 75% of fruit with symptoms). Result showed that the control banana was more susceptible compared to the treated banana. The control banana was highly severed (60% necrosis) compared to the treated banana. Major different ($p<0.05$) detected between the lesion of the control compared to the coated banana ($p>0.05$) for the concentration of 8% and 11%. The propolis coating successfully inhibited the fungus activity of *Colletotrichum gloeosporioides* activity on banana during storage. The higher concentration of extract coating seems to be better effectiveness against the fungus. Moreover the control banana showed higher weight loss (6.92%) compared to coated banana. Results also showed there was a significant difference in the total soluble solid ($p<0.05$) between treatments. In conclusion, banana treated with 11% concentration of propolis coating seems to be promising for the colour, total soluble solid content and titratable acidity also able to inhibit anthracnose disease caused by *Colletotrichum gloeosporioides* on banana.

Keywords: Propolis, coating, anthracnose disease, *Colletotrichum gloeosporioides*; banana

ORAL PRESENTERS

ANIMAL SCIENCE



ID: AN-O-31 LWHLB
Category: Animal Science

Effect of Different Glycerol Concentrations on Sperm Quality after Preservation of Nigerian Indigenous Cockerel Semen

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ABSTRACT

Glycerol is the most common cryoprotectant used to protect membrane sperm from being damaged during preservation. The objectives of the study were to characterize the semen characteristics of Nigerian indigenous cockerel and to determine the efficacy of different glycerol concentrations (0%, 2% and 3%) as a sperm protectant for the preservation of Nigerian indigenous cockerel semen under chilled temperature. Nine Nigerian indigenous cockerels were selected, semen was pooled and evaluated for macroscopic and microscopic criteria after being collected by abdominal massage method. The semen was then mixed with extender (Ringer's solution with different glycerol concentrations i.e. 0%, 2%, and 3%). The diluted semen was stored at 5°C. The evaluation of semen was assessed at 0, 1 and 6 hours. The result obtained from pooled semen were within acceptable range for AI, however, preserved semen result showed a difference ($P \leq 0.05$) in the total abnormal head sperm, live/dead and normal sperm, abnormal sperm head, neck or mid-piece and total sperm abnormalities at different storage time and glycerol concentration. However, there was no significant difference in progressive motility and tail defect in all concentrations and time. Similarly, no significant differences were observed for glycerol concentrations extender at 0 hour storage on, live and dead sperm, normal sperm and abnormal sperm mid-piece and tail were revealed. The present study suggests that 2% glycerol concentration in Ringer's extender can be recommended as a suitable combination of extender for short-term storage in indigenous cockerel semen.

Keywords: Cockerel semen, preservation and glycerol

ID: AN-O-33 HRFUG
Category: Animal Science

Molecular Detection and Antibiogram of *Staphylococcus aureus* in Rabbit, Rabbit Handler and Rabbitry in Terengganu, Malaysia

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ABSTRACT

Infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) have been a growing problem in human medicine since the 1960s, and more recently with the appearance of livestock-associated MRSA (LA-MRSA) in veterinary and livestock. Past study has reported the presence of LA-MRSA in rabbits. However, studies that focus on antimicrobial resistance issues in rabbit is still relatively scarce as compared to other species of animals. The objective of this study is to investigate the prevalence of *S. aureus* and MRSA in rabbits, farm handlers and living environment of rabbits in Terengganu. Swabs samples from 183 rabbits, 45 rabbit farm handlers and the rabbitry were collected from 16 different rabbit farms in Terengganu. Screening of bacteria and isolation of suspected *S. aureus* in the swab samples were done using routine microbiological tests. The identity of the bacteria isolates was confirmed using PCR where specific designed primers were used to detect the presence of *nuc* gene of *S.aureus* (278bp) and *mecA* gene (533bp) of MRSA. *S.aureus* isolates were also tested for their susceptibility toward the antimicrobial drugs using Kirby-Bauer disk. In this study, *S. aureus* were found in 19% of rabbits, 26.7% of rabbit handlers and 8.8% of swabs from rabbitry. However, MRSA (0%) were not detected from the isolated *S. aureus*. Antibiotic susceptibility test revealed that *S. aureus* from rabbit show low level of resistance (<20%) against 14 different antibiotics. Meanwhile, *S. aureus* from rabbit handlers were highly resistance against penicillin (86%), oxacillin (64%) and amoxicillin (50%). The antibiogram developed are valuable to provide the latest antibiotic therapeutic options to veterinarian and clinician to treat *S. aureus* infections. These finding suggests the emergence of antibiotic resistant *S. aureus* in the rabbit farms settings. Therefore, responsible and regulated usage of antibiotics needs to be practised to delay and prevent further emergence of antimicrobial resistance.
Keywords: Rabbit, *Staphylococcus aureus*, MRSA, *nuc* gene, *mecA* gene, Terengganu

ID: AN-O-67 GLETM
Category: Animal Science

Identification of *Pseudomonas aeruginosa* Strains Isolated from Dorper Sheep Milk with Subclinical-mastitis Infection by a Uniplex PCR Using 16S rRNA, lasI/R, gyrB and EcfX Genes

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ABSTRACT

Pseudomonas aeruginosa is an opportunistic and versatile pathogenic bacterium that can adapt in various environmental condition, which play a role in multiple virulence factor and resistance to antibiotics. Moreover, molecular identification techniques using single target gene is more susceptible to error and false positive. Thus, the detection of this strain with high specificity and sensitivity is crucial in order to control this pathogenic bacterium. The aim of this study was to evaluate six bacteria strains isolated from Dorper sheep milk's samples (13-1, 66-1, 00-1, 46-1, 10-R and 67-1) and two *P. aeruginosa* ATCC strains (ATCC BAA-2108 and ATCC27853) for prompt identification of the strains based on uniplex polymerase chain reaction which targeting PA-SS, PA-GS, lasI/R, gyrB and ecfX genes. In the present study, the Dorper sheep milk's samples (n = 32) were collected and tested with California mastitis test (CMT). Out of 32 samples, six of the samples were detected with strong mastitis, and thus were continued with inoculation process on selective media *Pseudomonas* Agar P (for pyocyanin) or F (fluorescein) and MacConkey agar for differentiation. After extraction of the bacteria chromosomal DNA, uniplex PCR amplification were carried out by using 16S rRNA (PA-SS and PA-GS) primers and specific *P. aeruginosa* genes (lasI/R, gyrB and ecfX) primers. The specificity of the primers was also examined by non-Pseudomonas species as a control for data comparison. Sequence analysis has revealed that six of the isolated strains were confirmed as *P. aeruginosa* strains with the respective genes sequence confirmed by BLAST and Clustal Omega. From this study, lasI/R, gyrB and ecfX were highly reliable primers with the percentage of identification of more than 95-100% as compared to PA-SS and PA-GS which were less than 90%. This study concludes that highly specific and sensitive assay has been developed using lasI/R, gyrB and ecfX targeted genes for the detection of *P. aeruginosa* strains isolated from fresh sheep milk samples.

Keywords: *Pseudomonas aeruginosa*, genes, identification, PCR, sheep milk

ID: AN-O-72 HNHSY
Category: Animal Science

Efficacy Of Detoxified Rubber Seed Meal (*Hevea brasiliensis*) On Growth Performance, Meat Quality and Carcass Of Japanese Quail (*Coturnix coturnix japonica*)

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ABSTRACT

A 4-weeks feeding trial on 60 tails aged 2-weeks quail was conducted to evaluate the effect of supplementing soybean meal with different level of processed rubber seed meal in quail's diet on growth performance, meat quality and carcass of quail. Rubber seed was processed into rubber seed meal (RSM) before proximate composition was done prior to diet formulation. Four dietary treatment groups consist of control (0% of RSM), treatment 1(10% of RSM), treatment 2 (20% of RSM) and treatment 3 (30% of RSM) were formulated for feeding experiment in triplicates. Parameters like daily feed intake, weekly body weight gain, average daily weight gain and feed conversion ratio were recorded and calculated. Quails were randomly picked and slaughtered at day-35 for proximate analysis, meat and liver quality analysis and carcass were conducted. Results showed that nutrient composition for crude protein, ether extract (fat), crude fibre, ash, moisture, carbohydrates (nitrogen feed extract) and metabolic energy content of rubber seed meal were 17.71%, 51.01%, 9.56%, 1.94%, 4.25%, 15.53% and 510.445 kcal respectively. No significant differences ($p>0.05$) on growth performances of quail, L*45min, L*24h, b*24h, SF, CL and WHC_p, breast meat quail were found among all treatments and control except on carcass yield, drumstick and wing. In conclusion, soybean meal can be replaced with 10%, 20% or 30% of rubber seed meal in quail's diet as all treatments showed no negative impact on growth performance, meat quality and carcass of quail. Further detailed research on effect of supplementing soybean meal with different level processed rubber seed meal in quail's diets is fully recommended.

Keywords: Rubber seed meal, quail, growth performance, meat quality, carcass quality

ID: AN-O-76 JSKTC
Category: Animal Science

Prevalence of *S. aureus* and MRSA in Goats and Animal Handlers in Terengganu, Malaysia

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ABSTRACT

Methicillin-resistance *Staphylococcus aureus* (MRSA) is an emerging veterinary and public health concern in both the human and animal populations. Livestock Associated MRSA (LA-MRSA) have been isolated in livestock and animal handlers. This study was aimed to determine the prevalence and antibiotic resistance profile of *S. aureus* and MRSA isolated from goats and animal handlers in Terengganu. Samples were collected from 140 goats, 5 veterinary personnel and 49 farm workers. Nasal swabs were collected from animals. Nasal and throat swabs were collected from veterinary personnel and farm workers. Identification of *S. aureus* and MRSA strains was phenotypically determined, and detection of *nuc* and *mec*A genes using PCR assay. All positive isolates were subjected to antibiotic susceptibility testing to 12 antibiotics. *S. aureus* was isolated from 42 (30%) goats and 18 (33%) veterinary personnel and farm workers. MRSA was only isolated from 1/6 (17%) nasal swab of human samples. The nasal isolates of *S. aureus* from goats showed high rates of resistance towards penicillin (81%), chloramphenicol (67%), and tetracycline (60%). The nasal isolates of *S. aureus* from human showed high rates of resistance to kanamycin (100%) and penicillin (83%), whereas the isolates from the oral swab showed high resistance to cefotaxime (100%), kanamycin (92%), chloramphenicol (58%), and penicillin (58%). This study provides useful information on MRSA in goats and human population in the study area and gives better understanding in the antibiotic-resistance pattern of the *S. aureus* isolates.

Keywords: Goat, animal handlers, *Staphylococcus aureus*, MRSA, *nuc* gene, *mecA* gene

ID: AN-O-83 YNSCP
Category: Animal Science

Effect of Bee Bread on Pregnancy Outcomes and Reproductive Systems in Rats Exposed to Heat Stress

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ABSTRACT

Exposure to extreme temperature during pregnancy was associated with abnormal birth outcomes including preterm birth, low birth weight, and placental abortion. Bee bread is a natural and unique product created by bees that is highly nutritional and has been recommended for human consumption as a source of high energy and protein. It is very useful for most cases of stress and also depression. Hence, this study aims to determine the effect of bee bread on pregnancy outcomes and reproductive system in rats exposed to heat stress. Pregnant rats were divided into four groups (n=6/group) comprising of control, bee bread, heat stress and bee bread plus heat stress (bee bread + heat stress) group. Rats from bee bread and bee bread + heat stress groups received bee bread (0.5g/kg body weight/day) orally by using oral gavage starting from day 0 pregnancy until delivery. Rats from heat stress and bee bread + heat stress groups were exposed to heat at 43˚C for 45 min/day until delivery. Following delivery, pregnancy outcomes were assessed and dams were euthanized. Reproductive organs were dissected and weighted. Rats in heat stress group had significantly decreased in litter size and fetal birth weight as well as a higher percentage of resorption and prolonged duration of pregnancy when compared with control and bee bread group. Interestingly, these parameters were significantly improved in bee bread + heat stress group. Therefore, supplementation of bee bread have a protective effect against abnormal pregnancy outcomes in rats exposed to heat stress.

Keywords: Heat stress, bee bread, female reproductive, pregnancy outcomes

ID: AN-O-84 NCTSN
Category: Animal Science

Effect of Bee Bread on The Female Reproductive System in Adult Sprague Dawley Rats

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ABSTRACT

Nutritional diets and supplementation has been in demand recently to prevent against various illness including female reproductive problems such as irregular menstrual cycle and decreasing fertility. Bee bread is processed pollen that undergoes lactic acid fermentation which is stored and packed in the honeycomb cells, with the addition of various enzymes and nectar or honey containing essential amino acid, fatty acid, phenolic compound and folic acid that can improve reproductive system. Hence, the aims of this study were to determine the effect of bee bread supplementation on estrous cycle, female's reproductive organs weight and pregnancy outcomes. 24 female rats were randomly divided into four groups, which consist of control and treated groups with 6 female rats in each group. The control group were administered with 1 ml of distilled water, while the treated groups were administered with 1g/kg of beebread, 2g/kg of beebread and 3g/kg of beebread diluted with distilled water consecutively for 28 days. Estrous cycle was assessed daily. After 28 days, the female rats were mated with normal male to induce pregnancy. Following delivery, pregnancy outcomes were observed and dams were euthanized. Reproductive organs were dissected and weighted. From the results, rats that were given 1 g/kg beebread show improvement compared to the control group in reproductive organs weight and numbers of pups. Gestation period increased significantly in 1g/kg bee bread compared to control. Rats that were given 3g/kg beebread shown a significant increase in estrous cycle and numbers of pups, and also a significant decrease in the percentage of resorption and congenital abnormalities rate compared to control group. The birth weight decrease and the percentage of stillbirth increase but not significantly. This study suggests that bee bread have a positive effect on the female reproductive system.

Keywords: bee bread, female reproductive system, oestrus cycle, ovary, uterus

ID: AN-O-120 KWGSU
Category: Animal Science

Effect of Fermenting Potato Waste with *Saccharomyces cerevisiae* on Nutrient Content and *in vitro* Digestibility

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ABSTRACT

A study was carry out to investigate the effects of *Saccharomyces cerevisiae* on fermenting potato waste (PW) and the digestibility of the fermented potato via *in vitro* gas production. Potato waste was subjected to three treatments: PW plus zero media (P0), PW plus 5 % sugar solution (PS) and PW + 5 % sugar solution + yeast (PSY); the treatments were replicated six times and incubated at 0, 24, 48, 72 and 96 hours in a completely randomized design (CRD) factorial. The fermented PW at 72 hours, having highest microbial biomass was subjected to *in vitro* gas production for determination of dry matter and organic matter digestibility. The result of PW fermentation over time revealed that there was no interaction ($p>0.05$) between treatments and time of fermentation hence main factors were separately analysed. The dry matter (DM), crude protein (CP) and ether extract (EE) of PSY were significantly ($p<0.05$) higher than values across P0 and PS. The proximate values and cell wall constituents were highest ($p<0.05$) at 72 hour of fermentation. Similarly, the *in vitro* gas produced by PSY at 2h was highest ($p<0.05$) across treatments, however no difference ($p>0.05$) was observed at the remaining incubation period. It was concluded that inoculating potato waste with *Saccharomyces cerevisiae* and fermented at 72 h improved nutrient contents and digestibility.

Keywords: yeast, potato waste, nutrient content, digestibility, gas production

ID: AN-O-126 VMGQT
Category: Animal Science

Characterization and Biocompatibility Evaluation of Elastin from Poultry Skin

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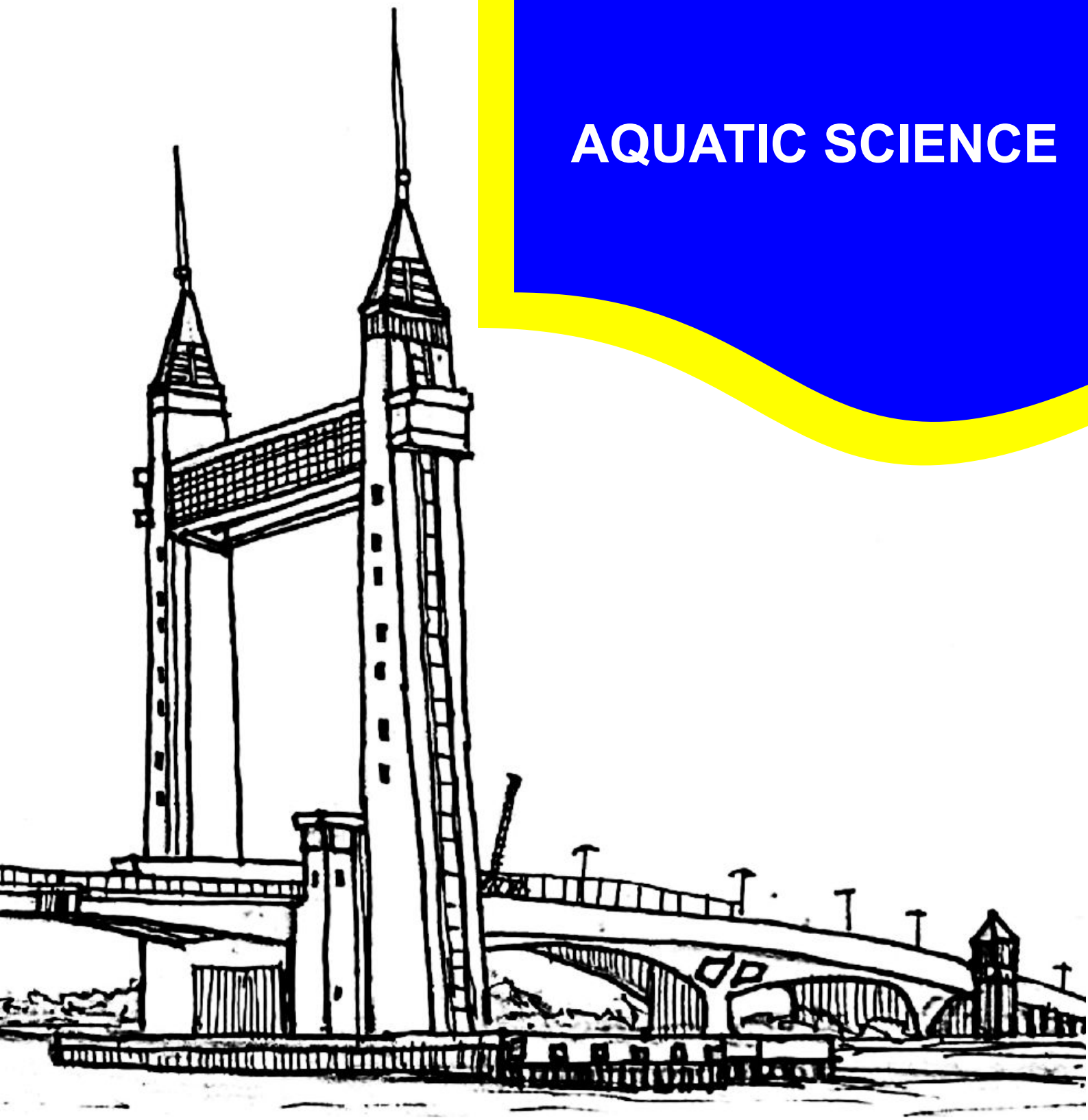
ABSTRACT

By-products from animal sources are currently being utilized for beneficial purposes. Poultry skin is rich sources of protein, which can be extracted and hydrolyzed to produce elastin. Elastin is an important structural protein in the extracellular matrix responsible for the elasticity of tissues and organs. In this study, elastin was extracted using hot water extraction and converted into soluble powder form to facilitate future applications. The purity of extracted elastin was analyzed by chemical characterization (amino acid profiling, proximate analyses and Fourier-transform infrared (FTIR) spectroscopy), followed by the biocompatibility evaluation through live & dead assay towards human dermal fibroblast cells. Results confirm a high quality of elastin was produced, with the presence of high amount of Proline (3.52% ± 0.05) and Glycine (6.06% ± 0.06) and low amount of Methionine (0.30% ± 0.01) and Histidine (1.17% ± 0.06) contents which are comparable with commercialized elastin from bovine neck ligament. FTIR analysis has shown the presence of typical peaks of amide A (N-H stretching), B (CH_2 asymmetrical stretching), I (C=O stretching) and II (N-H deformation) for protein, thus confirming the chemical structure of the elastin. Protein, fat, moisture and ash contents of the elastin powder were 51.2%, 2.5%, 13.6% and 7.8% respectively. Live and dead assay on elastin powder demonstrated no toxicity effect after 24 hr of observation. This study suggested that poultry skin could be an important source of Halal elastin that can be used as a potential material in functional food, antiaging cosmetics and regenerative medicine

Keywords: Elastin, live & dead assay, poultry skin, biocompatibility

ORAL PRESENTERS

AQUATIC SCIENCE



ID: AQ-O-08 NURXY
Category: Aquatic Sciences

Population Dynamics and the Spawning Season of the *Encrasicholina punctifer* from the Waters of Labuan

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ABSTRACT

Anchovy fisheries contribute greatly to the economy of Labuan in which they are commercially exploited and marketed in various forms. This research explores the important factors towards a sustainable anchovy fishery that lead to a positive impact to the economy of Labuan traditional fishermen. The study was conducted in the waters of Labuan from 2017 until 2019 using a mini purse-seine. The most dominant species in Labuan was *Encrasicholina punctifer*. Morphometric measurements for individual anchovy (total length, TL and body weight, BW) were recorded and the length-weight relationship was estimated using FiSAT program. The TL range from 4.5 cm – 8.5 cm. The length-weight relationship was given by $W = 0.01249\ L^{2.5881}$, $r^2 = 0.77$. The asymptotic length (L_∞) was estimated at 9.29 cm with the growth co-efficient (K) was 1.3 $^{yr-1}$. The total mortality (Z) was estimated at 4.37 $^{yr-1}$, natural mortality (M) was 3.04 $^{yr-1}$ and fishing mortality (F) was 1.33 $^{yr-1}$. The exploitation rate was 0.31, which was significantly lower than the optimum level of exploitation (E=0.50), implied that the anchovy fishery in Labuan is not overexploited. The maturity and spawning season of *E. punctifer* were determined through ovary examination. The female attained first sexual maturity at a size of 7.0 cm total length, while spawning months were occurred in June and July. The results of this study showed a current satisfactory management, as well as essential to replenish the information for the future anchovy fisheries in Labuan.

Keywords: Anchovy, Labuan, FiSAT, ovary examination, management

ID: AQ-O-39 SAMPH
Category: Aquatic Science

Species Composition and Diversity of Fishes in Pristine and Degraded Streams in Terengganu, Peninsular Malaysia

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ABSTRACT

Fish community structure and species richness of the degraded streams are not well known. In general, degraded streams may harboured less fish diversity. The present study aimed to compare the composition and diversity of freshwater fish between degraded and pristine streams from five selected streams (Sg. Peres, Sg. Bubu, Sg. Belar, Sg. Pur and Sg. Chantek) located in Hulu Terengganu and Besut, Terengganu, Peninsular Malaysia. Four streams were categorized as degraded and one stream acts as a control (pristine). Fish samples were collected between 8 July 2019 and 15 February 2020. Each sampling site consists of six subplots within 100m long sampling distance. Fishes were collected using an electrofisher, scoop nets and seine nets. Diversity indices were calculated to determine the diversity and pattern of species distribution among the study sites. A total of 980 fishes comprising of 16 families and six orders were recorded from the upper and lower reaches of the streams. Family Cyprinidae was the most diverse contributing about 39% followed by Balitoridae (9%). Seventeen percent of the fish recorded were singletons. Fish composition was dominated by *Glyptothorax fuscus* in which 128 individuals were collected, followed by *Mystacoleucus obtusirostris* with 119 individuals and *Poropuntius normani* with 109 individuals. Simpson-index analysis showed that the highest index value was recorded for Sg. Pur, D = 0.93, while the lowest was recorded for Sg. Bubu, D = 0.87. The highest evenness index of fish species was detected for Sg. Chantek, E = 0.69 and the lowest for Sg. Belar with E = 0.42. Streams with significant signs of disturbance had low Simpson index values, showing that stream degradation caused fish diversity to the decline. In conclusion, the information gathered from this study is very useful for conservation and future research.

ID: AQ-O-42 WHAPC
Category: Aquatic Sciences

Comparing Aquatic Insects Communities in Streams Affected by Different Flow Regimes

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ABSTRACT

Assemblages and diversity of the aquatic insect communities in the freshwater ecosystem are highly influenced by the environmental factor such as water quality and habitat heterogeneity. This may have prompt a variation in aquatic insects' composition among the streams especially between a normal free flow system compared to that of the frequently affected by long term flooding event. This study aim to investigate the diversity and assemblages differences of the aquatic insect communities between streams that affected by different flow regimes. Five sampling streams were selected from Taman Negara Sungai Relau, in Merapoh, Pahang representing the pristine regular free flow system, while, sixteen upper feeder streams from Tasik Kenyir representing the affected streams by frequent inundation. Aquatic insects were sampled using disturbance-removal sampling technique. The aquatic insects at both study areas were log-normally distributed with total 4,628 individuals from eight orders and 55 families collected in Tasik Kenyir while, 1,035 individuals from seven orders and 46 families were found in Taman Negara Sungai Relau, Merapoh. Sample size of the study areas were rarefied and indicated pristine regular free flow system had constituted more families compared to the inundated stream system. Further analysis such as diversity indices had denoted that Taman Negara Sungai Relau, Merapoh streams to have higher family richness and diversity of aquatic insects. Tasik Kenyir study area however possess a high β-diversity of aquatic insects, elucidated the long term effects of flooding event at the feeder streams, supporting high heterogeneity of in-stream habitat condition thus increases the turnover of the aquatic insects in the stream. The findings revealed the diversity and composition of aquatic insects were closely related to the stream condition. Pristine and conducive stream environment is therefore able to harbour more richness of aquatic insects by providing more habitat preference and food sources for their inhabitants.

Keywords: aquatic insects, alpha diversity, aquatic ecosystem, inundation, tropical streams

ID: AQ-O-52 YTCEQ
Category: Aquatic Science

Fish Species Richness, Their Importance and Conservation Status in Tropical Oil Palm Agroecosystem of Terengganu, Peninsular Malaysia

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ABSTRACT

The conversion of natural forests into oil palm cultivations had altered most of the streams habitat structure which subsequently affecting the aquatic organism in the water-bodies. However, over the years, the aquatic habitats recovered and able to sustain the aquatic organisms again, particularly fish. This study aims to document the understudied fish species richness and their conservation status, from oil palm agroecosystems in Terengganu and their importance., A total of 57 freshwater fish species were recorded from nine selected streams and the family Cyprinidae was the most dominant family, followed by the family Danionidae. From that, 28 species can be categorized as the ornamental fish, 21 species were considered as both for ornamental and food, while the other four species were regarded as suitable for ornamental, food, and sport fishing. Based on IUCN Redlist database, 77.2% (44 species) were in the Least Concern (LC) category, 12.3 % (seven species) were Not Evaluated (NE), and 8.8 % (five species) were subjected to Data Deficient category. The diversity of fishes among all streams varied significantly, where the lowest species richness is nine and the highest species richness was 18 species. The ichthyofauna in the palm oil areas in Terengganu can be considered as diverse despite the continuous disturbance from the agronomic practices. Additional and continuous inventories should be carried out to document the true diversity and species richness, plus monitoring the impact of fish turnover in oil palm agroecosystem. Additionally, overexploitation of the fish species especially with the high values of ornamental fish trade could reduce their diversity coupling the impact from agronomic practices.

Keywords: agroecosystem, conservation, fish diversity, oil palm, sustainable

ID: AQ-O-54 ZRCWD
Category: Aquatic Science

Effect of Invasive Peacock Bass Existence in The Freshwater Bodies of Malaysia

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ABSTRACT

Malaysian freshwater biodiversity is under threat after the introduction of an invasive peacock bass (*Cichla* spp.). The presence of this predator could challenge the coexistence of the native species. Field survey was used to identify the invaded freshwater bodies in Malaysia. In order to understand the negative effect of this species, one location invaded by peacock bass was selected (Lake Telabak, Jerteh). A total of 135 peacock bass samples were captured for stomach content using mitochondrial DNA analysis. The current study revealed that peacock bass species expand to all parts of Peninsular Malaysia with no records yet found in Kelantan and Borneo. Invasion success is more susceptible in Malaysian lakes (84.38%) compared to the dams, rivers and reservoirs. The mode of rapid expansion of this species is highly connected to the sport fishing and anglers. A propagule pressure, favourable habitat, prey abundance and feeding behaviours are responsible factors for the successful establishment of this species in Malaysia. Seven prey species (6 fishes 43.0% and 1 shrimp 5.1%) belongs to 5 families in fishes' stomach caught in Telabak Lake. The results revealed that peacock bass is highly predator and generalist feeder with an opportunistic feeding behaviour. At this point, proper management of this species must be implemented to reduce its population. This could be achieved through updating checklists of freshwater bodies, improving monitoring systems, and public awareness.

Keywords: Biological invasion, conservation, invasive species, native species

ID: AQ-O-57 HRUQB
Category: Aquatic Science

Morphometric Characteristics of Australian Redclaw Crayfish, *Cherax quadricarinatus*, From Melaka, Johor and Terengganu, Malaysia : A Comparison

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ABSTRACT

Australian redclaw crayfish, *Cherax quadricarinatus* (Von Marten, 1868) (Decapoda: Parastacidae), is a species of crayfish native to northern Australia and southern New Guinea but has been introduced and established feral population in many parts of the world including in Malaysia. In this present study, we examined the morphometric characteristics of *C. quadricarinatus* collected from three locations in Malaysia which are Tasik Ayer Keroh (Melaka), Muar (Johor) and Besut (Terengganu). The wild-caught crayfishes found in these selected locations were analysed for sex ratio, length-weight relationships (LWRs), chelae length (ChL)-width (ChW) relationships, carapace length (CL)-width (CW) relationships, and condition factor (K). The sex ratio of *C. quadricarinatus* from Melaka, Johor and Terengganu was found to be 0.73:1 (19 females/26 males), 2.9:1 (26 females/9 males) and 0.28:1 (4 females/14 males) respectively. The LWRs for redclaw crayfish from Melaka, Johor and Terengganu were $W = 0.018L^{3.06}$, $W = 0.0113L^{3.19}$, and $W = 0.0164L^{3.08}$, respectively. *C. quadricarinatus* from the three locations show positive allometric growth (b>3). The K values for Melaka, Johor and Terengganu were 2.07, 1.76 and 1.84 respectively. The regressions for the ChL-ChW relationship from Melaka, Johor and Terengganu were ChW = 0.3229ChL - 0.1901, ChW = 0.2705ChL - 0.0042 and ChW = 0.3451ChL - 0.0687 respectively. The regressions for the CL-CW relationship from Melaka, Johor and Terengganu were CW = 0.4227CL - 0.0627, CW = 0.4393CL - 0.1387 and CW = 0.4033CL + 0.0255 respectively.

Keywords: *Cherax quadricarinatus*, crayfish, morphometry, Malaysia

ID: AQ-O-58 TGDYJ
Category: Animal Science

Abundance, Gonadosomatic Index (GSI) and Hepatosomatic Index (HSI) of Australian Redclaw Crayfish (*Cherax quadricarinatus* von Marten, 1868) in Ayer Keroh Lake, Melaka

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ABSTRACT

The Australian redclaw crayfish (*Cherax quadricarinatus* von Martens, 1868) is native to Northern Australia and South-Eastern Papua New Guinea. It is a non-burrowing crayfish and physically tough species in various type of environments. Freshwater crayfish has been introduced globally through aquaculture and ornamental activities. The introduction of this redclaw crayfish in Malaysia is associated with the aquaculture and ornamental trade industry. Ayer Keroh Lake is known as the recreational park for the public and exposed to higher tendency of intentional release of redclaw crayfish into the water body. There is a need to evaluate the current population of the crayfish in Ayer Keroh Lake as the redclaw crayfish numbers increased. In this present study, we try to understand the adaptation level of redclaw crayfish in Ayer Keroh Lake by examining some aspects of the population dynamic such as the abundance, gonadosomatic indices (GSI) and hepatosomatic indices (HSI) of the species for six consecutive months. Redclaw crayfish were captured using the modified crayfish traps. A total of 25 traps were located at 5 different sampling plots in the lake. The traps were leave in the water for 48 hours before checking for redclaw crayfish. Captured redclaw crayfish were counted, sexed, measured for weight and length. Gonadosomatic indices (GSI) and hepatosomatic indices (HSI) were used to describe the temporal trend in the reproductive biology. The data collected in this present study will provide an insight to the establishment of wild population redclaw crayfish in our waterbody and might contribute the vital information on the aquatic invasive species management in Malaysia.

Keywords: *Cherax quadricarinatus*, crayfish, gonadosomatic index (GSI), hepatosomatic index (HSI), Malaysia

ID: AQ-O-59 UVJHP
Category: Aquatic Science

Species-Specific Primer for Monitoring Australian Redclaw Crayfish (*Cherax quadricarinatus*)

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ABSTRACT

The introduction of Australian redclaw crayfish, *Cherax quadricarinatus* has caused disturbance towards the native biodiversity and ecosystem by preying on the larvae of freshwater giant prawn, a local native organism. Thus, monitoring on the distribution of this invasive species should be done to minimize the effect on the environment and ecosystem. Environmental DNA (eDNA) method offers more rapid monitoring result with a shorter time compared to conventional monitoring method which consumes a lot of time and energy. Hence, species-specific primer should be developed to enable the used of environmental DNA (eDNA) method in monitoring the crayfish distribution. This study is aimed to develop a species-specific primer for *C. quadricarinatus* from mitochondrial DNA (mtDNA) COI gene, to validate the specificity and workability of the designed primer in detecting the targeted species from the environmental DNA (eDNA). The species-specific primer was designed using Primer3 Pro software from the extracted *C. quadcarinatus* sequence. The primer validation process was done by amplifying sequences from *C. quadricarinatus*, *Cherax destructor*, *Procambarus clarkii* and *Macrobrachium rosenbergii* to ensure only *C. quadricarinatus* samples are able to be amplified. Two sets of primers were designed namely CQCOI_F1-CQCOI_R2 and CQCOI_F2-CQCOI_R3 where both sets of primer have amplicon of 119bp and 175bp respectively. Annealing temperature at 64°C found to be the most optimum for both primer sets. Both primer sets have a 99.5% of specificity towards *C. quadricarinatus* and only detect the target species when tested along with other species. Besides, both primer sets also have the GC content percentage of 55%. Although both sets were confirmed species-specific, only CQCOI_F2 & CQCOI_R3 pair was selected as it has longer primer length which increases it specificity. Workability test also proven success as only *C. quadricarinatus* water eDNA sample were amplified at size of 175bp. A probe for quantitative PCR (qPCR) also has been designed according to the primer sequence and tested the specificity and workability towards *C. quadricarinatus*. This design can contribute to aquatic biodiversity conservation in Malaysia by enabling the early detection, control and management of *C. quadricarinatus* population.
Keywords: *Cherax quadricarinatus*, Australian redclaw crayfish, biodiversity conservation, eDNA, invasive species, species-specific primer

ID: AQ-O-79 FKGBD
Category: Aquatic Science

Gender Inequality in Inland Fisheries Communities of Thomas Dam, Dambatta, Nigeria

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ABSTRACT

The invisibility of the role played by women and their contributions in the fisheries sector is increasing exponentially especially among the Thomas Dam Dambatta fishing communities of Kano state, Nigeria. A qualitative study was conducted in August, 2020 among the Danmarke, Satame and Wailare inland fishing communities 120 people were interviewed, selected through a purposive sampling method. Data were obtained by focus group discussion (FGD) and semi-structured interviews according to themes of Ecosystem Approach to Fisheries Management. Thematic analysis includes qualitative analysis by transcription, coding and thematic categorization using ATLAS.ti. Results show that 90% of gender inequality causal factors are contributed by men, mostly on decision making in family household including fishing activities. Over 98% of Men also have ownership of the fishing equipment is controlled by men. The result shows that 66.7% of women's role in Wailare, 68% in Danmarke, and 70% are focused more on managing household while supporting their husbands in downstream processing of fish. Women become financial providers to men when required. Extrinsic factors that form challenges to fishers are seasonal issues and government's restrictions to fishing activities are also identified. It can be concluded that gender inequality exists across the three pillars of Ecosystem Approach in Fishery Management which are Good Governance, Ecological Wellbeing and Human Wellbeing due to invisibility of women's contribution towards inland fisheries.

Keywords: Gender equality, Women, Fisheries Community, Thomas Dam Nigeria

ID: AQ-O-81 FKGBD
Category: Aquatic Science

Gender Inequality in Fisheries Sector Development?

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ABSTRACT

Gender inequality poses severe challenges to the socio-economic wellbeing and ecological wellbeing of the fisheries and aquaculture sector in achieving inclusive development globally. Lack of sex-disaggregated data in fisheries and aquaculture research reaffirms the perception that the fisheries sector is a masculine industry. This lack of sex-disaggregated data, strengthened the policy neglect of gender problems in fisheries sector, leading to gender-blind policies which focuses more on the fish capture which is dominated by men rather than marketing and processing where women dominance is more pronounced. Even though over 78.7% of women globally are engaged in different activities within the fisheries value chain, yet their participation and contributions remain invisible. The aim of the research is to amplify the importance the Ecosystem Approach to Fisheries Management (EAFM) in addressing issues of gender inequality in the fisheries and the aquaculture sector with an emphasis on; management and decision making, and access and control of resources, which hinders the sustainable development processes in marginalized communities. This review paper concludes that sex-disaggregated research can assist in achieving goal number five of the sustainable development goals (SDGs) in the fisheries and aquaculture sector.

Keywords: Gender, Inequality, Fisheries, EAFM

ID: AQ-O-88 ZQFEA
Category: Aquatic Sciences

Morphometric and meristic variation of the Ikan Puyu (*Anabas testudineus*) (BLOCH, 1792) in Malaysia

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ABSTRACT

The Ikan Puyu (*Anabas testudineus*) is one of the important indigenous fish species in Malaysia and famous for its delicious taste and flavour. However, this fish population has declined due to the overfishing, pesticides usage in agricultural runoff and deforestation. A morphometric study was conducted to retain the fish data for further conservation purposes. Approximately 75 fish sample were randomly collected from five regions of Malaysia (Pahang, Perak, Terengganu, Sabah and Sarawak). Prior to measurement, the fish were anesthetizing using benzocaine (ethyl-p-amino-benzoate) and then measured by ruler and being photographed. Fish appearance was macroscopically observed and morphometric features analyzed by conventional and truss network measurement. Data was subjected to One Way Analysis of Variance and discriminant function analyses (DFA). Results showed significant differences (p<0.05) in 14 features in *A. testudineus* for conventional measurement. There are significant differences (p<0.05) in anal fin ray for meristic counting and six landmarks for truss network measurement. Both conventional and truss measurements showed four DFA which DF1 with 63.7% and 55.4%, DF2 with 25.9% and 29.7%, DF3 with 7.6% and 12.5%, and DF4 with 2.7% and 2.4%, respectively, among group variability. DF plotting presented showed that the conventional measurement were significantly different among regions. There was a notable overlapping for the sample at region 1 and 2 based on truss network measurement finding suggested that there was intermixing among the populations. There were significantly different in morphometric features among five regions based on the statistical analyses due to the separated geographical sites and different environment. In conclusion, morphometric data of the *A. testudineus* would be beneficial as guidelines among communities in further conservation measure and fisheries management.

Keywords: *Anabas testudineus*, ikan puyu, meristic, morphometric, truss network

ID: AQ-O-93 LWUED
Category: Aquatic Science

The Carbohydrate Profile of Riverine Fruits in the Natural Diet of Malaysian Mahseer, *Tor tambroides*

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ABSTRACT

The Malaysian mahseer, *Tor tambroides* (Bleeker, 1854), is a highly-valued aquaculture species in Malaysia. This species is known to consume fruits that fell from riverine trees in their natural habitat. We have previously identified fruits from 6 riverine tree species (*Pangium edule*, *Canarium odontophyllum*, *Dipterocarpus oblongifolius*, *Bellucia pentamera*, *Sandoricum koetjape*, *Gnetum gnemon*) to be part of the Malaysian mahseer's natural diet. This study presented the profiles of total carbohydrate, which comprises of crude fibre and nitrogen-free extract, and sugars (glucose, sucrose, fructose and maltose) of these fruits, obtained from proximate and high-performance liquid chromatography (HPLC) analyses. The carbohydrate components may contribute to the fish dietary fibre intake, whereas the sugars are highly digestible energy source for vertebrates and vital in maintaining bodily functions. These analyses were carried out to add data to the nutritional content of these fruits which subsequently will provide a basis in understanding the Malaysian mahseer's natural diet and its feeding behaviour. The data can also be used in feeding studies on dietary carbohydrate requirements and carbohydrate inclusion in fish feed especially in formulating low-cost, high-energy fish feed.

Keywords: Monosaccharide, Disaccharide, HPLC, Riverine Fruits, *Tor Tambroides*

ID: AQ-O-102 MFSFP
Category: Aquatic Science

The Possible Pathway of Water-borne Species Invasion in Malaysia: Where Danger Overthrows Beauty

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ABSTRACT

Biologist and philosopher Herbert Spencer, once said on social Darwinism, "survival of the fittest", but this term is not only implacable on "Invasion" but also, dangerous for the endangered native species. The state-of-the-art water-borne invasive species in Malaysia is scrutinized and assembled in this research work to assess the different pathways of water-borne species invasion in Malaysia. The data were collected from different sources including, published literatures, which are cross checked and validate with Global Invasive Species Database, CABI, IUCN Invasive Species Specialist Group, IUCN Red List, Malaysian government websites and WoRMS database. There are 59 water-borne invasive species available in Malaysia (where 10 native species which are invasive to the other regions) and classified into plants, fishes, algae, amphibian, mollusc, reptile, microorganism, crustaceans, sea star, coral, and sponge; among them 47 are freshwater species and 12 species are from marine habitat. The four invasion stages are proposed for the Malaysian invasive species, for instance arrival, establishment, localized and widespread. This review found major number of the species are already established and since a long time, they are spreading around the country's local habitat. It is also revealed that the most species are introduced in Malaysia due to intentional, purpose of aquaculture and aquarium trade from the different region especially South American Continent; where some of the species came accidentally, through international maritime trade using 13 commercial seaports around the country. The local dispersion of these invaders, occurred in many ways, including, local transport, natural dispersal, agriculture, and aquaculture. The long-run consequence of different invasion and invasive species are performing irreparable damages such as, impact on local habitat, niche, and ecosystem; competition with local species, hybridization and the transmission of disease. The most alarming phenomenon occurring right now; Malaysia is still importing ornamental species from around the globe, without concerning the invasion possibilities, which will lead to the permanent collapse of the food chain, ecosystems, and ecological balance, and demands urgent investigation.

Keywords: Biological invasion, international route of invasion, local dispersal, biodiversity, Sundaland

ID: AQ-O-110 EYUBG
Category: Aquatic Science

Performance of Natural and Synthetic Anaesthetic Agents in Handling of Hoven`s Carp (*Leptobarbus hoevenii*) Fingerlings

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ABSTRACT

The use of anaesthetic agents is essential in aquaculture practices to reduce fish stress, decrease handling pain, minimize fish movement and physiological changes in reaction to nociceptive stimuli. Clove oil is preferred due to natural and cheap price with low toxicity risks. NIKA Transmore is a renowned brand used in ornamental. The objectives of this study is to determine induction time for sedation, anaesthesia and anaesthetic recovery of *Leptobarbus hoevenii* fingerlings. Juveniles were exposed to different concentrations of clove oil (50.4 m g L^{-1}, 63.6 mg L^{-1} and 82.2 mg $L^{-1)}$ and NIKA transmore (45 µL L^{-1}, 60 µL L^{-1} and 75 µL L^{-1}). Results showed that Hoven`s carp juvenile showed low response ability towards stimuli and low ventilation during sedation. Anaesthesia can be identified by loss of equilibrium and swimming ability. All treatments caused sedation and anaesthetic effects without no mortality incurred. Shortest time duration for sedation is 2.11±0.9 and 1.05±0.6 minutes respectively while in anaesthetic effect are 3.23±1.7 and 5.15±2.8 minutes respectively. These were observed when fingerling was submitted to 82.2 mg L^{-1} clove oil and 75ul L^{-1} NIKA Transmore. Shortest post-anaesthetic recovery time occurred in fish subjected to 82.2 mg L-1 clove oil and NIKA Transmore is equivalent to 3.67±2.127 and 3.14±0.915 minutes respectively. Analysis showed significant difference for sedation time among concentration of Clove oil and Transmore ($P< 0.05$). However, anaesthesia time showed significant difference in Clove oil, not in NIKA Transmore ($P> 0.05$). It is concluded that the 82.2 mg L^{-1} clove oil are effective dosage for sedation and anesthetization, but no effect in faster recovery. In conclusion, this study provide insight on effective dosage for sedation and anaesthetization for fish transportation and handling to be used in aquaculture industry.

Keywords: Aquaculture, Anaesthetic, Sedation, Hoven`s carp

ID: AQ-O-125 MQAJQ
Category: Aquatic Sciences

Weather Factors and Fish Biodiversity: A case study of Asejire Lake

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ABSTRACT

Lake Asejire is one of the prominent Lakes in South-Western Nigeria which is faced with discharges from increasing anthropogenic activities. Dearth of documented information on the effects of weather factors on fish species in the Lake necessitated this study. Rainfall was measured using a standardized rain gauge and recorded in millimetres (mm) and atmospheric temperature was measured using Hygrometer and recorded in degrees Celsius (^{0}C). While water parameters were measure using standard water quality assessment kit. Fish were sampled fortnightly using monofilament gill nets of sizes 40mm and 60mm for a period of 9 months (January and September, 2018). Fish samples were sorted and identified using appropriate monographs.
Monthly data revealed highest values of rainfall (540mm) and temperature (20.2^{o}C) in the month of September and least values 70mm and 20.2^{o}C respectively in the month of January. The mean values of the water parameters measured were temperature, 18.36 ± 0.41^{o}C; pH, 7.30 ± 0.06; dissolved oxygen, 2.67 ± 0.10 mg/l; Ammonium, 0.21 ± 0.03ppm; Nitrates, 1.90 ± 0.33ppm and Nitrites, 0.14 ± 0.02ppm. Monthly distribution showed that fish was most abundant (26.90%) in March and least (1.96%) in September. There was a steady increase in temperature from January to September while rainfall pattern fluctuates (increasing and decreasing pattern) through the same period. Fish abundance similarly fluctuated across the months in no regular pattern.
Statistically, a negative relationship was observed between fish abundance with temperature and rainfall on the other hand. This implied that fish biodiversity in the Lake was affected by the fluctuating patterns of weather factors which was evident in the fluctuating patterns in the fish abundance recorded. It is important to monitor the trend so as to proffer a sustainable development and management plan for the fishery.

Keywords: Fish biodiversity, Sustainability, Water conditions, Weather factors.

ID: AQ-O-154 EYUBG
Category: Aquatic Science

Effect of Temperature on Embryonic Development and Hatching Rate of *Pangasius nasutus*

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ABSTRACT

Patin Buah (*Pangasius nasutus*) is one of most sought after due to its rarity and high price. Attempt for culturing this species still at initial level. Understanding the embryonic development stages and improving the phase by temperature variation will help hatching rate and culture method efficiency of this species. The objectives of this study are to observe effect of temperature on hatching time and hatching rate of *P. nasutus*. Three different temperature 26°C, 28°C, and 30°C were controlled using digital heater for egg incubation with each treatment have duplicates. The eggs were taken from the jar in the certain period of incubation and observed under microscope with camera installed to capture the stages of embryonic development for all treatments. After all eggs were hatched, hatching rate for each treatment were calculated and analysed using statistical analysis. Shortest amount of time for hatching were in 30°C, 28°C and 26°C (20.5 hours, 23.5 hours, and 26 hours respectively). However statistical analysis showed that there is no significant difference ($p>0.05$) in hatching rate between the treatments. Temperature plays role in reducing time of incubation but did not affect the hatching rate.

Keywords: *Pangasius nasutus*, Hatching rate, Aquaculture

ID:AQ-O-156 WTXAU
Category: Aquatic Science

Nutritional Value of Engkabang (*Shorea macrophylla*) Seed as Potential Feed for Fish

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ABSTRACT

Engkabang (*Shorea macrophylla*) is a seed that is famously known as the natural feed for Empurau (*Tor tambroides*) in the wild. This species is usually found along riverbanks and alluvial plains in Borneo. Several studies reported that Engkabang has low protein content at approximately less than 10% while lipid content is 14 to 30% depending on condition of seed. The high level of lipid content in Engkabang may give significant effect on growth performance of fish and reproductive physiology including gamete quality as only freshwater fish usually require low level of lipid of less than 10% lipid. Previous studies indicate that high protein content in fish feed will not give significant effects on growth performance of fish including Empurau fish (*Tor tambroides*) due to absence of protein sparing effect. Besides, in other study, Empurau fish (*Tor tambroides*) that being fed with diets that contain 24.5% crude protein resulted in higher ovulation response, shorter time for ovulation and higher fertilization of egg, compared to 31.5% crude protein diet. The high lipid in Engkabang may provide suitable nutritional value of high energy with significant n-3 and n-6 polyunsaturated fatty acids (PUFAs) with carbon chain lengths of 18 as well as long-chain polyunsaturated fatty acids (LC-PUFAs) with carbon chain lengths of 20 and 22 as EFAs required by fish as it improved physiology of fish and production of high quality gametes in fish. To date, most feeding trials of using Engkabang were conducted on fish juveniles while little work was done in understanding the effect of this seed on adult fish growth performance index. This indicates that Engkabang may be of importance in adult fish reproduction mechanism including fish spawners.

Keywords:*Shorea macrophylla*, *Tor tambroides*, Lipid, Growth performance, Reproductive physiology.

ORAL PRESENTERS

FOOD TECHNOLOGY

ID: FT-O-01 TDDNG
Category: Food Technology

Improving Elderly Muscle Mass Through High-Protein Pudding-Jelly Premix

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ABSTRACT

Human aging process is accompanying with a momentous deterioration in muscular function, performance, loss of skeletal muscle mass and strength. Malaysia will be occupied by 15% elderly citizens in the near future. Decrease in muscle weight among elderly is one of the many symptoms faced by this population. Other than exercise, good protein intake is a major treatment to overcome this phenomenon. Abundance imported functional products are flourish in our local market. MARDI has made an initiative to develop a local-made & local-source product to cater elderly muscle weight deterioration problems. This high-protein pudding-jelly premix technology was made mainly from local spinach (contains 28.3% protein), local orange sweet potato (contains 7.4% protein), and local pumpkin (contains 7.2% protein). The premix contains approximately 20mg/kg creatine, a protein complex requires for muscle development. Shelf life studies (using sorption isotherm and mathematical expression) indicated that the premix was sustained under OPP/Al/PE packaging type for approximately two years, without any changes in protein content (approximately 13.8%). Improving of elderly muscle weight was proven through gastrocnemius muscle in-vivo relative weight study, where laboratory aged rats treated with developed product were significantly increased in muscle weight when compared to the control group. Product was safe for consumption by the elderly as subacute toxicity study showed that the developed product did not cause any toxic effect to the laboratory aged rats and no organ failure (kidney and liver) detected from blood clinical analysis. The functional properties offered by the developed product has led to a ninety percent (90%) of respondent were agreed to the product's suggested price (RM8/sachet; and RM24/box) during the marketability study. Although this product was dedicated to elder population, adults and sportsmen could have the same benefits too.

Keywords: aging, elderly food, muscle weight, protein intake, Sarcopenia

ID: FT-O-17 REDFK
Category: Food Technology

The impact of (*Canarium odontophyllum* Miq.) Dabai Optimum Soaking Condition Towards The Development Of Dabai Peanut Spread Physicochemical Properties and Sensory Evaluation

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ABSTRACT

Canarium odontophyllum Miq. also known as dabai is known as Sarawak indigenous fruit and utilised for dabai peanut spread formulation. Dabai is physically hard in texture and consumed by soaking under heat treatment. Therefore, dabai optimum soaking condition is determined followed by the development of dabai peanut spread. The determination of soaking condition requires: soaking time (2, 4, 6, 8, 10 and 12) mins and soaking temperature (50°C, 60°C, 70°C and 80°C) as independent variables, and (water absorption, crude protein content, crude fat content, moisture content, ash content and colour) as dependent variables. 50°C for 4 minutes is the optimum dabai soaking condition, and it being utilised for dabai peanut spread formulation. There were six different formulations with different ratio of soaked dabai and roasted peanut, and further undergo proximate analyses and sensory evaluation test. The combination of low amount of soaked dabai (40 g) with high amount of roasted peanut (160 g) has produced high amount of crude protein and crude fat and found acceptable by the panellists. The information obtained provides a better understanding on dabai as potential food product ingredient.

Keywords: *Canarium Odontophyllum miq.*, dabai, soaking condition, physicochemical properties, dabai peanut spread

ID: FT-O-21 KZWNS
Category: Food Technology

Effect of Ultrasound–Assisted Extraction Methods on the Physicochemical Properties and Antioxidant Activity of Chickpea Protein Hydrolysate

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ABSTRACT

The aim of this study was to investigate the effect of ultrasound-assisted extraction methods on the physicochemical properties and antioxidant activity of chickpea protein hydrolysate (UCPH). The UCPH were prepared under the optimal ultrasound conditions (20 kHz, 50°C, time 15min, 10s/2s on/off time, and 50% amplitude) and characterized on the yield, degree of hydrolysis (DH), protein concentration, solubility, emulsifying and foaming properties, water holding capacity, fat binding capacity, chemical and amino acids composition, SDS-PAGE, and antioxidants activity. The chemical composition of UCPH showed significantly higher in protein (80%), moisture (4.37%), and ash (7.83%) but lower in fat (1.22%) compared to the chickpea protein hydrolysate (CPH). The UCPH also higher in yields (55.41%), DH (70.63%), protein concentration, foaming capacity, foaming stability, emulsion capacity, emulsion stability, -oil holding capacity, solubility and antioxidant activity than CPH. Despite, ultrasonication method used decreases water holding capacity compared to hydrolysis without ultrasonication. However, ultrasonication not causes any changes in SDS-PAGE and amino acid composition between UCPH and CPH. This finding suggests that the ultrasound-assisted extraction method of chickpea protein hydrolysis could produce peptides with high antioxidant activity and good physicochemical properties that could be useful in multiple applications such as in food and nutraceuticals industries.

Keywords: Legume, chickpea, protein hydrolysate, enzymatic hydrolysis, antioxidant activity, ultrasound-assisted extraction

ID: FT-O-30 CFJXZ
Category: Food Science & Technology

Effect of Biological Combined with Ultrasonic Extraction and Solvent Extraction on Resveratrol and Anthocyanin Content of Ripe Mulberry Fruits

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ABSTRACT

This research aimed to find out the optimal process for resveratrol extracted from ripe mulberry fruits. Mulberry fruits from Chiang Mai variety which were harvested from mixed ripening stage were suitable for using as raw material, because of its high value of resveratrol and anthocyanin content. In this study, two extraction methods were investigated; biological extraction and solvent extraction methods. From biological extraction without ultrasonic treatment and without deacidification, it was found that resveratrol content was increased during yeast fermentation. After filtration, fermented mulberry fruit solution had very high recovery value of resveratrol (331.97%) from fresh ripe mulberry fruits. From solvent extraction, preliminary dehydration of fresh ripe mulberry fruits decreased the amount of resveratrol and anthocyanin content. So that fresh ripe mulberry fruits without dehydration were suitable to use as raw material. Mulberry juice and cake were obtained from hydraulic pressing of fresh ripe mulberry fruits. It was found that mulberry fruit cake had high resveratrol content approximately 2/3 of whole resveratrol content. In this study, mulberry fruit cake was selected as raw material for solvent extraction. Room temperature extraction of mulberry fruit cake with mixed solvent (ethanol:ethyl acetate = 50:50) at the ratio of 1:5 for 1 hour soaking time could provide 104.24% of resveratrol recovery from fresh ripe mulberry fruits. According to resveratrol recovery, the high potential method for resveratrol extract should be biological extraction. The extract solution with high resveratrol content could be utilized as concentrate or powder forms.

Keywords: Mulberry fruits, Resveratrol extraction, Biological extraction, Ultrasonic extraction, Solvent extraction

ID: FT-O-47 XPBXM
Category: Food Science & Technology

Effects of Incorporating Green Banana Flour on Snack Bar Glycemic Response In Normal Volunteers

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ABSTRACT

Food with lower glycemic index is related with reduced risk of several chronic diseases, such as Type-2 diabetes and heart disease. This work was aimed to produce low glycemic index snack bars by partial substitution with green banana flour (GBF) for rolled oats at 15%. Snack bar without GBF represented the control. The glycemic index and glycemic load of snack bars with GBF (15%) or without GBF were determined in healthy volunteers. Eight subjects with mean age (± standard deviation) of 25 ± 1.49 years and mean body mass index (± standard deviation) of 22.34 ± 2.52, were tested on seven occasions for non-consecutive days. Subjects were required to consume 50 g of available carbohydrate as a portion of snack bars or a glucose drink (reference) after 10-12 hours overnight fast. Blood glucose was taken for 120 minutes at 15-minute interval in the first hour and 30-minute interval in the second hour after consumption. Incremental area under the curve for glucose response was calculated for each snack bar and compared with that of glucose drink to determine the glycemic index. Results showed that the glycemic index and glycemic load for snack bar which contained GBF (31.01 ± 16.94; 15.51 ± 8.47, respectively) were lower than that of control (31.71 ± 6.96; 15.85 ± 3.47, respectively). These research findings could be a useful platform to develop low glycemic index (<55) snack bars as an alternative snack for individuals in maintaining a desirable blood glucose response.

Keywords: Glycemic response, Green banana flour, *in vivo*, Snack bar

ID: FT-O-60 CBWJE
Category: Food Technology

The Nutritional Composition of Noodle Incorporated with Mango Peel Powder

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ABSTRACT

Noodle is one of the staple food among Asians other than rice. Due to its high consumption, the demands for highly nutritious noodle products are growing rapidly. Mango peel is one of the major by products in mango processing industry that posed serious environmental concerns. This leads to the increasing study and research in the utilization of this waste into wealth. This study was conducted in order to investigate the effect of mango peel powder incorporation on the nutritional composition of noodle. Cleaned mango peel was dried by using cabinet drying and ground into powder before being used in the production of noodle. The nutritional content of the mango peel incorporated noodle was then analysed in order to determine its nutritional content such as proximate analysis (Ash, crude fiber, moisture, fat, protein, carbohydrate and dietary fiber), total phenolic content (TPC) and total carotenoids. Noodle sample without mango peel powder was prepared as control. From the results obtained, it was determined that the addition of mango peel powder improves the nutritional content of noodle with the dietary fiber content of 7.26±0.33% as compared to 0% for control sample. An increase in the antioxidant content were also observed with 73.65±1.47 mg GAE/L of total phenolic content and 6.13±0.01 μg/g of total carotenoids. In conclusion, mango peel powder can be utilized as an added ingredient in the production of highly nutritional noodle.

Keywords: Mango peel, Noodle, Nutritional content, food waste, antioxidant

ID: FT-O-68 UTRSU
Category: Food Science & Technology

Does Chilling Duration and Concentration Affect Starch Functionality and Digestibility of Pre-Gelatinized Sweet Potato Flour (*Ipomoea batatas* var. VitAto)?

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ABSTRACT

Tubers such as sweet potato (*Ipomoea batatas* var. VitAto) can be processed into a variety of foods. However, severe processing methods can increase starch digestibility contributing to high glycemic index (GI) value of final product. Though, modification of starch structures by manipulating their gelatinization and retrogradation levels, performed at different concentrations and storage conditions may resist starch digestibility, thus reduce GI value. Therefore, this study was carried out to investigate the functional properties and starch digestibility of VitAto flour after pre-gelatinized at different flour concentrations (20%, 30% and 40%w/v) followed by chilling (4ºC) at different storage durations (3 and 7 days). The dried, treated flours were then analysed for starch properties such as water absorption index (WAI), cold swelling properties (CSP), pasting and crystallinity properties. Whereas, starch digestibility was determined by calculating the percentage of resistance starch (RS). Results showed that, when the flour concentration increased, the WSI decreased while the WAI and CSP increased. The pasting viscosity profiles of the treated samples were observed to be low (<0.01Pa.s) and only sample with 20% flour concentration (7 days chilling) showed a clear peak at 86.89ºC with viscosity of 0.01Pa.s. Higher final viscosity (0.02Pa.s) was exhibited by sample treated at 40% and 7 days of chill storage. Samples treated at 30% and 40% flour concentrations showed clear crystalline peak reduction at 17º and no peak was observed for sample with 20% flour concentration. Resistant starch was similarly increased for both chilling durations with higher flour concentrations which ranged from 9.63% to 25.45%. As conclusion, 40% of pregelatinized VitAto flour exhibited lower WSI (25.69-30.34g/100g of dry solids), higher WAI (4.60-4.69g/g of dry solids) and CSP (3.17-3.25g/g) with the highest percentage of resistant starch (24.72-25.45%). This sample might function as slow digestible VitAto flour which was achieved at both chilling durations.

Keywords: starch, pregelatinized, digestibility, resistant starch, sweet potato

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Category: Food Technology

Physicochemical Properties of Rose Cactus (*Pereskia bleo*) Mucilage and Pea Protein Isolate Complex Coacervates as a Function of Mixing Ratio

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ABSTRACT

Rose cactus mucilage (RCM) obtained from the leaves of *Pereskia bleo,* is one of the potential hydrocolloids having a characteristic of anionic polysaccharide that could form a complex coacervate with the oppositely-charged proteins. Coacervates have drawn attention for their ability to effectively encapsulate bioactive ingredients within the emulsion-based delivery system. This study aimed to determine the physicochemical properties (zeta potential, turbidity, coacervate yield, emulsifying properties, and droplet microstructure) of complex coacervates based on RCM and pea protein isolate (PPI) at different mixing ratios (RCM: PPI; 0:10 to 10:0). The RCM was firstly obtained by extraction in alkali medium (0.14 M sodium hydroxide) with acetone precipitation. It was revealed that RCM has a characteristic of anionic polysaccharide with zeta potential values of -7.8 to -11.7 mV measured at pH 3 to 4. Based on this fact, the 2% RCM-PPI complex coacervates were then prepared at pH 3.60 (±0.09) for optimum coacervation. There were significant effects ($p < 0.05$) of mixing ratios on zeta potential, yield, turbidity, and also emulsifying properties of the RCM-PPI coacervates. RCM-PPI coacervates at mixing ratios (8:2) affected significantly ($p < 0.05$) on zeta potential and emulsifying properties across all mixing ratios. The zeta potential, yield, turbidity, emulsifying capacity, and also emulsifying stability were -9.5 mV, 25.68%, 1.40, 27.11%, and 24.71% respectively. Droplet microstructure also displayed agglomeration and dense structure in RCM-PPI coacervate at this mixing ratio. FTIR spectroscopy revealed contribution of hydrogen bonds at 3200 - 3550 cm^{-1} in RCM-PPI (8:2) coacervates indicating their significant interaction. This study suggested higher fraction of protein in mixing ratios are preferable for optimum coacervation, ensuring better functionality in the emulsion system.

Keywords: Rose cactus mucilage, proteins, biopolymer, coacervate, hydrocolloid

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Category: Food Technology

Antioxidant Properties of Fresh and Roasted Sacha Inchi Kernel, Oil and Its Cake

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ABSTRACT

Sacha inchi (*Plukenetia volubilis* L.) is recognized in other parts of the world as a sustainable crop with viable commercial applications. In Malaysia, Sacha inchi was introduced to the smallholders and farmers as an effort to increase their income. Limited data was found regarding the antioxidant properties of Sacha inchi kernel, oil and its cake in Malaysia. Thus, this study aims to determine the antioxidant properties of Sacha inchi kernel, oil and its cake which include total phenolic content (TPC), ABTS assay, DPPH assay and β-carotene. In this study, the fresh kernel was roasted at 120°C for 10 minutes and the cake is obtained after oil extraction. The results show no significant difference of antioxidant capacity between fresh and roasted kernel except for ABTS assay. However, there were significant difference between fresh and roasted oil as expressed in total phenolic content, beta carotene, DPPH and ABTS assay. The TPC for fresh and roasted oil was 0.14 ± 0.01 mg GAE/g and 0.32 ± 0.01 mg GAE/g respectively. Fresh oil has higher carotene content (1.31 ± 0.27 ppm) compared to roasted oil (0.44 ± 0.20 ppm). DPPH value for fresh and roasted oil was 44.05 % and 44.58 % respectively while ABTS value for fresh and roasted oil was 21.92% and 26.31% respectively. In addition, there were significant difference of ABTS and DPPH value between fresh and roasted cake. Fresh cake has higher ABTS value (35.052 ± 0.083 %) compared to roasted cake (34.528 ± 0.142 %). Fresh cake has higher DPPH value (37.440 ± 0.129 %) compared to roasted cake (35.274 ± 0.000 %). The results indicate that the kernel, oil and its cake could be used as a source of valuable antioxidants and might be useful in developing a new functional food ingredients.

Keywords: Sacha inchi, total phenolic content, ABTS, DPPH, β-carotene

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Category: Food Technology

Eleusine indica for Food and Medicine

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ABSTRACT

Eleusine indica, a perennial herb belongs to the Poaceae family, is locally known as "rumput sambau". The species can be found in tropical region and it is the only species of *Eleusine* in Malaysia. In India, some parts of the plant such the roots and the seeds are used as food and can be eaten raw or cooked. The young seedling is also used as a side dish with rice and the seeds are sometime used as famine food. Although, this grass is not considered as food in Malaysia, the local people utilise it to treat various ailments such as in hastening the delivery of placenta for women, helping to ease vaginal bleeding, treating asthma and tonic for symptoms related to flu. Therefore, a complete review of *E. indica* research progress is necessary to organize and evaluate its potential for further studies and commercial exploitation. The information on the species was collected from scientific journals, books, and reports searched through available databases such as Google Scholar, PubMed, Directory of Open Access Journals, Science Direct, Bioline International and Reaxys. Contextually, the present review reveals that the plant is relatively safe to ingest, represents a rich source of nutrients and contains therapeutic phytochemicals such as flavonoids, steroids, essential oils, cardiac glycosides, coumarins, fatty acids, anthraquinones, anthrones, triterpenes, tannins and alkaloids. Thus, *E. indica* can be considered as a natural reservoir for both food and medicine.

Keywords: Goose grass, Nutritious food, Bioactive compounds, Ethnomedicinal uses, Pharmacological effects

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Category: Food Technology

Extraction of Functional Bioactive Compound from Different Plantain Peels (*Musa paradisiaca* L.) Using High Pressure Processing

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ABSTRACT

This study addresses the current interest in utilizing fruit waste as food additives for a more sustainable food chain practice. Plantains (*Musa paradisiaca* L.) are cooking bananas whose pulps are used by locals in various cooking techniques but have few food applications in regards to their peels, despite the peels having high number of bioactive compounds. Besides the rising consumers awareness for a healthier food intake, the need of practicing green technology in food industry is also an urgent concern. High pressure processing (HPP) is a technique used as an alternative method to extract bioactive compounds in a safer environment. This study aims to enhance the extraction of functional bioactive compounds of different local plantain peels ("*Abu*", "*Nangka*" and "*Tanduk*") using selected HPP parameters (pressure and time). A comparison between different cutting size and sample to solvent ratio of pulp and peel was also included to obtain the best result. The effects of HPP on the extraction of bioactive compounds from the plantains are evaluated through total phenolic content (TPC), total flavonoid content (TFC), 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay, ferric-reducing antioxidant power (FRAP), pH and microbial load count. The preliminary results showed "*Tanduk"* peels cut at (1x1) cm pieces and extracted with HPP at 500 MPa for 180 s has the highest TPC (448µg/ml), TFC (1.05mg/ml), DPPH-radical scavenging activity (EC_{50} of 0.014mg/ml) and FRAP (0.61mmol Trolox/g sample). The high pressure causes the cell walls to deteriorate, promoting more bioactive compounds to diffuse into solvent. Absence of high temperature also reduces tendency of heat-sensitive compound to degenerate. The high pressure exerted by HPP provides unfavourable environment for microbial growth, resulting in significantly no microbial load in samples while maintaining the pH of samples. The application of waste as food additives can significantly contribute to Malaysia's sustainability in food industries and agricultural growth.

Keywords: Antioxidant, high pressure processing, peel, plantain, waste

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Category: Food Technology

Physicochemical Properties and Sensory Acceptance of Pastilles Incorporated with Butterfly Pea Flower (*Clitoria ternatea*)

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ABSTRACT

Butterfly pea flower (Bunga Telang), comes from the ternate family, which in many countries is commonly used as remedy ingredients. The objective of this study was to evaluate the physicochemical properties, antioxidant activity and sensory acceptance of butterfly pea flower pastille. Five different formulations with one control formulation were produced which were sample A (0% butterfly pea flower), B (2.5% butterfly pea flower), C (5.0% butterfly pea flower), D (7.5% butterfly pea flower), E(10.0% butterfly pea flower) and F(12.5% butterfly pea flower). In general, the pastille produced was round in shaped with dark purple colour. In chemical analysis, the higher value for moisture content was in sample F (15.39%), ash was in sample C (0.91%), crude fiber was in sample B (0.16%). The higher value of antioxidative assay for 2,2-diphenyl-1-picrylhydrazyl (DPPH) was in sample C (59.84%), while total phenolic content (TPC) and total flavonoid content (TFA) was higher in sample F, 6.55 GAE mg/mL and 3.62 QE mg/g respectively. For physical analysis, the higher total soluble solid (72.95° Brix) and pH (3.17) was characterized by D sample. Water activity and syneresis was higher in F sample, 0.68 and 0.15, respectively. In colour analysis, the higher value for L* was observed in sample A (64.47), a* in sample F (12.12) and b* (13.35) in sample A. While the higher value for texture analysis in hardness was sample D (4531.40g), springiness was in sample F (0.99mm), cohesiveness was in sample A (0.86g), gumminess was in sample A (3196.20g), chewiness was in sample D (3129.20g) and resilience was in sample A (0.32mm). The sensory evaluation showed that the sample D was the most accepted by the panellists, but no significant difference in overall acceptability was observed. Considering this result, the production of Butterfly pea flower pastille may serve as a good alternative to synthetic-based candy-like products.

Keywords: Antioxidant activity, butterfly pea flower, pastille,

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Category: Food Technology

Development of Espresso Cocoa: Effects of Grinding Process and Fat Content on Certain Physicochemical and Sensorial Properties

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ABSTRACT

There is an increase in the utilization of cocoa as an alternative to regular espresso coffee. Other polyphenols in cocoa such as theobromine is a good source of antioxidant contributed to the flavour and aroma in cocoa products. Different fat content (20, 34 and 40%) and the grinding level (10, 30, 50 and 70) using espresso machine was evaluated in producing a concentrated coffee drink, with close resemblance to espresso coffee. Concentrated cocoa drink made of cocoa bean with 20% fat, grind at level 50 showed better physicochemical properties of highest foam index (4.33%), total solids content (24.36 mg/mL), extraction value (10.37%), caffeine content (3.31 μg/mL), theobromine content (34.26 μg/mL), antioxidant capacity (1726.3 μM TE), TPC (193.57 mg/mL GAE) and the highest viscosity (5.63 mPa.s) concentrated cocoa drink. Five different classes of volatile compounds were detected from fresh-brewed concentrated cocoa drinks which responsible for the unique aroma properties including alcohols, aldehyde, and ketones, esters, acids, and pyrazines. The panellists preferred the concentrated cocoa drink made with defatted cocoa nibs. These findings are significant to the cocoa industries where the concentrated cocoa drink may act as an alternative cocoa drink with improved nutritional content.

Keywords: cocoa bean, defatted cocoa bean, cocoa espresso, sensory, volatiles compounds

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Category: Food Science & Technology

Onion Essential Oil-in-Water Emulsion as Food Flavouring Agent: Effect of Environmental Stress on Physical Properties and Antibacterial Activity

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ABSTRACT

Plant essential oils (EOs), which are acknowledged as Generally Recognized as Safe (GRAS) by the FDA, have the potential to be used as a flavouring agent. However, there are limitations in some EOs such as low water solubility and high volatility, which limit their application in food technology. This study was conducted to develop onion (*Allium cepa*) EO as a flavouring agent and determine its stability against environmental stress via emulsification technique, with different concentrations of sodium caseinate, as a delivery system. Emulsions containing onion EO were prepared using different concentrations of sodium caseinate (3, 5 and 7 wt%) via solvent-displacement technique. The physical properties (average droplet size, colour (L*), turbidity and stability measurement) and antibacterial activity (agar disk diffusion) of emulsions were then determined. Results show that emulsion with 7 wt% sodium caseinate was the most desirable sample in term of Physical properties ans antibacterial activity. Hence, it was selected for environmental stress studies (i.e. thermal processing, freeze-thaw cycles and ultraviolet (UV) exposure). Results revealed that all types of environmental stresses had significant ($p < 0.05$) effects on droplet size, colour, turbidity and stability. Generally, the environmental stresses increased the droplet size except in freeze-thaw cycle case, while all stresses decreased the stability and lightness. All types of environmental stress treatment did not show significant ($p < 0.05$) effect on antibacterial activity enhancement against *Salmonella* Typhimurium and *Listeria monocytogenes* except in the case of UV treatment against *L. monocytogenes*. Therefore, the present work has demonstrated the potential use of emulsion as encapsulation and delivery system of essential oil flavours for food applications.

Keywords: Emulsion, Environmental stress, Flavour, Onion oil, Sodium caseinate

ID: FT-O-101 ASHTX
Category: Food Science & Technology

Effects of Different Types of Edible Oils on Physicochemical Properties, Oxidative Stability and Sensory Acceptability of Peanut Cookies

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ABSTRACT

Peanut cookie is a popular cookie that is generally eaten as a snack. It is made up of corn oil and more susceptible to oxidation due to the high unsaturated fatty acids in the corn oil. Lipid oxidation will decrease the quality and sensory acceptability of the food products. Rice bran oil and sunflower oil are common edible oils that are available in the market. These two oils are more stable to oxidation compared to corn oil. In this study, rice bran oil and sunflower oil were used to substitute the corn oil in the peanut cookie. Effects of different types of edible oils (corn, sunflower and rice bran) on the physicochemical properties, oxidative stability and sensory acceptability of peanut cookies were investigated. Results showed that proximate composition of peanut cookies made from corn oil (CPC), sunflower oil (SPC) and rice bran oil (RPC) was not significantly different ($p>0.05$). Physical properties (colour, hardness and fracturability) of peanut cookies were significantly different ($p<0.05$) between samples. SPC had the highest values for lightness and yellowness but lowest in redness. The values for hardness and fracturability of SPC were higher than CPC and RPC. Oxidative stability parameters [peroxide value, p-anisidine value, total oxidation value (TOTOX), free fatty acid and acid value] of peanut cookies were increased during storage. CPC contained the highest value in almost all oxidative stability measurements, indicating that it was more susceptible to oxidation than SPC and RPC. RPC had the highest mean scores for sensory acceptability compared to CPC and SPC. Overall, this study indicated that rice bran oil and sunflower oil could be used as a substitute to corn oil to increase peanut cookies' oxidative stability.

Keywords: peanut cookie, edible oil, physicochemical, oxidation, sensory

ID: FT-O-106 WBKBM
Category: Food Technology

Exploring Recent Processing Conditions to Tailor-made Peptides Derived from Aquatic Collagen – A Review

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ABSTRACT

Collagens from aquatic sources have been extensively studied for their extractability and distinguish properties. Previous works have shown that a good yield of collagen with promising quality can be achieved by optimizing the extraction parameters such as temperature, contact time, chemical and enzyme concentration. Recently collagen has been promoted as precursor of bioactive peptides where its hydrolysed form plays an integral part for the subsequent peptide's properties. The processing steps from native collagen to turn into hydrolysed collagen can be manipulated to obtain peptides with targeted bioactivities. Chemical and enzymatic hydrolysis are commonly employed to retrieve the collagen hydrolysate from its parent molecule. Some of the reported bioactivities of the hydrolysate includes angiotensin-1 converting enzyme (ACE-1) inhibition, antioxidant, antiglycan and antimicrobial activities, depending on the collagen source and methods employed. Emerging green technology such as ultrasound, subcritical water hydrolysis and fermentation are now gaining attention for collagen extraction and hydrolysis. These techniques while looking very promising as safer and cleaner choice need to be monitored closely as to ensure the process did not compromise the quality of resulting collagen and its hydrolysate. In this review, we discussed the current existing and emerging processing conditions for the extraction of collagen and its hydrolysate as precursor for bioactive peptide production. The specific bioactivities in accordance with the respective processing conditions are highlighted.

Keywords: aquatic sources, collagen, collagen hydrolysate, bioactive peptides, processing conditions

ID: FT-O-107 WBKBM
Category: Food Technology

Effects of Enzymatic Hydrolysis at Different Temperatures on the Physicochemical and Functional Properties of Hydrolysed Collagen from *Pangasius* sp. Fish

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ABSTRACT

The effects of enzymatic hydrolysis at different temperatures for the production of hydrolysed collagen from *Pangasius* sp. fish were evaluated. Enzymatic reaction of alcalase (A) and bromelain (B) at different hydrolysis temperatures (30 ºC, 40 ºC and 50 ºC) was incorporated in the extraction process. The resulting hydrolysed collagens (A30, A40, A50, B30, B40 and B50) were then characterized for their physicochemical and functional properties. Yields (dry wt%) of the hydrolysed collagens obtained were in the range of 20.96 ± 0.86 % to 24.11 ± 0.04 % with the hydrolysis by bromelain at 40 °C was the highest. Whereas the degree of hydrolysis (DH) for collagen treated with bromelain at 30 °C (13.66 ± 0.27%) was significantly higher ($p<0.05$) than that of other treatments. Predominant amino acid observed for all samples were glycine, proline and hydroxyproline. Protein content of all samples was generally high (>70 %). A40 showed the highest value of water holding capacity (5.13 ± 0.15 ml/g) while A30 had the highest emulsifying activity (59.19 ± 0.81%) compared to other enzymatic treatments. Solubility of the hydrolysed collagens were about ~70 %. In addition, the extracted hydrolysed collagens exhibited good DPPH radical scavenging activity with B30 had significantly higher value ($p<0.05$) compared to others (57.72 ± 0.03 %). Therefore, the hydrolysis conditions are critical to be monitored so as to yield hydrolysed collagen of desirable qualities to suit various applications in food industry.

Keywords: hydrolysed collagen, Pangasius fish, different temperature, alcalase, bromelain

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Category: Food Technology

Assessment of Total Phenolic Content, Antioxidative Activities and Amino Acids Profiles of Low Molecular Weight Chia Hydrolysates Fractions and Identification of the Potential Antioxidant Peptides Sequences

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ABSTRACT

In recent years, the research for bioactive peptides from natural sources and by-product of food processing has gained growing interests among researchers. Chia (*Salvia hispanica L.*) is a small seed from an annual herbaceous plant originally from Southern Mexico and Northern Guatemala. Generally, the chia oil industrial production produced an underutilised by-product known as defatted chia flour (DCF), which is considered a potential source of antioxidative peptides. This study aims to determine the total phenolic content, antioxidant activities, and amino acid profiles of different molecular weight of chia protein hydrolysates, subsequently to identify the antioxidative peptide sequences. The experiment has been carried out using a completely randomised block design. In this study, the chia protein was isolated from the defatted chia flour before hydrolysis using three different proteases (alcalase, papain and pancreatin). Among the prepared hydrolysates, alcalase-CH demonstrated the highest total phenolic content (3.67 mg GAE/g) and antioxidant activities (DPPH: 35.46 μM TE/mg; ABTS: 34.45 μM TE/mg; FRAP: 23.11 μM Fe (II)/mg), thus being selected to further fractionated into molecular weight (MW) fractions (>10 kDa, 4-10 kDa and ≤3 kDa) via ultrafiltration. The ≤ 3kDa kDa MW fraction of alcalase-CH demonstrated highest hydrophilic (48.33 %) and aromatic (25.00 %) amino acid, and exhibited the highest total phenolic content (5.46 mg GAE/g) and antioxidant activities (DPPH: 70.16 μM TE/mg; ABTS: 79.82 μM TE/mg; FRAP: 43.21 μM Fe(II)/mg), hence was selected for antioxidative peptides sequence identification. Two potential antioxidative peptide sequences, LFVTAAVAAR and VSAPGPVLTR were identified via in-gel digestion coupled with mass spectrometric analysis. The antioxidative chia hydrolysates can be developed and used as a natural antioxidant ingredient for functional food and nutraceutical applications.

Keywords: Antioxidant, chia hydrolysates, molecular weight fractions, peptide sequence, phenolic content

ID: FT-O-117 PNGHT
Category: Food Science

Turning Tarap Seeds into Flour of Improved Quality

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ABSTRACT

The purpose of this research was to create flour out of seeds of a tropical fruit known as Tarap which is native to Borneo. The rational of creating this product was to create flour of better colour, aroma, taste and texture. Tarap is a seasonal fruit that only grows in Borneo, an island in Southeast Asia and it is closely related to more familiar fruits like jackfruits and cempedak. The seeds of this fruit are frequently used for many purposes and this research would like to explore the plausibility of turning the seeds into flour or main ingredients in making flour that can improve its quality and subsequently, the taste and texture of pastries that are made of this ingredient. There were two methods used in collecting data and these were comparison experiments and questionnaires. There were two cycles of comparison experiment on the effects of the quantity of the ingredients used in making two types of pastries, shortbreads and macaroons. The results were assessed from the appearance, taste and texture of the two types of pastries produced from the Tarap flour. The first experiment indicated that both the macaroons and shortbreads did not meet the expected criteria. However, the second experiment showed that there was an improvement on the three main assessed criteria. Thus, the researcher finalized the suggested recipe for the two types of pastries based on the results of the second experiment. There were 20 respondents who were students of baking and pastry program from a local vocational institution who volunteered to answer questionnaires related to the three aspects of the flour: appearance, taste and texture. Based on the findings, the students expressed strong approval on the quality and potential of the flour. In fact, the researchers have successfully used the flour to bake shortbreads and macaroons.

Keywords: Tarap, seeds, flour, pastries

ID: FT-O-118 NPUFB
Category: Food Science & Technology

Chemical Characterization of Butterfly Pea Flower (*Clitoria ternatea*)

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ABSTRACT

Colours are important in food industry as it affects consumer perception towards food and influences consumers' purchasing decisions. Synthetic colourants were associated with the risk of hyperactivity and allergies, especially in youngsters. This has created a demand for finding a natural source of colourant. *Clitoria ternatea* or known as bunga telang is a good source of natural colourant with high antioxidant capacity and has find many applications in the food industry. To date, a natural blue colourant is difficult to obtain since the anthocyanins responsible for this colour is the least stable and easily degraded after extraction. Thus, this study is aimed to characterize the chemical constituents of the extractable polyphenols from ethanolic extract of *C. ternatea*. In this work, dried *C. ternatea* was extracted with 60% ethanol at 60°C for 2 hours. The extract was tested for its total phenolic content (TPC), total flavonoid content (TFC), total monomeric anthocyanin (TMA), DPPH scavenging assay and ABTS scavenging assays. Results showed that the TPC of *C. ternatea* extract was 102.37mgGAE/g_{280nm} and 28.8mgGAE/g_{750nm} whilst TFC was 35.73mgQE/g. The TMA of the extract was found to be 2.72CE/g and 2.88ME/g, respectively. Ascorbic acid and trolox were used as a standard antioxidant. The DPPH value of the extract was 0.7325 μMol Ascorbic acid/g and 0.55 μMol Trolox/g. While, for ABTS assay, the extract exhibit 5.90 μMol Ascorbic acid/g and 5.84 μMol Trolox/g. It is notable that, the TPC in ethanolic extract exhibited strong correlation in both assays, indicating a strong antioxidant potential of the plant. Hence, serves as a great potential of potent natural antioxidants and food additives. Future research could further explore the presence of polyphenols in *C. ternatea* particularly the anthocyanins and should be devoted to improving the anthocyanins' stability during storage.

Keywords: *Clitorea ternatea*, colors, ethanolic extract, anthocyanins, antioxidants

ID: FT-O-131 JEGQX
Category: Food Technology

Effect of Various Drying Methods on Physical and Chemical Composition of Chia (*Salvia hispanica* L.) Mucilage Powder as Novel Hydrocolloid

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ABSTRACT

Natural hydrocolloids rely on the proximate composition for their functional characteristics and biological aspects. The effect on the physical and chemical composition of chia mucilage of drying methods (freeze-drying and oven-drying) including comparison with hydroxypropyl methylcellulose (HPMC), xanthan gum and arabic gum has been investigated. Chia mucilage dried in a freeze dryer (FD) gave a neutral polysaccharide and recommended for pharmaceutical excipients due to their neutral properties. FD has a lower water activity (a_w), a better hydrocolloid and could be considered healthy products from toxic, chemical and microbiological reactions following the freeze-dried process. FD has significantly higher ($p<0.05$) total dietary fibre (76.83 ± 1.50 g/100 g) and protein content (6.14 ± 0.28 g/100 g) compared to chia mucilage dried in air convection heat oven (ACHO), which was (66.54 ± 4.91 g/100 g, 5.68±0.08 g/100 g) and xanthan gum, which was (62.47 ± 3.71 g/100 g, 3.48±0.09 g/100 g), respectively. Fat, ash, carbohydrate and moisture content of FD and ACHO were not significantly ($p>0.05$) affected by the drying methods. These findings will help select the appropriate drying process, depending on the physical and chemical composition of chia mucilage in a food product. Our results indicated that FD as a potential natural hydrocolloid source in food processing.

Keywords: Chia mucilage, drying method, freeze-drying, oven-drying, physical and chemical composition

ID: FT-O-133 QHAXV
Category: Food Science & Technology

The Effect of Surfactant Type on The Recovery of Polyphenols from Grape Pomace Extracts using Colloidal Gas Aphrons (CGA)

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ABSTRACT

Red grape (*Vitis venefera*) is one of the largest cultivated fruit worldwide and was used in many food applications including wine production. These has generated a massive amount of waste which is considerably high in polyphenols. Although the chemical characterization of the extract was well documented in the literature, the alternative extraction process was left unexplored. Surfactant-based separation has gained interest as an alternative as they possess unique characteristics. Therefore, this study was aimed to explore the application of surfactant using Colloidal Gas Aphrons (CGA) in recovering polyphenols from grape pomace. Briefly, CGA were generated using Tween20 and CTAB and were used to recover the polyphenols from ethanolic (EE) and hot water extracts (HWE) of grape pomace. The aphron and liquid phase were quantified for their total phenolic content, total anthocyanins, total sugar, total protein and also antioxidant activity. Results showed that slightly higher recovery of polyphenols was achieved under CTAB separation as compared to Tween20 in both EE and HWE. For anthocyanins, the recovery was higher with CTAB in EE, but was higher with Tween20 in HWE. In the case of proteins, higher recovery was achieved under separation of CGA by Tween20 in both extracts suggesting that they were drained with the liquid phase. The analysis of antioxidant power of aphron and liquid phases from EE and HWE separated from CGA generated from Tween20 and CTAB showed a protecting effect by Tween20 on the polyphenols. In the aphron phase of EE, those separated from Tween20 had higher antioxidant power as compared to those from CTAB. As a conclusion, the recovery of polyphenols was almost similar in both surfactants with higher antioxidant power in Tween20. Further study on integrating CGA separation using Tween20 should be explored in food application.

Keywords: Grape pomace, surfactants, colloidal gas aphrons, polyphenols, antioxidants

ID: FT-O-137 XPBXM
Category: Food Science & Technology

Effects of Incubation Time and Temperature on Physical Properties of Clarification Beetroot (*Beta vulgaris* L.) Juice and Its Quality as Affected by Enzyme Treatments

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ABSTRACT

The fresh beetroot is perishable, led to have a relatively short shelf life. Transforming of fresh beetroot into juice through thermal processing with the aid of enzymes is one of the preservation method to increase the yield and preserve their quality. This study was performed to determine the effect of different concentrations of commercial enzymes on the extraction yield. Besides, the effect of incubation time and temperature on physical properties of clarification beetroot juice and the quality of beetroot juice as affected by enzymes treatments were also evaluated. For juice extraction, the beetroot pulp was blended with distilled water (3:1) and treated with two commercial enzymes (pectinase and cellulase) and the combination (pectinase + cellulase) at different concentrations from 0.5 to 2 U/mL for 4 hrs at 40 °C. For juice clarification, the extracted juice was treated with the aforementioned enzymes at concentration of 1.0 U/mL for different incubation temperatures from 40 to 50 °C and time from 15 to 30 min. Determination of juice yield, colour, cloud value, total soluble solids, pH, ascorbic acid, total titratable acidity, and total sugar content of juice were conducted. Overall, the juice treated with pectinase at 1.5 U/mL had significantly ($p<0.05$) highest extraction yield. For clarification, a prolongation of incubation temperature from 40 to 50 °C and incubation period from 15 to 30 min resulted higher lightness, redness, and yellowness values for the juice. Juice incubated with enzymes at 50 °C for 15 min showed the optimum cloud value. Enzymes treatments significantly increased the total titrable acidity, total sugar content, and vitamin C content in juice, but the pH of extracted juice was deceased. The total soluble solid content remained unaffected with the enzymatic treatments. In conclusion, the enzymatic treatments had resulted desirable characteristics and improved the quality of beetroot juice.

Keywords: Pectinase, cellulase, clarification, physical properties, beetroot juice

ID: FT-O-139 QGWFA
Category: Food Technology

Isolation and Characterization of Effective Microorganism from Fermented Fruit Juice

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ABSTRACT

Current study was conducted to isolate and characterized the bacteria from fermented fruit juice of papaya and pineapple using morphological and biochemical test. Isolated bacteria were cultured on selective medium i.e Burk medium, Pikovskaya agar, Aleksandrow agar, , gelatin supplemented agar and tryptic soy broth medium with L-tryptophan to evaluate their ability to fix nitrogen, solubilized phosphate, potassium and gelatin, as well as produced indole-3-acetic acid respectively. A total of 6 bacterial strains were isolated from papaya (3) and pineapple (3) respectively. All isolates were found to have the ability to fix nitrogen and produced IAA, five out of six bacteria capable of solubilized phosphate, while only one out of six isolates were able to solubilize potassium. Among isolates, bacteria from papaya named SB1 showed an outstanding characteristic comparable to control. This study showed that the isolated bacteria had potential to be exploited as an alternative biofertilizer and is worth for further investigation.

Keywords: Fermented fruit juice, phosphate solubilizing bacteria, gelatinase, biofertilizer

ID: FT-O-147 VZMNT
Category: Food Technology

Detection of *Salmonella* Enteritidis in Raw Chicken Meat at retail markets in Selangor, Malaysia

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ABSTRACT

Salmonella is a leading cause of food poisoning in various countries. *Salmonella* Enteritidis is one of the serovars that causes salmonellosis or food contamination to humans whereby the primary vehicles of this bacterial infection are poultry and egg products. In Malaysia, poultry and egg products can be regarded as one of the major protein sources for the population of this country. Thus, the presence of *Salmonella* in these food products will lead to serious public health problems. This study was conducted to detect the presence of *S*. Enteritidis from chicken meat samples using polymerase chain reaction (PCR) analysis. A total of 18 samples (n=18) of chicken meat consisting of wings (6), thighs (6) and breasts (6) were purchased from markets at Sri Kembangan, Sri Serdang and Bangi in September 2017. A total of 27 *Salmonella* isolates were successfully isolated, based on biochemical tests of citrate (100%) and catalase (100%) positive as well as production of hydrogen sulphide, H2S (100%) on TSI agar. Out of 27 presumptive *Salmonella* spp.,16 isolates (59%) were *S*. Enteritidis using PCR analysis which targeted *sdf*1 gene. As a conclusion, the presence of *S*. Enteritidis in small sample size indicated that the potential of *Salmonella* infection from chicken source especially when the food handlers are improper in preparing of food in the kitchen. Thus, animal-based food product may consider as one of the major source of human salmonellosis.

Keywords: *Salmonella* Enteritidis, Raw chicken meat, retail market

ID: FT-O-153 LRBGV
Category: Food Technology

Antioxidant and Antimicrobial Properties of Yogurt when incorporated with Mango (*Mangifera indica* L.) Leaves and their Effects on the Viability of Lactic Acid Bacteria (LAB) during Storage

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ABSTRACT

Mango (*Mangifera indica*) is an alternative herbal medicine that that has been used to treat various infections for decades. Various parts of mango tree such as fruits, roots, kernel, leaves and barks have been used in enthnomedicinal. This study mainly focus on antioxidant and antimicrobial properties in mango leaf extract (MLE) with yogurt during storage to produce a functional yogurt by using mango leaf extract as natural additive. In this study, yogurt was used as a medium to determine the viability of lactic acid bacteria after inoculated with the highest concentration of mango leaf extract (30%). The antioxidant properties determination of mango leaf extract and yogurt incorporated with extract was carried out by analyzing the total phenolic content (TPC) and 1,1- diphenyl-2-picrylhdrazyl (DPPH). The acidity content of yogurt was analyzed using pH and titratable acidity (TA) analysis. The antimicrobial test was carried out by analyzing the minimum inhibition concentration (MIC) of mango leaf extract while microbial count was tested on yogurt incorporated with mango leaf extract. Result showed that 30% of the mango leaves extract has the highest value in DPPH (79.79±2.92%) and TPC (391.55 ±48.8 mg GAE/ml extract) compared to extract 20% and 25%. The mango leaf extract which rich in polyphenol content tend to have antibacterial agents which inhibit the growth of pathogen. During storage, the addition of MLE into yogurt reduced the microbial count on PDA compared to yogurt without MLE ($p<0.05$) and produced significantly higher antioxidant. The results showed yogurt with MLE was higher in antioxidant capacity at day 4 which increased the lactic acid bacteria to the maximum number. Overall, addition of mango leaves extract into yogurt are beneficial in food industry due to high in antioxidant and antimicrobial properties to maintain the viability of lactic acid bacteria under recommended concentration (6 log CFU/ml).

Keywords: Mango leaves, antioxidant, antimicrobial, viability, lactic acid bacteria, storage

POSTER PRESENTERS

AGRICULTURE

Agriculture-Biotechnology-Agribusiness

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Category: Agriculture

Study of Vanilla Essential Oil Extraction: Analytical and Antibacterial Analysis

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ABSTRACT

Vanilla belongs to the family (*Orchidaceae*), one of the largest families, including about seven hundred genres and 20,000 species. Orchids are the most popular family representatives, giving beautiful and desired blossoms. There are 110 to 150 cultivars and kinds of vanilla. Vanilla orchid is a tropical climbing orchid native to Mexico, and to this day some of the best vanilla beans in the world are produced in Papantla, Mexico. Vanilla has very high demand and prices in the world for its popular uses in flavouring ice creams and soft drinks. However, there is limited research on vanilla extraction around the world since not all the countries are producing commercial organic vanilla. As for that, there is no research carry out about the extraction using waste of vanilla which comes from the leaves and expired vanilla pods. This study was conducted to maximize the utilization of vanilla waste by converting it into vanilla essential oil. Scientific assessment was carried out to reveal the improvement of skin hydration, elasticity, and transepidermal water loss using skin analyzer. Antibacterial assessment also has been carried out to provide supportive evidences. From the result, it is proved that the vanilla oil generated able to perform as a good body oil essence by improving skin hydration and positive antibacterial tests against four types of common bacteria found in Malaysia.

Keywords: Vanilla orchid, vanilla waste, phenolic, aromatherapy oil, phytochemical

ID: AG-EP-06 CQZVF
Category: Agriculture

Effects Of *Heterotrigona itama* Propolis Towards Anti-proliferation And Apoptotic Activity Against Uterine Leiomyosarcoma (Sk-ut-1) Cells

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ABSTRACT

Propolis is a complex resinous mixture collected by stingless bee's product from various sources, including plant resins which has been used to treat several diseases in folk medicine and it is an important source of bioactive natural compound and drug derivatives. Ethanolic extract of stingless bee species produced by *Heterotrigona itama* against uterine leiomyosarcoma (SK-UT-1) cells was investigate on the proliferation effect and apoptotic activity. In order to evaluate the effect of propolis extract on anti-proliferation against SK-UT-1 cell line was treated with HI extract based on IC_{25}, IC_{50} and IC_{75} values was assessed by MTT assay method. The examination using fluorescence microscopy and Annexin V flow cytometry analysis revealed the presence of morphological features of apoptotic activity. The effect of ethanolic extracts on molecular mechanism was studied via Western blotting. The finding shows that the extract SK-UT-1 cell proliferation rate was found to be significantly reduced with dose dependence for 72 hours incubation. The proportion of SK-UT-1 cells in the early apoptotic, late apoptotic and necrotic cell inhibited death modes was showed reduced percentage of cell viability at different concentration (3.125 μg⁄mg to 50 μg⁄mg) at 72 hours. AO/PI staining of SKUT-1 cells treated with the extract revealed that majority of cells were in the apoptotic cell death mode. Downregulation of anti-apoptotic gene of Bcl-2 and PARP-1 cleavage supports the apoptotic activity of HI propolis ethanolic extracts in Western blot analysis. The HI extracts also inhibit the SK-UT-1 growth by protein IκBα, cyclin B1, which involved in apoptotic activity. This study has shown that the ethanolic extract of H. *itama* was reduced proliferation effects towards SK-UT-1 cells and induced the cells into apoptotic cell death mode, also actively involved in the protein expression.

Keywords: *Heterotrigona itama*, anti-proliferation, apoptotic activity, propolis, protein expression

ID: AG-EP-12 RUHZC
Category: Agriculture

HPTLC Fingerprinting Coupled with Chemometric Analysis for Evaluation of Different Extraction Methods on Stingless Bee's Propolis

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ABSTRACT

Propolis is a natural remedy used in folk medicine and believe to have broad spectrum of biologically active with therapeutic properties. Propolis consists of several different materials collected by the bees including resin, wax, latex etc and used to protect their hive from predator and microorganism. In order to harness its therapeutic benefits, extraction protocol must be optimized. In this work, propolis was extracted by different extraction methods; maceration, sonication and Soxhlet in 70 % and 95 % ethanol. High-performance thin-layer chromatography (HPTLC) coupled with chemometric were employed to evaluate the chemical profile through their chemical fingerprints. HPTLC chromatogram of propolis revealed a complex chemical fingerprint in each different extraction methods viewed under 254 nm and 366 nm. There were eleven and ten of unknown compounds detected in all extraction methods viewed under 254 nm and 366 nm, respectively. Hierarchical Cluster Analysis (HCA) grouped the propolis extracts into three different cluster based on percentages ethanol, different extraction methods and the intensities of unknown compound present in each samples.

Keywords: Propolis, extraction methods, HPTLC, HCA

ID: AG-EP-15 DKNAJ
Category: Agriculture

Ripening Behaviour and Quality of Giant Granadilla (*Passiflora quadrangularis*) Fruit

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ABSTRACT

Passiflora quadrangularis is one of the species in genus *Passiflora,* well-known for its appealing and sumptuous flowers and aromatic fruits. This species bears largest fruit (~1-3 kg) with edible fleshy mesocarp. Although it has been planted together with the popular purple and yellow passion fruits, scientific studies have not explored its production, pre- and post-harvest handling, and nutritional profiling. The present study therefore aims to examine the ripening behaviour of *Passiflora quadrangularis* and to evaluate the nutritional properties of this fruit. The experiment was conducted at passion fruit farm in Universiti Putra Malaysia Bintulu Sarawak Campus, Malaysia. The flowers were tagged at anthesis and fruit was harvested at three developmental stages; 1) green, harvested after 40 and 45 days after anthesis (DAA); 2) mature-green, harvested 50 and 55 DAA, and 3) fully ripe, 60 DAA. All the samples were analyzed based on general properties following AOAC standard protocol. The optimum harvesting period of this fruit was 55 to 60 days after anthesis (DAA). Fruits harvested on day 55 are ideal for cooking. Fruits harvested at day 60 were suitable for consumed as fresh, both mesocarp and pulp. At ripening (day 60) the fruit firmness was 3.33N, with total soluble solid of the pulp was 14.57°Brix. Pulp and mesocarp pH also increased slightly at maturation, 3.76 and 5.14, respectively. Based on the observation, this fruit is identified as a non-climacteric fruit and must be treated with ethylene to enhance the ripening during storage. Findings on nutritional properties showed, apart from the excellent moisture in the pulp (85.77%), it also possessed good carbohydrate (7.36%), protein (2.55%) and also fiber (2.36%). The mesocarp was also high in moisture (86.55%), carbohydrate (3.59%) and fiber (7.63%) but lower in protein (0.93%). The pulp and mesocarp also possessed higher phenolic (28.00mg GAE g^{-1} and 64.0mg GAE g^{-1}, respectively) and flavonoid content (11.00mg QE g^{-1} and 40.00mg QE g^{-1}, respectively). This study documented the quality of *Passiflora quadrangularis* fruit at different pre-harvesting stages which are crucial for improving marketable qualities, fruit production, and product development.

Keywords: Fruit maturity, fruit ripening, non-climacteric fruit, *Passiflora quadrangularis*, passion fruit

ID: AG-EP-16 ZYXXT
Category: Agriculture

Characterization and Phytotoxicity Assessment of *Wedelia trilobata* Essential Oil Grown in Different Conditions

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ABSTRACT

The growing interest in developing of plant essential oil (EO) as alternative herbicides has led to a systematic examination of plant EO for their biological properties. *Wedelia trilobata* (L.) Hitchc. belonging to *Asteraceae* is an evergreen perennial shrubby-weed with potential bioactive compounds and biological activities. In this study, we aimed to understand how chemical composition and phytotoxic activity of *W. trilobata* EO changed when grown different conditions. To achieve this goal, we used metabolomics and bioassay experiments to identify metabolic differences in *W. trilobata* EO grown in field and in control conditions and correlate with their ability to inhibit germination and growth of weedy rice and lettuce. Results showed that EO grown in control condition contained higher percentage of sesquiterpene hydrocarbons (73.04%) and lower amount of monoterpenes (42.68%) than those in field-grown EO. A total of 50 known compounds representing 99.75 % and 99.76% of the total oil were identified in field-grown oil and those in controlled conditions respectively. The main compounds in the field-grown EO were limonene (17.94 %) and β-pellandrene (14.15%). γ-elemene (12.57%) and germacrene-D (11.77%) were the highest compounds in oil grown in control condition. The EO of *W. trilobata* showed inhibition against germination and growth of weedy rice and lettuce, but varied considerably. We found that germination of weedy rice and lettuce was susceptible to oil grown in control condition, whereas field-grown oil exhibited strong inhibitory effects on shoot and root growth of weedy rice and lettuce. Using partial least squares (PLS) analysis, bioactive compounds that responsible for the phytotoxic activity were identified. Together, the variations in essential oil composition and their biological activities in different growth conditions provide baseline data for bioprospecting of *W. trilobata* EO.

Keywords: Essential oil, *Wedelia trilobata*, GC-MS, Chemometric, Phytotoxic activity, PLS

ID: AG-EP-27 ZRLDC
Category: Agriculture

Effects of Biochar and Organic Fertilizer on The Plant Growth and Control of Root Knot Nematode Disease of Kenaf (*Hibiscus cannabinus*)

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ABSTRACT

Kenaf (*Hibiscus cannabinus*) is cultivated for its fiber. In Malaysia, this crop was grown at the BRIS soil area; which was previously cultivated with tobacco plant. BRIS soil is known as unfertile soil and need to be treated to improve the growth of plant. In this study, the effect of BRIS soil treated with biochar and its combination with other organic fertilizer on the growth of kenaf and its consequence effect on plant resistancy against root knot nematode disease were investigated. The design for the experiment was CRD (complete randomized design) with ten replicates. The plot size was 5 meter x 5 meter each. Treatments are (1) chemical fertilizer (NPK), (2) biochar, (3) biochar: cow dung, (4) biochar: organic compost and (5) biochar: cow dung: organic compost with the ratio 1 to 1. The plant growth parameters such as plant height, chlorophyll content, plant biomass and fiber dry weight were measured at the end of the study. The roots of plant were collected to investigate the indirect effect of these treatments on the plant resistancy against root knot nematode disease. Despite of having the significantly higher number of nematode galls on plant roots, results obtained shows that the application of chemical fertilizer was significantly improved the growth of kenaf compared to other treatments. On the other hand, eventhough the number of nematode galls found on plant roots at the plot treated with biochar is significantly lower compared to other treatments, biochar application does not improve the plant growth performance.

Keywords: Kenaf, biochar, organic fertilizer, root knot nematode

ID: AG-EP-28 ZRLDC
Category: Agriculture

Effect of Agriculture Waste Materials Application on Kenaf (*Hibiscus cannabinus*) Growth and Resistancy Against Root Knot Nematode Disease

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ABSTRACT

BRIS soil fertility and the infestation of root-knot nematode is the main challenge in Kenaf *(Hibiscus cannabinus)* plantation. The growth of kenaf is largely depended on the soil nutrient level and its resistancy against the infestation by pest and disease. This study was designed to determine the best soil treatment using agriculture waste materials for kenaf cultivation. The experiment conducted at 5 meter x 5 meter plot for each treatment by using Complete Randomized Design (CRD) and replicated 10 times. Soil were treated with biochar, cow dung, organic compost, and NPK fertilizer. The performance of those soil treatments were evaluated through the performance of plant growth and its physiological responses, as well as the plant resistancy against root-knot nematodes infestation. The results showed that kenaf grown at the field plot treated with cow dung has the better plant growth compared to the plants grown in other treatments. The application of cow dung was found significantly enhanced the height of the plant, chlorophyll content, stalk diameter, length of stalk, dry weight and fiber content of kenaf plant. In addition, the plant roots at the plot treated with cow dung is free from nematode infestation. As conclusion, cow dung is the best soil treatment as it is significantly produce the best result in plant growth performance, produce more fiber and free from root-knot nematode infestation.

Keywords: Kenaf, biochar, organic fertilizer, root knot nematode

ID: AG-EP-29 JVWBU
Category: Agriculture

Stingless Honey Bee and Honey Bee: The Study of Consumers' Knowledge, Perception and Acceptance in Kuala Terengganu

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ABSTRACT

Honey is the simple word for the nectar derived from the product made by bees from the sting or stingless bee honey. Stingless bee honey is the product that had demand nowadays in Malaysia. Stingless bee honey and the honey bee had demanded in the market not because to consume as to eat, but also used as an addition for health products and beauty. However, less study has been done on consumers' knowledge, perception, and acceptance of stingless honey bees and honey bees. This research's objective is to study consumers' knowledge, perception, and acceptance towards stingless honey bee and honey bee. On top of that, to compare the socio-demographic profile with knowledge, perception and acceptance of the stingless honey bee and honey bee products. Lastly, the relationship between perception and acceptance towards stingless honey bee and honey bee products. The research was conducted in Kuala Terengganu, Terengganu. A cross-sectional method was used to collect the data of 150 respondents with a set of questionnaires containing a series of questions for the study. The result shows that they have good acceptance in honey with the median of 4.00 (1). There is also a significant difference ($p<0.05$) between the acceptance of a stingless honey bee, which is 0.013. This indicates that acceptance and gender have significant differences in terms of their way of accepting honey. Meanwhile, there was no significant difference between the mean rank of social, demographic profiles of age and status towards knowledge, perception, and acceptance towards stingless honey bee and the honey bee. With the understanding of the consumers' knowledge, perception and acceptance, it helps to expand and easy to know better.

Keywords: Honey bee, stingless honey bee, consumer knowledge, perception, acceptance

ID: AG-EP-32 ZRLDC
Category: Agriculture

Identification and Quantification of Saponin in *Furcaea gigantae*

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ABSTRACT

Furcraea plants contains saponins compound that can act as molluscicide agents and effective in controlling Golden Apple Snail at paddy field. However, the type of saponin and their amount is differed between species. This study was done to identify the type of saponin in *Furcraea gigantae* by using Fourier Transform Infrared (FTIR) spectroscopy. The amount of saponin in *F. gigantae* crude extract was quantify by using High Performance Liquid Chromatography (HPLC). Result shows that the *F. gigantae* has bidesmosidic furostanol saponin. The structure of furostanol saponin in *F. gigantae* was established as 3-[(O-6-deoxy-α-L-mannopyranosyl-(1→4)-O-β-D-glucopyranos-yl-(1→3)-O-[O-β-D-glucopyranosyl-(1→3)-β-D-glucopyranosyl-(1→2)-O-β-D-glucopyranosyl-(1→4)-β-D-galactopyranosyl)oxy]-(3 β,5α,15α,22α,25R)-26-(β-D-glucopyranosyloxy)-15,22-di-hydroxy-furost-12-one (Da Silva and Parente, 2006). The yield of saponin extracted from the *F. gigantae* plant is 5.77 wt%. Findings is important in formulating the biopesticide made from *F. gigantae*.

Keywords: *Furcraea gigantae*, molluscicide, saponin

ID: AG-EP-34 TYQHG
Category: Agriculture

Floral Development and Pollination Compatibility of *Durio zibethinus* Variety D197 (Raja Kunyit/Musang King)

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ABSTRACT

Variety D197 or Raja Kunyit/Musang King durian is one of the trending variety being planted commercially in Malaysia and have high demand locally and for export purpose. This variety comes from *Durio zibethinus* under Bombacaceae family. Due to high demand, planters of durian having high interest to change from conventional method of having poly varieties being planted in an orchard to mono variety planting. However, this does not comply with the planting recommendation and from previous studies conducted with other durian varieties showed some varieties of durian facing self-incompatibility condition causing problems to set fruit. Observation of floral development and study of compatibility status was conducted at Lembah Temir Orchard located at Lembah Klau, Raub, Pahang, Malaysia. Twelve trees were used for observation and pollination compatibility were done by using Completely Randomized Design (CRD). The pollination treatments used were D197 with pollens of D197 of the same tree (PST), D197 with pollens of D197 of different tree (PDT), D197 with pollens of D24(Xenogamy), autonomous autogamy and open pollinated which act as control. Fruit sets of each treatments were recorded at 7th, 14th, 21st, 28th days after anthesis or pollination and at harvest. The results showed xenogamy has the highest percentage of fruit set compared to other pollination treatments and the fruit rate maintained from 14th day after anthesis until the harvest. This inability of self-pollination to set fruit showed the self-incompability of D197 durian variety. This result support the incompatibility of other durian varieties as studied previously and it was also suggested the incompatibility problem cluster within the family of Bombacaceae. It was observed the D197 flower has herkogamy condition during anthesis and along with self-incompatibility, both affect the ability to set fruits.

Keywords: Durian, D197, Musang King, Self-incompatibility, Pollination

ID: AG-EP-74 WQFXF
Category: Agriculture

Assessment of Soil Moisture Characteristics as Affected by Different Root Zone Spatial Variability and Controlled Porosity Level

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ABSTRACT

The soil moisture characteristic curve of a soil depicts the relationship between the soil suction (tension in the soil pore water) and the amount of water retained in a soil (expressed as mass or volume water content, θm or θv). This curve is an important hydraulic property which strongly affected by soil texture and structure. It could therefore be considered as a basis of soil property. Hence, this paper presents an experimental investigation to evaluate the soil water characteristic curves of different root zone spatial and porosity level of soil mixture. The experimental study was conducted in a greenhouse at the Institute of Sustainable Agrotechnology (INSAT) Research Station of Universiti Malaysia Perlis (UniMAP). The tested media used were Beach Ridges Interspersed with Swales (BRIS) and clay soil. The media were combined in different percentages Mix 1 (100% clay), Mix 2 (25% BRIS : 75% clay), Mix 3 (50% BRIS : 50% clay) and Mix 4 (75% BRIS : 25% clay). Three cylindrical container sizes with different capacity (15 L, 30 L and 45 L) were used in this experiment. The experiment was laid out in randomized complete block design (RCBD) with four replications. The study revealed that soil moisture characteristic curve was strongly affected by both factors which was the slope of the curve was gentler as the clay content increases in the growing mixture. However, the slope of the curve was steep due to high proportion of BRIS soil. The study concluded that, appropriate root zone spatial and porosity level of soil mixture was important to ensure proper growth of the crop especially in container.

Keywords: Soil moisture characteristic curve, Beach Ridges Interspersed with Swales (BRIS) soil, Clay soil

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Category: Agriculture

Isolation, HPLC Quantification and Characterization of Bioactive Goniothalamin from *Goniothalamus andersonii*

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ABSTRACT

Goniothalamin (GTN) is a styryl lactone compound commonly found in genus Goniothalamus sp. GTN have been reported to possess potential antiproliferative activity against leukemia *in vitro* and *in vivo*. The aim of this study was to optimize the GTN isolation and HPLC quantification methods as well as to characterize the isolated GTN from the dried stem bark of *Goniothalamus andersonii*. The powdered stem barks were extracted using four solvents including methanol, ethyl acetate, petroleum ether, and hexane. Goniothalamin was detected and quantified by high performance liquid chromatography (HPLC), purified using preparative thin layer chromatography (prep-TLC) with hexane and ethyl acetate as solvent system (ratio; 0.55:0.45) and characterized by means of nuclear magnetic resonance (NMR) and gas chromatography – mass spectrometry (GCMS). As a result, extraction using hexane yielded the most amount of crude extract containing GTN (0.58%) compared to other extract. Quantification of prep-TLC fractionates using HPLC RP C-18 system eluted with methanol and water at a 1.0 mL/min flow rate, revealed a single GTN peak at min 43.4 indicating its purify, 1D-NMR spectrum shows the common GTN signals and GCMS analysis revealed major fragment ions for GTN with molecular formula $C_{13}H_{12}O_2$ *m/z* (rel. int.): 104, 68, 200, 131, 91 and 172. Nuclear magnetic resonance (NMR) spectrum assignment also revealed the signals of GTN structure. In conclusion, the findings recorded optimized quantitative methods to perform quality control and imaging data needed in order to support further research of this goniothalamin.

Keywords: Goniothalamin, HPLC quantification, *Goniothalamus andersonii*, GCMS, NMR

ID: AG-EP-94 GDMXB
Category: Agriculture

Integrating Extraction Technique Enhanced Total Phenolic Content and Antioxidant Activities of *Heterotrigona itama* Propolis Extract

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ABSTRACT

Propolis is a natural resinous properties by-product from beehive collected by a bee from plants. It captures researchers interest due to rich phytochemicals composition such as antioxidant, antiviral and antifungal antibacterial and anti-inflammatory. Recently, there is a demand for a greener alternative in extraction techniques of natural sources. Several extraction techniques have chosen in enhancing total phenolic content and antioxidant activities of *Heterotrigona itama* propolis extract. In the present study, three different extraction techniques have been applied: a) heating treatment, enzymatic-assisted and combination of heating and enzymatic-assisted extraction. Total phenolic content (TPC) was determined using the Folin-Ciocalteu method, while the antioxidant activities were analysed using ferric reducing antioxidant power (FRAP) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay. Generally, the combination of heating and enzymatic assisted extraction helps to increase total phenolic content and antioxidant activities of propolis extract compared to a single extraction technique used. The combination propolis extract showed the highest total phenolic content and DPPH activities at 194.03 ± 4.40 mg GAE/g and 90.95 ± 1.69 mg AAE/g respectively. Meanwhile, the heating treatment extract showed the highest FRAP value of 136.34 ± 3.04 mg AAE/g. Conversely, enzyme-assisted propolis extract showed the lowest total phenolic content and antioxidant activities at 35.95 ± 2.32 mg GAE/g, 43.45 ± 0.67 mg AAE/g and 26.73 ± 0.94 mg AAE/g respectively. This finding indicated that total phenolic content and antioxidant activity of propolis extract can be enhanced by integrating of several extraction methods.

Keywords: DPPH free radical scavenging, FRAP, enzymatic-assisted, propolis, TPC

ID: AG-EP-112 NKEER
Category: Agriculture

Morphological and Genetic Diversity of Longan Crystal (*Pometia pinnata*) Genotypes

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ABSTRACT

Pometia pinnata also known as Kasai, Matoa, or longan crystal is an underutilized species of the Sapindaceae family. This species is not commonly known internationally but extremely popular among the local people of Sarawak. *Pometia pinnata* is distributed throughout the Asia Pacific Region of the world. The plant has multi-functional properties with ecological, environmental, social, and economic benefits. This species has shown considerable confusion concerning the taxonomy due to external fruit colouration. To-date limited scientific studies have been reported on this species, including their morphological variability and genetic diversity. Therefore, the present study aims to evaluate the genetic diversity of *P. pinnata* through morphological and molecular approaches. The sampling was conducted randomly at 60 locations in Sibu and Bintulu, Sarawak. Thirty-one (31) quantitative and (27) qualitative data on the leaves, stems, flowers, fruits and seeds were measured. The genetic analysis was carried out using ITS primer sets. Based on the field survey, 11 genotypes of *P. pinnata* were recorded, namely purple big, purple small, purple medium, green big, green small, green medium, green ovoid, green soft skin, yellow, red, and rainbow genotypes. Observation through the morphological approach indicated no significant differences ($p<0.05$) among the vegetative and floral characteristics among the genotypes except for green soft exocarp accessions which possessed smaller leaves and flower size. However, the fruit variables were varied among accessions, including their exocarp colour, size and shape. Two major clades were generated by maximum parsimony tree with *P. pinnata* accessions grouped well together with the reference sequence in same group. Purple, green, yellow, red, and exocarp genotypes were arranged in a single sub-clade, respectively, despite their size. In summary, this is the first detailed research on *Pometia pinnata* accessions present in Sarawak, Malaysia. Proper classification of *P. pinnata* genotypes is important for future breeding work and conservation.

Keywords: ITS primer, morphology, *Pometia Pinnata,* phylogenetic, Sapindaceae

ID: AG-EP-114 QJQUD
Category: Agriculture

New Records of Wild Passion Fruit (*Passiflora suberosa* L.) in Malaysia: Evidence from Morphology and ITS Analysis

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ABSTRACT

Passiflora species are known to be one of the most alluring and appealing plants of the tropics. In Malaysia, only eight species of *Passiflora* were recorded, i.e., *Passiflora edulis* Sims, *Passiflora edulis* f. *flavicarpa*, *Passiflora incarnata, Passiflora caerulea, Passiflora coccinea, Passiflora ligularis, Passiflora quadrangularis* and *Passiflora foetida.* However, based on the preliminary observation in certain locations, there is another form of wild *Passiflora* species found on the roadside and in the bushes. The plants observed to share similar characteristics as other common *Passiflora* species, including single to three-lobed leaves with glands at petiole and flowers with 3 stigmas, rows of corona filaments, and androgynophore. Thus, this leads to the interest in researching the taxonomy of the wild *Passiflora* species observed through morphological and molecular approaches. Besides, the plant exhibits intraspecies dissimilarity among them and makes the speciation challenging. Therefore, this study also aims to examine the environmental influence on the morphological variation of this wild species. Samples were collected from various locations in Port Dickson and Bintulu, Malaysia. Analysis through morphology and genetics confirmed the identified species as *Passiflora suberosa*. This species has the characteristics of small flowers (7.71-15.10 mm), small fruits (6.59-7.62 mm), absence of petals and bracts. Among the studied locations, there were no significant (p<0.05) differences observed for vegetative and reproductive variables however, the leaves qualitative parameters distinctly varied among them. Plants that grew in shade areas (low light intensity) showed white variations on their leaves. In contrast, plants that grew in open areas (high light intensity) exhibited purple pigmentation on their leaf surface. With the new records of *Passiflora suberosa*, nine *Passiflora* species have now been found in Malaysia. It is suggested that the future exploitation of this species includes detailed nutrition and phytochemical research is important to understand the full potential of this species use in pharmaceutical and nutraceutical industries.

Keywords: ITS primer, morphology, *Passiflora suberosa,* passion fruit, phylogenetic, taxonomy

ID: AG-EP-127 JUFBY
Category: Agriculture

Durio of Sarawak : A Review on Its Taxonomy and Distribution

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ABSTRACT

Durian or the "King of Fruits" has been identified as a new source of agricultural wealth and highlighted as one of nine premium fruits in the Malaysian National Agro-food Policy (2011-2020). Although it is pungent in aroma, durian has become extremely popular recently, due to its high nutritional value and the widespread acceptance of its products. The genus of *Durio* consists of 30 species, and 23 species have been recorded in Malaysia with cultivar grown commercially from *Durio zibethinus*. Sarawak is the most diverse and home for 16 unique species, and these species diverse in shape, taste, and smell that hold great promise for future domestication. This review is highlighted on the *Durio* species present at Sarawak, their unique characteristics and distribution pattern. The local *Durio* species are widely found on low hill, ridge slopes, or undulating land in mixed dipterocarp forests. Among the 23 species, *D. oxleyanus* (Isu), and *D. kutejensis* (Nyekak) are being domesticated and widely sold at tamu markets in Sarawak. The other wild edible species, i.e., *D. affinis* (Durian daun tajam), *D. dulcis* (Kulit merah), *D. graveolens* (Isi merah) and *D. testudinarum* (Durian kura-kura) are still found in wild, but occasionally they can be found semi domesticated. Generally, the local *Durio* species were smaller in size with thin flesh than *D. zibenthinus* clones. It has a smooth creamy texture, sweet with an excellent unique durian flavour too. Considering the rising demand for durians, factors like aroma and flavour, which consumers preference in purchasing are further looked at to explore the potential of enhancing favourable traits and increasing its economic value in the global market. Detail research is needed to examine the physicochemical properties and volatile constituents of local durian species that will be shedding light on how their economic value can be enhanced.

Keywords: Domestication, Durian, Economic value, Sarawak, Wild durian, Utilization

ID: AG-EP-132 JYXTT
Category: Agriculture

Shelf Life and Storage Conditions to Prolong Viability of Seeds of *Artocarpus odoratissimus* Blanco

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ABSTRACT

Artocarpus odoratissimus Blanco is a species of Moraceae family, one of the indigenous fruits of Borneo that popular for its odour and juicy flesh. This species is gaining visibility in the local markets at East Malaysia and widely utilized by people as food, medicine, and timber. *Artocarpus odoratissimus* is propagated by seed. The initial moisture content of seed was 49.25% on a fresh weight basis with 92% initial germination. Seeds of *A. odoratissimus* being recalcitrant in nature pose storage problems and have a short shelf life. Deterioration of this seed is rush, causing difficulty in storing large quantities and or long transport of the seeds. Therefore, it is necessary to find the right storage method for *A. odoratissimus* seeds in order to prolong seed viability of this species. This study aimed to determine the viability of seeds of *A. odoratissimus* with storage time treatments and find the efficient storage method. Seeds were stored at four different temperatures: ambient (25˚C), 20˚C, 15˚C, and 10˚C and two different conditions: transparent container and dark container. The effect of storage conditions was studied for 0 to 12 weeks of storage, arranged in a completely randomized design with 4 x 2 factorial arrangement and 30 replicates in each treatment. Seed water content, total viability, potential viability, vigour strength, respiration rate and membrane leakage were also measured. The favourable storage temperature range was from 15 to 20°C. Maximum germination percentage (62.1%) with minimum water loss (19.4%) was when *A. odorarissimus* seeds stored at 20°C for 2 weeks storage period. The study revealed that at the 42.13% moisture level beyond, the germination could not occur. Additionally, after three months of storing, it was observed that irrespective of the type of storage containers were able to prolong seed viability.

Keywords: Chilling sensitive, Germination, Recalcitrant seeds, Shelf life, Storage, Terap, Viability

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Category: Agriculture

Liquid Biphasic System (LBS) for Purification of A-amylase from Agricultural Waste

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ABSTRACT

In recent years, the downstream bioprocessing industries are venturing into less tedious, simple and high efficiency separation process by implementing advanced purification and extraction methods. The discussion will be mainly focused on the amylase enzyme purification from agricultural industrial waste using conventional and advanced techniques of extraction and purification using Liquid Biphasic System (LBS). LBS method is prominent as an efficient, economical and versatile emerging technique for the bioprocessing of biotechnological products compared to other methods such as ion exchange chromatography, affinity chromatography and membrane extraction. The two phase separation method can be either the water-soluble polymers, or a polymer and a salt, or alcohol and a salt, which are simpler and lower cost used with a larger purification scale. Next the comparison between the different approaches in LBS for the purification of amylase from agricultural waste are also included. Current technology has made evolvement to the simple LBS into the microwave assisted LBS, ultrasound assisted LBS and electric assisted LBS. The pH, time, temperature and concentration are some of the research parameters that will be taken into the consideration in the advance technique reviews.

Keywords: Agricultural waste, α -amylase, Enzyme, Liquid biphasic system, Separation

ID: AG-EP-135 EXTKM
Category: Agriculture

Evaluation of Effective Bacterial Consortium in Controlling Oil Palm Bagworm, *Metisa plana*

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ABSTRACT

Elaeis guinensis is known as African oil palm, is the major important plantation crop in Malaysia. one of the important pest that could decrease the yield of oil palm production in Malaysia is the bagworm, *Metisa plana*. Previously, the bagworm infestation is controlled by using insecticides such as trichlorfon. However, , the excessive uses of insecticide have led to the larvae resistance and give negative effects on the environment. Therefore, several bacteria strains such as *Bacillus thuringiensis*, *B. toyonensis*, *Serratia marcescens*, and *Paenibacillus* sp. were evaluated in this study as potential biocontrol agents in controlling *M. plana* effectively. Bacterial insecticidal activity at different concentrations and different stages against bagworm were assessed. Then, the synergistic pathogenicity of bacterial consortium against bagworm, *M. plana* was evaluated. The bacterial strains that grown in nutrient broth were sprayed on the larvae of *M. plana* with different concentrations and the result indicates that the highest mortality was caused by the concentration of 10^9 with the effectiveness, 48.5 % in seven days. The larvae instar of *M. plana* were divided into two stages, Stage 1 (consisting of larvae on levels 2, 3, and 4) and Stage 2 (consist of larvae in levels 5, 6, and 7). The result showed that the highest mortality rate against *M. plana* in Stage 1, with effectiveness 54.8 % in seven days. Bacterial consortium exhibited high insecticidal activity against *M. plana* with Consortium 4 (*B. thuringiensis* and *Paenibacillus* strain) which have the most antagonistic potentiality with 92.3 % mortality rate in four days. Overall, the consortium of bacteria treatment caused higher mortality of *M. plana* compared to single bacterial strains. This study promised the potential biological approach for sustainable pest management in the oil palm industry in Malaysia.

Keywords: *Metisa plana*, oil palm, bacterial consortium, synergistic pathogenicity, insecticidal activity.

ID: AG-EP-149 RMRHH
Category: Agriculture

Evaluation of Morphological Traits in Cucumber (*Cucumis sativus*) Germplasm for Their Utilization in Hybrid Breeding

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ABSTRACT

Cucumber (*Cucumis sativus*, family *Cucurbitaceae*) is an essential crop globally. In hybrid breeding, performance of the parental lines is of utmost significance for effective and economic hybrid seed production. The current research aims to evaluate the performance of eight cucumber accessions collected from MARDI germplasm based on their morphological traits. A total of three qualitative and 15 quantitative traits based on the AVRDC-GRSU characterization record sheet were recorded and evaluated in five replicated plants per each accessions. Data was subjected for one-way ANOVA followed by Duncan Multiple Range Test (DMRT) as a post hoc test. Results of morphological characterization showed that the quantitative traits varied significantly. For instance, plant height varied from 65.50 to 159.00 cm, whereas fruit weight varied from 47.98 g to 200.38 g. In this study, cucumber accessions can be divided into two groups: the 'short cucumber' which is generally referred to as mini cucumber, and the 'long cucumber', based on their vegetative and fruit traits. In addition, a set of potential cross-combinations that can be planned to develop highly heterotic hybrid was identified. Morphological variation found among the cucumber accessions highlighted the possibility of these plant materials to be used for their genetic improvement and breeding programs.

Keywords: cucumber, germplasm, morphological traits, hybrid breeding

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Category: Agriculture

Proximate Composition Profiling of Corn Stalk and Rice Straw for Preparation as Biofiller in Bioplastic Production

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ABSTRACT

Besides the rising environmental concern and health issues regarding the increasing global production of synthetic polymers manufactured mainly from crude oil, their end-products produce a significant amount of solid wastes due to difficulties associated with their recycling and recovery. The non-renewability and non-biodegradability characteristics of petroleum-based plastics have been attempted to be resolved by the production of bio-based plastics. Starch is one of the biopolymers that can be processed for bioplastics. Different blends and composites have been produced for the last two decades because of the weakness of pure starch-based materials, such as lower mechanical properties and remarkably hygroscopic in nature. In regard to production, bioplastic blends have lower production cost, lower density, biodegradability, flexibility during processing and abundantly available. However, inclusion of any natural fibres as reinforcement agents in bioplastic starch for food packaging application may lead to various concerns including the food safety, impurities, permeability, and resilience. Therefore the application of corn stalk and rice straw fibres as natural waste fillers in bioplastic starch have been studied in order to overcome the major drawbacks of bioplastic starch itself and allowing them to be used in various applications especially in food packaging industry. By this means, corn stalk and rice straw fibres have been analysed for their proximate composition by adapting the procedures from Mohan et al. (2012) and Komal et al. (2018) with some modification, followed with morphology characterisation using FESEM. Results obtained and subsequent trends observed in untreated and chemical (NaOH) treated fibres were compared and contrasted. Chemical treatment with NaOH resulted in better modification of fibres surface by removing a certain rate of lignin, hemicellulose, wax, and oils covering the external surface of natural fibres, hence will enhance the interfacial properties between fibres and bioplastic starch. This will be resulting in good mechanical properties for composite (bioplastic starch reinforced by natural fibres). As conclusion, corn stalk and rice straw fibres studied have potential use as high value reinforcing agents in bioplastic starch.

Keywords: Proximate Analysis, Bioplastic, Corn Stalk, Rice Straw, Biofiller, Alkaline Treatment

ID: AG-EP-158 AADTT
Category: Agriculture

Assessment on Effect of *Mangifera* sp. Microwave Extraction Against Bacterial Activity

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ABSTRACT

Mangifera sp belongs to the family Anacardiaceae can easily be found all over tropical regions in this world, cheaper and less side effects compare to the standard drug antibiotics. In addition, *Mangifera sp*. have been reports as medicinal plant that possessed antibacterial activity against human pathogens. In this study, the effect of *Mangifera* sp leaves microwave extraction of were investigated. Standard methods were used in determine the Minimum Inhibition Concentration (MIC) using disc-diffusion agar and 96 well plate against various bacteria namely *Klebsiella pneumoniae, Enterococcus faecalis, Proteus mirabilis, Salmonella enterica, Pseudomonas aeruginosa and Acinetobacter baumannii*. Effect of microwave extraction of sample *Mangifera* was observed using few timelines such as soxhlet, 2 min, 5 min, 8 min, 10 min and 12 min. The result obtained showed that 10 min sample (M10) was the optimum time and have highest antibacterial effect compare to others timelines. M10 was used to against *Acinetobacter baumannii* and showed great outcome since it has zone of inhibitions of 20 mm (200 mg/ml) and MIC of 6.125 mg/ml. In summary, Mangifera sp. exhibited significant antimicrobial activity comparable to gentamycin as positive control and optimum microwave time for sample *Mangifera* sp is 10 min.

Keywords: Antimicrobial, Mangifera, Microwave, Disc-diffusion

ID: AG-EP-159 DVLRF
Category: Agriculture

Carbon Sources Effects on Different Strains of Phytase Producing Bacteria Isolated from Malaysia's Hot Spring

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ABSTRACT

This study aimed to determine the effects of using different carbon sources to the growth of different strains of phytase producing bacteria based on optical density (OD), colony forming unit (CFU), and their phytase production. All four strains of bacteria potentially producing phytase have been isolated from several hot springs in Malaysia, which were in Labis, Johor (L3), Dusun Tua, Selangor (RT), Ulu Legong, Kedah (A) and Ranau, Sabah (B9). The bacteria were grown in nutrient agar (NA) and modified Phytase Screening Medium (PSM) liquid media for culture enrichment. Glucose and lactose were used as the carbon source and growth was done under optimum culture conditions (pH 5.5, 37°C, 200 rpm) for 72 hours through batch culture method using a shake-flask scale. All experiments were done in triplicates. For quantitative screening of phytase production, the bacterial cultures were harvested to obtain the supernatants that were used to measure the amount of inorganic phosphorus released by the bacterial strains. Among these carbon sources, glucose have shown consistency between their CFU counts and the observed ODs whereas lactose shown inconsistency. Meanwhile, the maximum phytase activity was recorded for all strains in the presence of glucose in which bacteria strain L3 (0.040 U/mL), RT (0.036 U/mL), B9 (0.026 U/mL), and A (0.026 U/mL). As for the overall, strain L3 (from Labis, Johor) gave promising rate of inorganic phosphate released with optimum phytase activity value of 0.04 U/mL in presence of glucose and lactose. In the future, biochemical research and molecular identification may also be carried out to identify molecular identity in the strains. This study can provide an efficient strategy to produce maximum phytase as few studies stated that phytase is an application tool in functional food production that consists of myo – inositol phosphates that is believed to have important pharmacological effects.

Keywords: Carbon sources, Phytase-producing bacteria, Hot spring, Phytic acid, Bacteria growth

ID: AG-EP-160 APNHR
Category: Agriculture

Biotechnology Coronavirus-Era Self-Efficacy First: Primary-Healthcare Workers Attitude Toward-Behaviour in Nigerian Local-Governments

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ABSTRACT

Spread of coronavirus (COVID-19) imposes heavy biotechnological and socio-economic challenges around the globe "One of the toughest challenges ever faced by World Health Organisation (WHO), coronavirus infected and killed millions of live since outbreak in China last December, 2019, now being driven by people in their 20s, 30s and 40s that don't know they are infected. Despite the benefits of biotechnology towards socio-economic growth, it's delivery and implementation have being affected by lack of awareness, inadequate of ICT infrastructures and enough funds to improve communities especially primary-healthcare workers attitude to accept the current deteriorating socio-economic situations "we are already living in an era of unlimited expertise on adoption of science, technology and innovation to develop biotechnological ecosystem in Nigeria, build a strong competitive economy." Using novel means or approaches such as artificial intelligence, machine learning, genomics and nanotechnologies to achieve the desired mandate. Twenty-eight behaviour intention theoretical factors were reviewed, pilot survey testing was conducted from March 18th, 2020 to February 1st, 2021 among twelve primary-healthcare workers who were conversant with biotechnology. Pre-processed collected data have shown significant percentage frequency counts range values 33% to 92% of demographic information stance to adapt mobile health, adapted training factors range values 42% to 67 % and behaviour intention factor items average range values of 47% to 58.3% for hypothesis development in finding explanation to biotechnology implementation plans. Except biotechnology adoption problem insights including enough survival-fund, interoperability, change of attitude toward behaviour (average percentage value of 47%) are mapped towards national policy design and implementation. Poor outcomes and lack of biotechnology awareness will result among primary-healthcare workers.

Keywords: Behaviour-Intention, Biotechnology, Primary-Healthcare, Workers, Attitude.

ID: AG-EP-163 TCCDA
Category: Agriculture

Effect of Plant Growth Regulators, Media Strength and Carbon Sources on In Vitro Seed Germination of *Hylocereus undatus* (White Dragon Fruit)

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ABSTRACT

Hylocereus undatus (white dragon fruit) has become an important commodity in Malaysia due to its health benefits and ornamental purpose. The price of this fruit is consistently high because of most of them are imported. This study investigates the suitable conditions for *in vitro* culture of *H. undatus* as conventional propagation has failed to meet market demand. The seeds were germinated in Murashige and Skoog (MS) basal medium consisted of different plant growth regulators (PGRs), MS of different strength and MS supplemented with different carbon sources as factors affecting germination. The time taken for the seeds to germinate, percentage of germination, shoot and height length were chosen as parameters to study the effects of those factors. In all treatments, percentage of germination achieved was 100%. It was found that the media condition of *H. undatus* seeds to germinate was the fastest in MS + 1 mg/L BAP with the lowest mean of day to germinate 5.00 ± 1.79 days but the growth of shoot and root is higher in MSO which is 1.94 ± 0.30 cm and 2.64 ± 0.97 cm. In terms of media strength, *H. undatus* seeds germinated faster in the quarter strength of MS with 5.00 ± 1.30 days compared to the other media strength. Also, the growth of the shoot and root of the explants is optimum in the quarter strength of MS with the highest mean 2.70 ± 0.45 cm and 3.70 ± 0.45 cm. The observation from carbon sources requirement highlighted that seed germination of *Hylocereus undatus* was the most optimum in MS with 15 g/L of sucrose with the lowest mean of the germination day is 4 ± 0.00 days. Similarly the optimum growth of shoot is 2.30 ± 0.57 cm in the same treatment. There is no significant difference between the root length in MS with 15g/L of sucrose and root length in MS with 30g/L of glucose. It is shows that the root of *Hylocereus undatus* proliferated and grown in optimum rate in the MS with 15g/L of sucrose and root length in MS with 30g/L of glucose. Optimization of these media factor is important aspect in this study to ensure the large numbers of seedlings can be produced with the optimum rate of the growth. The study concludes that the *Hylocereus undatus* seed required MS culture media without PGR, of quarter strength and supplemented with 15 g/L of sucrose. This culture condition is proposed to be used by tissue culturist to produce seedlings of *Hylocereus undatus* to ensure the production will meet the market demand in Malaysia.

Keywords: Dragon fruit, Germination, Basal medium, Plant growth regulators, Carbon sources

ID: AG-EP-164 DAWTC
Category: Agriculture

Effect of Plant Growth Regulators, Strength of Growth Media and Carbon Sources on Seed Germination of *Hylocereus costaricensis* (Red Dragon Fruit)

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ABSTRACT

Hylocereus costaricensis which also commonly known as red dragon fruit or 'pitahaya' is popular for its purple-red flesh. It has gained the worldwide concede first as an ornamental plant and then as a commercial fruit crop. There are many benefits of dragon fruit which it can promote a healthy and glowing skin. The present study aims to determine seed germination time and percentage, length of the shoot and root when supplied with different plant growth regulators, strength of growth media, and carbon sources. Seed germination was observed by culturing the seeds in media supplemented with different plant growth regulators and different concentration which are 1 mg/L BAP, 2 mg/L BAP and 15 mg/L GA. Then, the seed growth was measured under different strengths of Murashige and Skoog (MS) basal media which were full strength, half strength or quarter strength that promoted the seed germination the most. The percentage of seed germination was determined by the effect of fructose, sucrose, and glucose as a carbon source. In this study, the seeds of dragon fruit were 100% germinated. The seed showed the highest germination is MS + 2 mg/L BAP with the average period of 2 days but the elongation of shoot and root were not the fastest. For media strength, the seed germinations were most affected in quarter strength media which is in day 2 the seeds were already germinated. However, the elongation for roots and shoots were the best in half-strength media which showed the highest length compared to other treatments. The effect of carbon sources influenced the fastest day to germinate shown in 30 g/L sucrose but not for root and shoot length. 30 g/L glucose enhanced the root length the highest which is 2.48 cm. The average shoot length showed in 30 g/L sucrose and 15g/L fructose was similar which was 1.38 cm. The effect of carbon sources that boost the shoot length the most was in TCS3 (2.04 cm) which was in 15 g/L fructose. The effect of those factors should be considered to enhance the best condition for seed development and achieve the demand of this fruit.

Keywords: Dragon fruit, Germination, Basal medium, Plant growth regulators, Carbon sources

ID: AG-EP-166 TBGAC
Category: Agriculture

Effects of Rooting Media and Growing Condition on Stem Cuttings of *Strobilanthes crispus* and *Chromolaena odorata*

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ABSTRACT

Strobilanthes crispus and *Chromolaena odorata* are medicinal plants that traditionally used by Malaysians to treat kidney stone and wound healing respectively. The advancement of science and technology has widened the application of these medicinal plant into food and beverages products (for *S. crispus*) as well as pharmaceutical industry. To cater the sustainable supply of raw materials, propagation of these species in large scale is essential. Cuttings is the most widely used technique and simple way to produce clones in many herbaceous, ornamentals and woody plants in large scale. However, the success of cuttings is influenced on how the stock plants are grown and treated. Therefore, this study was developed to identify the suitable rooting media and growing condition for stem cuttings of these two species. Full grown mother trees of *S. crispus* and *C. odorata* were used as stock plants for this experiment. The stem of the plants were cut into 15 cm length with three nodes. Two different rooting media such as T1-top soil: sand (2:1) and T2- top soil: sand (1:1) were tested and the stem cuttings were grown in two different condition (i. green house (RH: 64%, Light intensity: 351 -399 lux; ii. growth chamber (RH: 90%, Light intensity: 749 -754 lux). The survival rate of the cuttings were recorded weekly whilst the rooting performances were measured at week 4 of the cuttings. Cuttings of *S. crispus* and *C. odorata* shows 100% survival rate in T1- top soil: sand (2:1) at green house condition whereas cuttings grown in growth chamber gradually reduce survival rate after two weeks with percentage below 70%. This study suggests the stem cuttings of *S. crispus* and *C. odorata* should be grown in T1-soil: sand (2:1) growing media at green house condition. The findings from this study is essential for breeders and herbal propagators for mass production of these two medicinal plant in future.

Keywords: Green house, medicinal value, propagation technique, rooting media, stem cutting

ID: AG-EP-167 TBABA
Category: Agriculture

Production of High Quality Planting Materials through Breeding for Four Important Herbal Species: A Review

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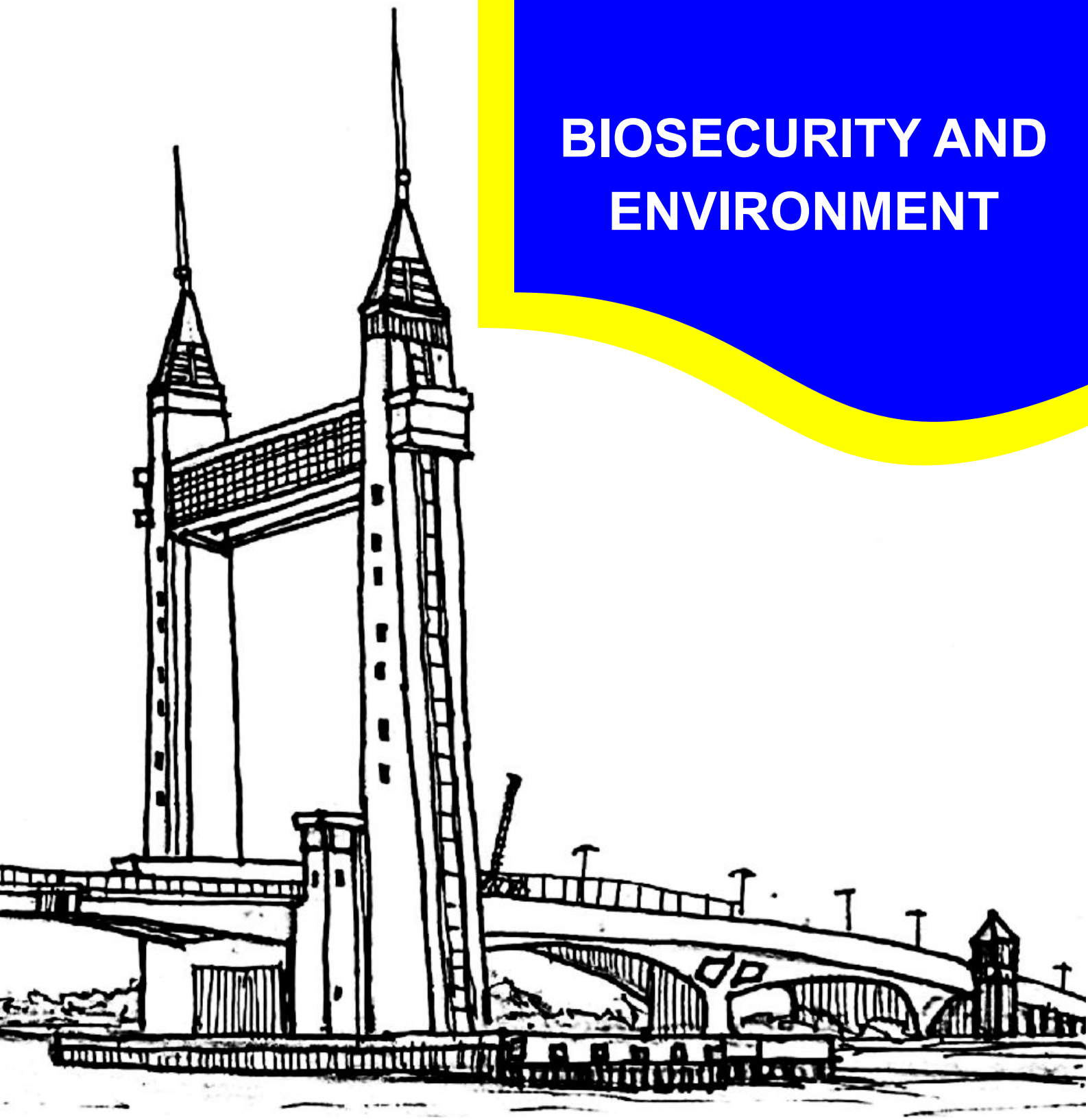
ABSTRACT

Forest Research Institute Malaysia (FRIM) has conducted several research on the production of high quality planting materials for four important medicinal plants under the 11th Malaysian Plan project. The four selected species are *Chromolaena odorata* (siam weed), *Andrographis paniculata* (creat or green chiretta), *Beackea frutescens* (false ru) and *Senna alata* (candle bush). These species are found to have a significant benefit to the human's health. *C. odorata* (kapal terbang) leaf extract are found to have relatively strong inhibition on platelet-activating factor (PAF) receptor binding *in vitro*, indicating an anti-inflammatory activity, which is favourable for wound healing. A major bioactive compound in *A. paniculata*, andrographolide has shown anticancer potential in various research. Whereas, *B. frutescens* has a potential to be used as anti-gout remedies. Research conducted by FRIM showed that active compound in the leaves and stems of *B. frutescens* extract are effective in inhibiting uric acid formation and promoting uric acid secretion. Whereas for *S. alata*, the highest content of major flavonoid glycoside compound, kaempferol-3-O-gentiobioside (K3G), has an anti-inflammatory effect detected in leaf extracts. With the growing interest in these species as a source of new pharmaceutical products and the increasing demand for herbal products in Malaysia, the demand for its raw materials is also increasing. Therefore, initiatives have been taken by FRIM to select and to produce high quality planting materials for future uses. To our knowledge, most of the raw materials used in producing herbal products and its development were being sourced from the wild, with little knowledge on the quality of the raw materials. In order to ensure the quality and sustainability of raw materials in the market, it is important to come out with suitable breeding strategy for the selected species. This paper highlights research by FRIM on collecting, screening, selecting and producing high quality planting materials for the four species based on their growth performance and bioactive compounds. Germplasm plots for the species were also established in FRIM for future breeding activities. The outputs derived from this study will support the herbal industries in getting quality raw materials in the future. By using high quality plants will also increase the value of pharmaceutical products in the market. It is anticipated that herbal industries and interested party will seek FRIM for high quality seeds and seedlings materials for the development of their products as well as for the establishment of commercial herbal plantation.

Keywords: breeding strategy, selection, growth performance, bioactive compound, product development, commercial plantation

POSTER PRESENTERS

BIOSECURITY AND ENVIRONMENT



ID: BE-EP-20 YMGDL
Category: Biosecurity & Environment

Diversity and Abundance of Hymenopteran Parasitoids at Two Different Elevations in Redang Island, Besut, Terengganu

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ABSTRACT

A study was conducted to determine the diversity and abundance of hymenopteran parasitoids in two different elevations of the coastal and inland forest of Redang Island, Terengganu. Three Malaise traps were installed for each sampling point in the plot area. The insect samples were collected after seven days and brought to the laboratory for sorting, enumerating, and identifying process from order up to the family level. The abundance of parasitoids collected between two plots was statistically analyzed using T-test analysis and one-way Analysis of Variance (ANOVA) was used to compare the abundance of hymenopteran parasitoids between different families. The insect diversity was analyzed using the Shannon-Weiner Diversity Index (H'). Overall, a total of 13 families of hymenopteran parasitoids comprising 48 individuals were successfully identified. The most abundant families identified was Braconidae with 24 individuals followed by Ichneumonidae with six individuals whilst the lowest families identified with only one individual each were Elasmidae, Mutillidae, Diapriidae, Chalcididae, Eulophidae, Pompilidae, Chrysididae, and Platygastridae. The abundance of hymenopteran parasitoids between plots was not significantly different ($p>0.05$) which coastal forest recorded 26 individuals whereas 22 individuals in the inland forest. However, the Shannon Wiener Diversity Index (H') showed that the inland forest had significantly higher diversity with the value of H'=1.58 compared to the coastal forest (H'=1.42). In conclusion, the diversity of hymenopteran parasitoids in the inland forest was higher than coastal forest might be due to the variability of the host and plant variation in the higher land. For the future, vegetation species, distribution, and abiotic factors can be taken into consideration in determining the diversity and abundance of hymenopteran parasitoids in the Redang Island forest.

Keywords: Insect diversity, parasitoids, Hymenoptera, island

ID: BE-EP-71 EVXBD
Category: Biosecurity & Environment

Seasonal Variations of Soil Moisture Regime at Dry Region of Lowland Dipterocarp Forest in Pasoh Forest Reserve, Peninsular Malaysia.

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ABSTRACT

Soil moisture is an important component in the terrestrial hydrological process and has a great influence on nutrient cycle and energy flow. Tropical rainforest sometimes experiences a severe dry period for several months. Soil moisture is responsible for regulating transpiration during this time. This study focuses on the soil moisture in the tropical rainforest by determining soil water content at 6 ha Pasoh Reserve Forest, Negeri Sembilan, Peninsular Malaysia. The study area is located within the drier area in Peninsular Malaysia and therefore is suitable for assessing soil moisture fluctuation during the dry and wet seasons. We measure soil moisture from 39 grid points using Amplitude Domain Reflectometry (ADR-type) soil moisture profile probe from a different soil depth at 0.1, 0.2, 0.3, 0.4, 0.6 and 1.0 meter on monthly basis. The objective of this study is to determine the seasonal soil moisture fluctuation in the Pasoh Forest Reserve as the effect of monsoon season. During the Northeast monsoon season between October 2019 to March 2020, soil water content was higher compared to the other months of the year. October shows the most rainfall amounting 364.77 mm month-1. Expectedly, at all soil depth, the moisture revealed the higher as the rainfall is at most. The soil moisture also increased significantly with a deeper soil depth at 1m, compared to shallower soil depth. This study could be used as a model for development of forests associated with soil moisture and ecological character of the tropical forest.

Keywords: Soil moisture, Rainfall, Tropical forest, Principal Component Analysis (PCA), Monsoon season

ID: BE-EP-136 LTZRE
Category: Biosecurity & Environment

Kelantan Household Intention in Minimizing Food Waste through Knowledge, Attitude and Practice of Food Waste Management

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ABSTRACT

The amount of household waste generated at the end of food supply chain is one of major factor that contributed towards environmental pollution. Household waste materials consist of high percentage of organic mass that is categorized as raw food waste produced during food preparation and leftover. The aim of this study is to investigate the current practice of food waste management and the intention of Kelantan household in minimizing food waste. Questionnaire was developed based on knowledge, attitude and practices survey model. A total number of 384 Kota Bharu residents participated in this study, randomly. Descriptive, reliability and Pearson correlation analysis were analyzed through Statistical Package for the Social Science (SPSS). Results showed that, the increasing amount of food waste generated from each house directly correlate with current practice of food waste disposal method of which disposal to the waste bin. Results from the survey showed that estimated food waste generated weekly are approximately 2.6 -3.0 kg per person. Increases of food waste generated among Kota Bharu residents are resulting from the high family monthly income, along with their common food choices are the home cooked and restaurant food that have high tendency to generate more food waste during preparation and consumption. Moreover, some of residents are still unable to categorized organic waste properly. However, the mean of attitude and practices are slightly low compared to their knowledge and intention on food and food waste management to minimize the generated waste. Result showed that there is a significant relation of Kota Bharu residents' intention in reducing the food through the knowledge, attitudes and practices. Then, this study intentionally to influence the householders to improve their food and food waste management practice at house and consequently will reduce amount of food waste produced at house.

Keywords: Food waste, waste management

ID: BE-EP-151 HCVAM
Category: Biosecurity & Environment

Comparison of Stumpage Value in Old and Young Recovered Primary Forest at FRIM Selangor Forest Park

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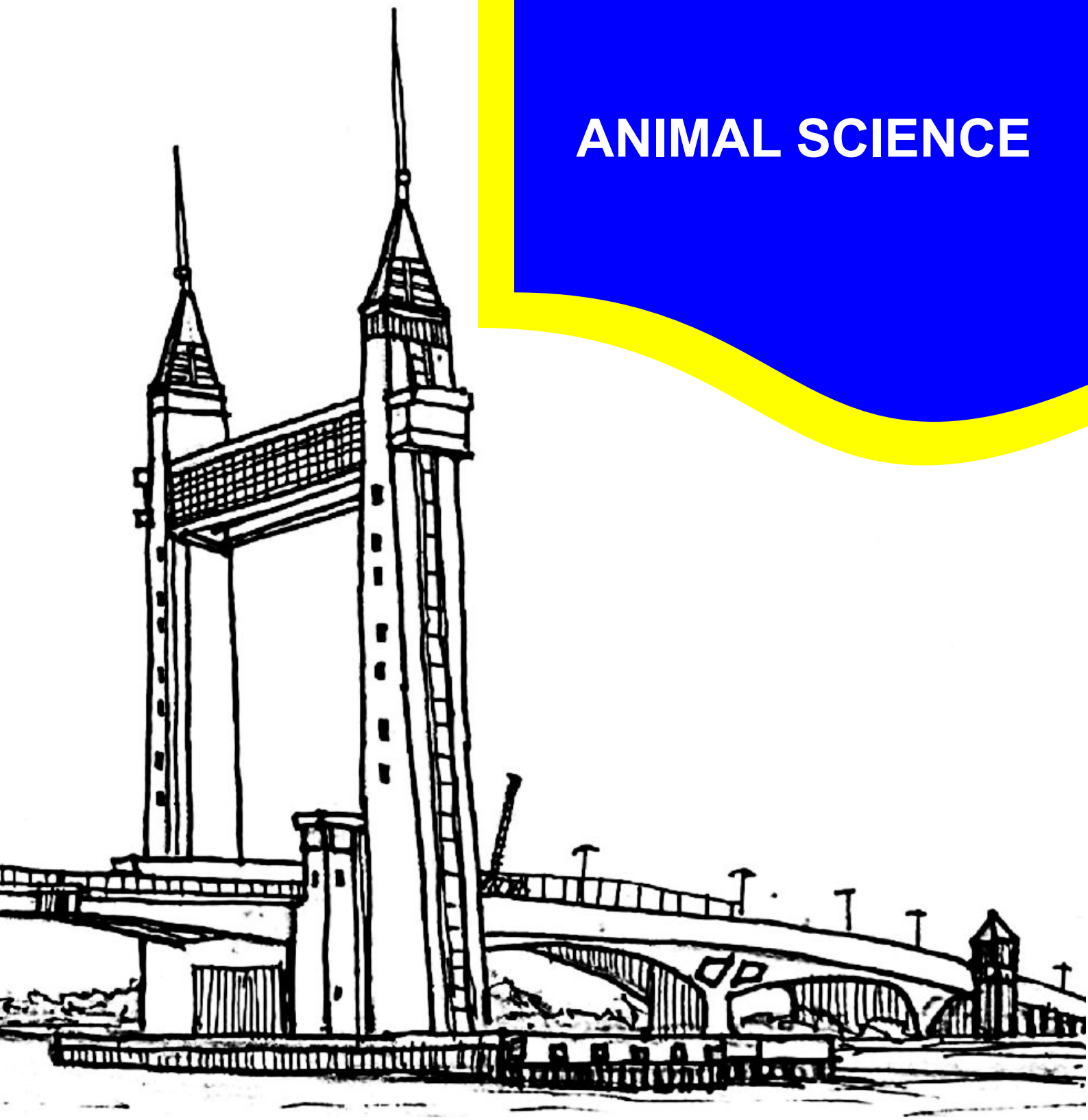
ABSTRACT

The restoration efforts in FRIM was long initiated back in the 1920s made it is now known as man-made forest. Out of 55 identified field area in FRIM, 53 fields are plantation area with the initial year tree planting was started as early as in year 1927 and continued to other fields that developed old and young recovered primary forest. In order to sustain the conservation's effort, the institute was declared as a National Heritage in 2012 and currently in the process of pursuing the title of UNESCO World Heritage Sites. For this conservation to be translated in monetary value that reflects the richness of this natural treasure, the estimation of stumpage value of these old and young recovered primary forest is calculated. This paper will highlight the composition of trees according to family, species, diameter and tree volume in both recovered primary forest. The economic valuation of timber resources will be estimated for four fields that represent both old; field 11 and 20 and young recovered primary forest; field 52 and 53 using residual value technique. This comparison study is made to justify the importance of reforestation of a degraded area. Results showed the estimated stumpage value for old recovered primary forest that aged between 72 (field 20) to 93 years old (field 11) is higher than the value of other Malaysia forest reserves even though they are recovered forest. Estimated stumpage value in young recovered forest as expected in this study is much lower and they are aged between 11 to 23 years old. For this young recovered forest to be as rich as field 11 and 20, the area should be open for more plantation and increase the number of trees planted.

Keywords: Man-made forest, old forest, young forest, stumpage valuation, ecosystem services

POSTER PRESENTERS

ANIMAL SCIENCE



ID: AN-EP-40 MPEER
Category: Animal Science

Effects of Different Equilibration and Freezing Time on the Quality of Post-thawed Katjang x Boer Semen

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ABSTRACT

Several steps involved during the processing of frozen semen such as diluting, cooling, freezing, and thawing of semen and each step can contribute to sperm damages. The aim of this study is to determine the effects of different equilibration and freezing time on the quality of Katjang x Boer semen. Fresh semen from 3 bucks was collected using an artificial vagina. Fresh semen with 70% motility or more was processed for freezing and each buck was repeated four times. Fresh semen was diluted using Tris-egg yolk extender into a final concentration of 100x106 sperm/ml and was aliquot into labelled 0.25 ml straws. Samples were kept in a pharmaceutical refrigerator to be equilibrated at 4°C for 3 or 4 hr and were placed at 4 cm above the surface of the liquid nitrogen in a polystyrene box. Samples were vapoured (-120°C) at the freezing time (FT) of 3, 6, or 9 min before plunged into liquid nitrogen (-196°C). Post-thawed semen was evaluated after being thawed in a water bath at 37°C for 3 secs and were analysed for sperm motility (TM, PM) and motion kinetics (VAP, VSL, and VCL) using CEROS. Results showed no interactions ($p>0.05$) between ET and FT. However, ET at 4 hr had significantly higher ($p<0.05$) sperm motility (TM: 60.0%, PM: 18.8%) and motion kinetics (VAP: 63.0 µm/s, VSL: 50.8 µm/s, and VCL: 98.3 µm/s) compared to at 3 hr (47.9%, 10.6%, and 57.9, 46.9, 89.3 µm/s respectively). Meanwhile, various times of FT showed no significant difference ($p>0.05$) in all parameters. Therefore, this concludes that the equilibration of 4 hr showed the optimal result in the cooling process of Katjang x Boer buck semen and further study is needed at the time of freezing and related factors such as the type of cryoprotectants used to further improve the quality of post-thawed semen Katjang x Boer buck.

Keywords: Buck, equilibration time, freezing time, motion kinetics, sperm motility

ID: AN-EP-48 XMKVE
Category: Animal Science

Effect of Different Harvesting Age on Fiber Content of Grain Corn Silage

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ABSTRACT

In livestock production, feed production is a major cost and this situation will be more intricate due to the increase price of imported raw materials such as corn and soybeans. Green feed resources or forage is the most readily available and low-cost fibre for ruminant farming. In 2018, grain corn is categorized as Malaysia's new source of wealth in terms of grain corn production and it can also be categorized as a source of ruminant alternative fibrous feed. Therefore, studies on the grain corn plant were conducted to evaluate the potential of grain corn plant at different harvesting age to produce silage for feed production for ruminants. Grain corn forage was planted and were harvested at different time 80, 90 and 110 days. The whole grain corn plant was chopped using the mechanical machine and packed in 5 kg plastic bags to be ensilaged for 35 days. Silage samples were dried in the oven and were ground before carried out proximate analysis. Findings showed that grain corn plant silage harvested at 110 days had significantly lower ($p<0.05$) in neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent lignin (ADL), hemicellulose and cellulose. From the results, grain corn silage at different harvesting time will influences the fibre content. The late harvesting plant silage showed decreases on NDF, ADL, hemicellulose and cellulose. As a conclusion, grain corn silage at different harvesting time can be used as ruminant feed sources with specific division such as for maintenance group or for growing stage ruminant groups.

Keywords: Grain corn, alternative source, harvesting age, silage, proximate analysis

ID: AN-EP-50 UMJLM
Category: Animal Science

Pest Control in Edible Bird Nest Swiftlets (*Aerodramus fuciphagus*) Houses in Terengganu, Malaysia

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ABSTRACT

Majority of edible bird nest (EBN) swiftlet ranching industry entrepreneurs suffered losses due to lack of information regarding pest control in swiftlet house. This study identify pest in swiftlet house and to determine pest control in swiftlet house in coastal, rural and urban area in Terengganu. This study was conducted from October 2019 until October 2020 and sampling was conducted in 30 differents swiftlet house (10 in coastal, 10 in rural and 10 in urban area) in Terengganu by round inside and outside of swiftlet house for each floor to observe and record pest of swiftlet. Traps were used to catch pest that disturb upon the swiftlets, with nest, swiftlet chicks and adults observed visually from time to time in order to identify the pest that disturb on swiftlets and the different life stages of swiftlets. Results showed that ant made up the highest percentage of pest in swiftlet house (49%), followed by house gecko (33%), rat (10%) and cockroach (8%). Rural area showed the highest percentage regarding location of pest disturbance in swiftlet house (37.3%), followed by urban and coastal area with percentage of 34.1% and 28.6% respectively. There is no significant correlation among pest disturbance in swiftlet house with location area. Pest control in swiftlet house were the success factors to ensure high swiftlet population which in term contributes to higher nest production.

Keywords: Pest control, Edible bird nest swiftlet, Nest production

ID: AN-EP-63 MYBNZ
Category: Animal Science

Comparative Efficacy of Estrus Synchronization Between Modified Herbs and CIDR in Cattle

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ABSTRACT

Estrous synchronization in cattle involved managing females' estrous cycle enabling breeding at a specific time. The estrous cycle in cattle is 21-days and can be adjusted by following an effective estrous synchronization protocol. Control Internal Drug Release (CIDR) is commercially practiced to obtain estrous in a female. However, CIDR is costly and requires a skilled technician to avoid abortion. Plus, CIDR may increase the risk of vaginal infection which creates an ascending infection to the uterus, causing endometritis-pyometra. Therefore, the utilization of modified herbs as an alternative can be used in estrous synchronization. MH derived from plants proved to be cost-effective and safe. MH consisted of beneficial nutritional values. The objectives of the study were (1) to observe the primary and secondary estrous in cattle derived from modified herb treatment and (2) to compare the effectiveness of CIDR and modified herb in cattle estrous synchronization. A total of six cattle were divided randomly into two groups, (A) CIDR group (n=3); (B) MH group (n=3). Estrous signs were recorded at 0700, 0900, 1100, 1300, 1500, 1700, 1900, 2100 for a duration of 45 minutes. The observation was conducted after CIDR withdrawal (n=7 days) and three days continuous given modified herbs respectively. Animals were showed signs of estrous underwent artificial insemination followed by pregnancy diagnosis with Test Kit PregnaDrop (day 35 to 40 of gestation). The primary estrous signs of restlessness in MH (2.4) showed significantly higher ($P<0.05$) than CIDR (0.3). Other primary sign of estrous such as sniffs the vulva of others cows, rest her chin on the back of others and mounting showed no significant differences. The secondary sign which vulva swelling and mucous discharge showed 100% (n=6) for both treatments. The outcome of this study proves that herbs are an alternative tool in estrous synchronization.

Keywords: Estrous synchronization, Control Internal Drug Release (CIDR), modified herbs(MH), artificial insemination, pregnancy diagnosis

ID: AN-EP-64 CGCUA
Category: Animal Science

The Effects of Hay Feeding on Body Condition Score among Stabled Horses (*Equus ferus caballus*) in Malaysia

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ABSTRACT

Horse industry in Malaysia have been introduced since 19th century as transportation and sports. Thoroughbred, Pony and Arabian breed of horses are the most common in Malaysia for physical performance in leisure riding, equestrian sport, polo, endurance and patrolling. Light work horses require lower feed demands compared to heavy work horses. Hay feeding practices among horse stable in Malaysia was reported to consume 1 kg of roughage dry matter per 100 kg from the body weight (BW). Horses took longer time to digest forages compared to hay. Thus, the aim of this study was to identify the effects of hay feeding on growth performance of horses among horse stable in Malaysia. A total of 27 horses in good physical condition aged 2~8 years were used in the study. Horses were feed with two different type of feed (hay and concentrate) based on horse owners feeding regimes. The horses were fed 2, 3 and 4 times a day. Body condition score (BCS) of horses were rated by using Henneke's scale from 1 to 9 base on six body areas (neck, withers, shoulders, ribs, loin and tail head. The body weight (BW) were measured and calculated to achieve objective of this study. One-way ANOVA and t-test were carried to analyse the data (BCS, BW, number of feeing time and amount of hay) a day. There was significant difference ($p<0.05$) between BW (311.78±19.87) and gender of horses. However, results showed that no significant differences ($p\geq0.05$) in amount of hay a day with BCS, frequency feeding time with BCS, and correlation between amounts of hay given a day with growth performance. In conclusion, the amount of hay given for equine feeding regime were not influence the horse growth performance among stable in Malaysia.

Keywords: Equine, hay, feeding practices, body condition score, animal welfare

ID: AN-EP-143 AABDR
Category: Animal Science

Effect of Karas (*Aquilaria malaccensis*) on Male Reproductive System in Adult Sprague Dawley Rats

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ABSTRACT

Aquilaria malaccensis has been consumed by people of many cultures as traditional medicine to treat various kinds of diseases such as diabetes, arthritis, asthma, and gout. Recently, this plant was found to be beneficial in the pharmaceutical field as it contains high anti-oxidant and free radical scavenging properties. However, information on its effect on male fertility and reproductive organs is very scarce. Therefore, this study was conducted to determine the effect of karas on male reproductive organ weight (testis, epididymis, prostate gland, and seminal vesicle) and sperm parameter (sperm count, sperm morphology, and sperm motility) in adult rats. In this study, 24 male rats were allocated into four groups (n=6/group), which consist of control and treated groups. The control rats were administered with 1 ml of distilled water, meanwhile for the treated groups were administered at 1g/kg body weight, 2g/kg body weight and 3g/kg body weight of karas diluted in distilled water by oral gavage once daily for 28 days. The rats were euthanized on Day 29 for assessment on reproductive organs weight and sperm parameter. From the result, the mean weight of testis, epididymis, prostate gland, seminal vesicle, and sperm motility did not differ between control and treated groups ($p>0.05$). A significant increase of sperm number ($p<0.05$) and a decrease in percentage of the abnormal sperm ($p<0.05$) were seen in the treated group at dose 1g/kg body weight compared to the control group. However, when the dose was increased, the number of sperm became lower and the percentage of abnormal sperm became higher. In conclusion, karas has positive and negative effects on male reproductive system. This study suggests 1g/kg body weight is an effective dose for karas.

Keywords: *Aquilaria malaccensis*, male reproductive system, sperm parameter

ID: AN-EP-144 DNQBA
Category: Animal Science

Acute Oral Toxicity Study of *Aquilaria malaccensis* Leaves Aqueous Extract on, Physical and Behavioural Evaluation, Body Weight Changes, and Organs Weight of Adult Female Sprague Dawley Rats.

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ABSTRACT

Despite the usage of *Aquilaria malaccensis* plants as a raw constituent for making herbal drinks and traditional remedies, the plant is also known to have a variety of benefits, such as an analgesic, antioxidant and anti-cancer properties. It was deemed to provide benefits to human health. Although it widely used, the scientific evidence on the safety and potentially adverse effect of the leaves is still lacking. To date, the reliable clarification from previous studies on the potential toxicity of *Aquilaria malaccensis* leaves is still insufficient to be classified as safe to be consumed at a certain level of consumption. Therefore, this acute study will emphasize the effects of the consumption on physical parameters, body weight, and organs weight of rats. 24 adult females were chosen randomly and singly-caged into four groups of six, comprised of one control group and three treatment groups. 1 ml of distilled water administered to rats in the control group. A single dose of the extract is diluted with distilled water and administered using oral gavage at a dosage of 1g, 2g, and 3g/kg of body weight. The physical and behavioural examination was done within a critical period of 4 hours post-administration, followed by 24 hours and daily observation until day 15. No atypical behaviour and mortality were recorded within the treatment period. Aside from the statistically significant escalation of ovary weight, there was no significant difference observed on the weight of other selected organs and body weight changes. Thus, this study proposed that the maximum dose of *Aquilaria malaccensis* at 3g/kg body weight has exerted no hazardous consequences on the rats. Besides, it has a beneficial effect as the enlargement of the ovary might provide better outcomes on female reproduction.

Keywords: Acute, Oral toxicity, *Aquilaria malaccensis,* Gaharu.

ID: AN-EP-162 WRLTC
Category: Animal Science

Knowledge, Attitude and Practices (KAP) Analysis Towards Antimicrobial Resistance Among Animal Handlers in Peninsular Malaysia

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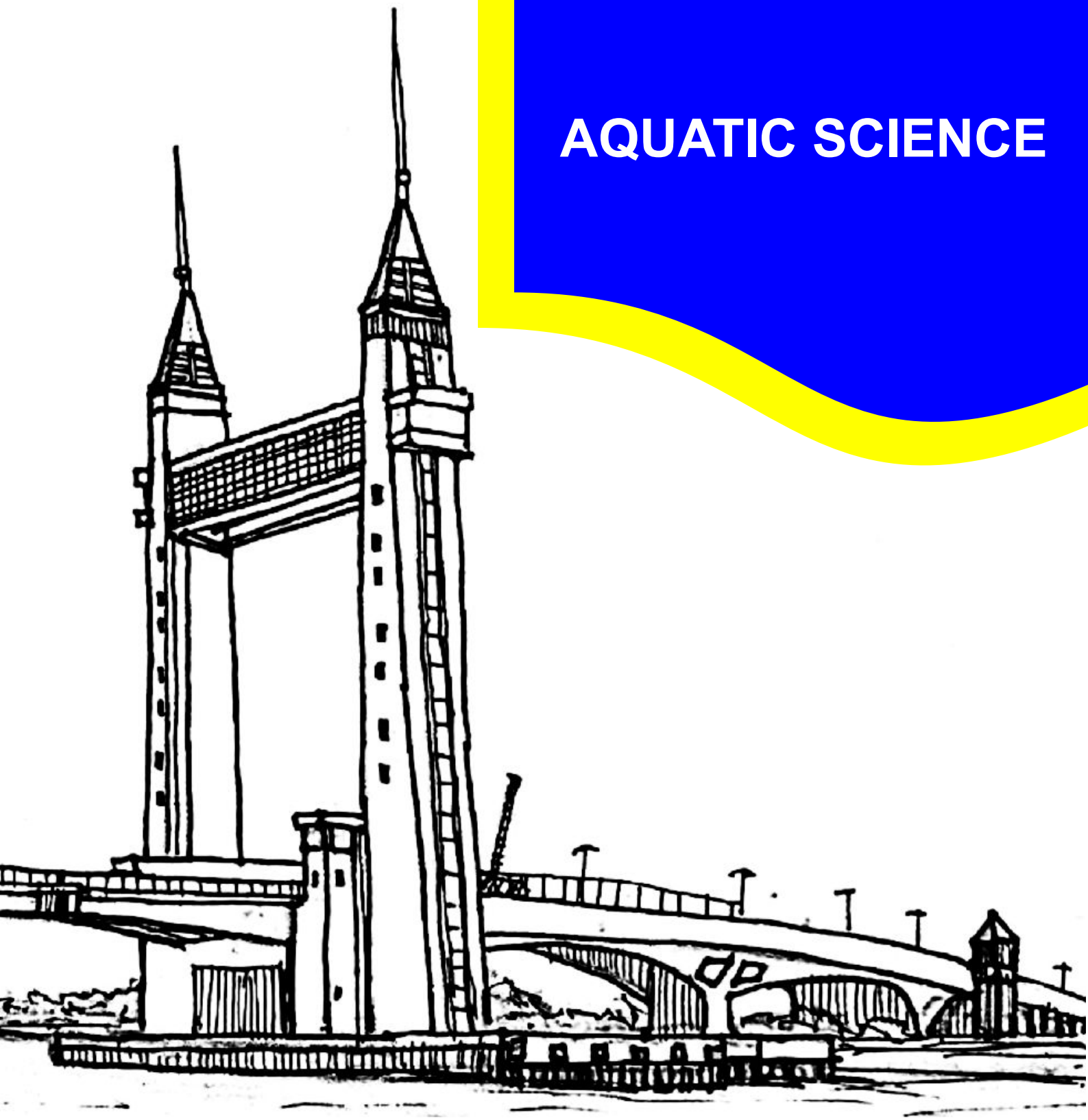
ABSTRACT

The emergence of zoonotic bacteria strain with antimicrobial resistance (AMR) trait such as methicillin-resistant *S. aureus* in human and animals is a global health concerns. The collaborative effort of promoting responsible antibiotics usage under One Health concept has been shown able to reduce the unregulated usage of antibiotics that could leads to the emergence of AMR. In Malaysia, research that study on KAP of AMR among animal handlers is limited. This cross-sectional study was conducted to determine and compare the knowledge, attitude and practices towards AMR among animal handlers. A total of 349 animal handlers from Peninsular Malaysia were recruited in this study, where the respondents were required to answer a questionnaire consisting of four different sections: demographics, knowledge, attitude and practices towards AMR. The results are presented in percentages with the parameter to categorize the level of awareness been set at high (>50%), moderate (25 % - 50%) and low (<25%). Out of 349 respondents, 188 (53.9%) were university graduates and 187 (53.6%) of respondents were male. Data collected from KAP analysis revealed that the respondents were moderately aware on AMR related issues. 28.4% (99/349) of the respondent aware of MRSA threats while the other 24.4% or 85 of the respondents were familiar regarding the development and transmission of AMR microorganisms. Furthermore, 35.8% (125/349) of the respondents were aware on the One Health concept. Majority of the respondents (90%) that were aware on AMR, MRSA and the One Health concept were university graduates. These findings demonstrated that there is a huge knowledge gap between university graduate with non-university graduate in regards to the danger of AMR and the important of One Health concept.

Keywords: KAP analysis Antimicrobial resistance; Methicillin-resistant *Staphylococcus aureus*; Animal handlers; One Health

POSTER PRESENTERS

AQUATIC SCIENCE



ID: AQ-EP-09 NURXY
Category: Aquatic Science

Population Dynamics and Reproductive Biology of *Sardinella fimbriata* within Lawas Waters Sarawak

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ABSTRACT

Fisheries in the Lawas waters has been one of the most important area of fishing activity for the traditional fishermen. It has become a renowned fishing spot for the fringe scale sardine, *Sardinella fimbriata*. This study aims to analyse the growth parameters and spawning season of *S. fimbriata*. The study was conducted from 2017 until 2019, which operated by using a mini purse-seine. The length-weight relationship was estimated using FiSAT program. The length-weight relationship was given by $W = 0.07663\ L^{2.1028}$, $r^2 = 0.71$. The asymptotic length (L_∞) was estimated at 15.61 cm with the growth co-efficient (K) was 0.97 yr^{-1}. The total mortality (Z) was estimated at 3.23 yr^{-1}, natural mortality (M) was 2.17 yr^{-1} and fishing mortality (F) was 1.06 yr^{-1}. The exploitation rate was 0.33, indicating a sustainable exploitation. Ovary examination was conducted to determine the maturity and spawning season of *S. fimbriata*. The females reached first sexual maturity at a size of 10.40 cm total length. The spawning months were occurred from February until July with two major peaks in March and July. The results of this study showed that there is unnecessary to warn for any intervention, in which the effort could be increased reasonably to enhance the landings of *S. fimbriata* and the economy of the traditional fishermen of Lawas.

Keywords: *Sardinella fimbriata*, Lawas, FiSAT, ovary examination, management

ID: AQ-P-13 GWVNL
Category: Aquatic Science

Effect of Substrate on Growth, Survival and Moulting in Juvenile Red Claw, *Cherax quadricarinatus*

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ABSTRACT

The experiment was conducted to determine the effects of different substrate on the survival, growth and total number of moulting in juvenile red claw, *Cherax quadricarinatus* for aquaculture purposes. In the present study, there is a problem in culturing juvenile stage of *C. quadricarinatus* especially for survival and growth. Thus, a substrate was used to improve the survival and growth of *C. quadricarinatus* especially for the intensive system due *C. quadricarinatus* need a large space to survive. *C quadricarinatus* with initial body weight from 1.10 to 2.90 g, total length 2.82 to 4.36 cm were placed in tanks (80 L in volume capacity) with 55L in water and there are eight juveniles in each tank. Treatment tanks were introduced with coral as treatment 2 and pipe as treatment 3. While, tank without shelters was set as control (treatment 1). Black nets were installed on top of each for circumventing foreign objects enter the tank and protect from direct sunlight. Besides, *C. quadricarinatus* were acclimatized for seven days before started the experiment. The experiment was done in duplicate and conducted for 60 days and *C. quadricarinatus* were fed twice daily (morning and evening) based on 5% of body weight. From the total of two replications, *C. quadricarinatus* for treatment 2 (coral) were significantly in survival (81.25±8.84%), weight gain (347.36 ±6.04%), specific growth rate (2.50±0.02%), carapace length (32.93 ± 0.93 %) and total number of moulting (55.00±2.93%) compared to other treatments. Besides, the control treatment (treatment 1) has a lower percentage in survival (37.50±8.84%) weight gain (122.60±20.51%) specific growth rate (1.33±0.15%), carapace length (25.84±0.33 %) and total number of molting (29.00±0.71%). As a conclusion, usage of coral as the substrate in the rearing tank showed improvement in survival, weight gain, specific growth rate, carapace length and total number of molting in *C. quadricarinatus*. The coral can use in rearing tank for increase the growth and survival for a small scale and not for commercial. In addition, in the environmental aspect, the present study showed the benefit of replacing the use of PVC pipes with the natural structure of dead coral.

Keywords: *Cherax quadricarinatus*, red claw, substrate, survival, growth, moulting

ID: AQ-EP-98 AQXBH
Category: Aquatic Science

Isolation and Identification of Multiple Antibiotic Resistant Bacteria from Shrimp Aquaculture Ponds in Terengganu and Their Survival Under Environmental Stresses

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ABSTRACT

The administration of antibiotics in *Litopenaeus vannamei* (white shrimp) farm is widely used to increase growth and improve the feed efficiency for maximising the profit. The study was conducted to isolate and identify the occurrence of multiple antibiotic resistance (MAR) in two different district locations of shrimp farms in Terengganu. Different selective media were used to isolate various bacteria such as *Vibrio* spp., *Escherichia coli, Staphylococcus* spp., Enterobacteriaceae, *Pseudomonas* spp., Yeast and Mould from fresh raw shrimps collected at aquaculture pond. In this study, 44 isolates of presumptive bacteria were further identified using appropriate biochemical tests, API 20E and API Staph. The identified bacteria isolates were tested for their antibiotic resistance against different antibiotics (oxytetracycline, enrofloxacin, ciprofloxacin, florfenicol, sarafloxacin, gentamycin, tetracycline, kanamycin, chloramphenicol and penicillin) using the disk diffusion method. The multiple antibiotic resistant (MAR) index were determined for each isolated bacteria. Results showed that most of the isolated bacteria were resistant towards penicillin and susceptible towards ciprofloxacin. Then, the optical density of MAR bacteria were monitored at 600 nm using spectrophotometer in order to evaluate their tolerance to different temperatures (37, 40, 50 and 60ºC) and pH (2, 4, 7 and 11). Their survival under environmental stresses were compared with the control. This study is important to monitor the antibiotic resistant patterns and widespread of MAR in shrimp aquaculture in Terengganu. Future study is needed to control the developing and spreading of MAR in our food chain.

Keywords: white shrimp, environmental stress, multiple antibiotic resistant bacteria, shrimp, food chain

ID: AQ-EP-99 FWGCE
Category: Aquatic Science

Polyunsaturated Fatty Acids Composition of the Sea Urchin Gonads

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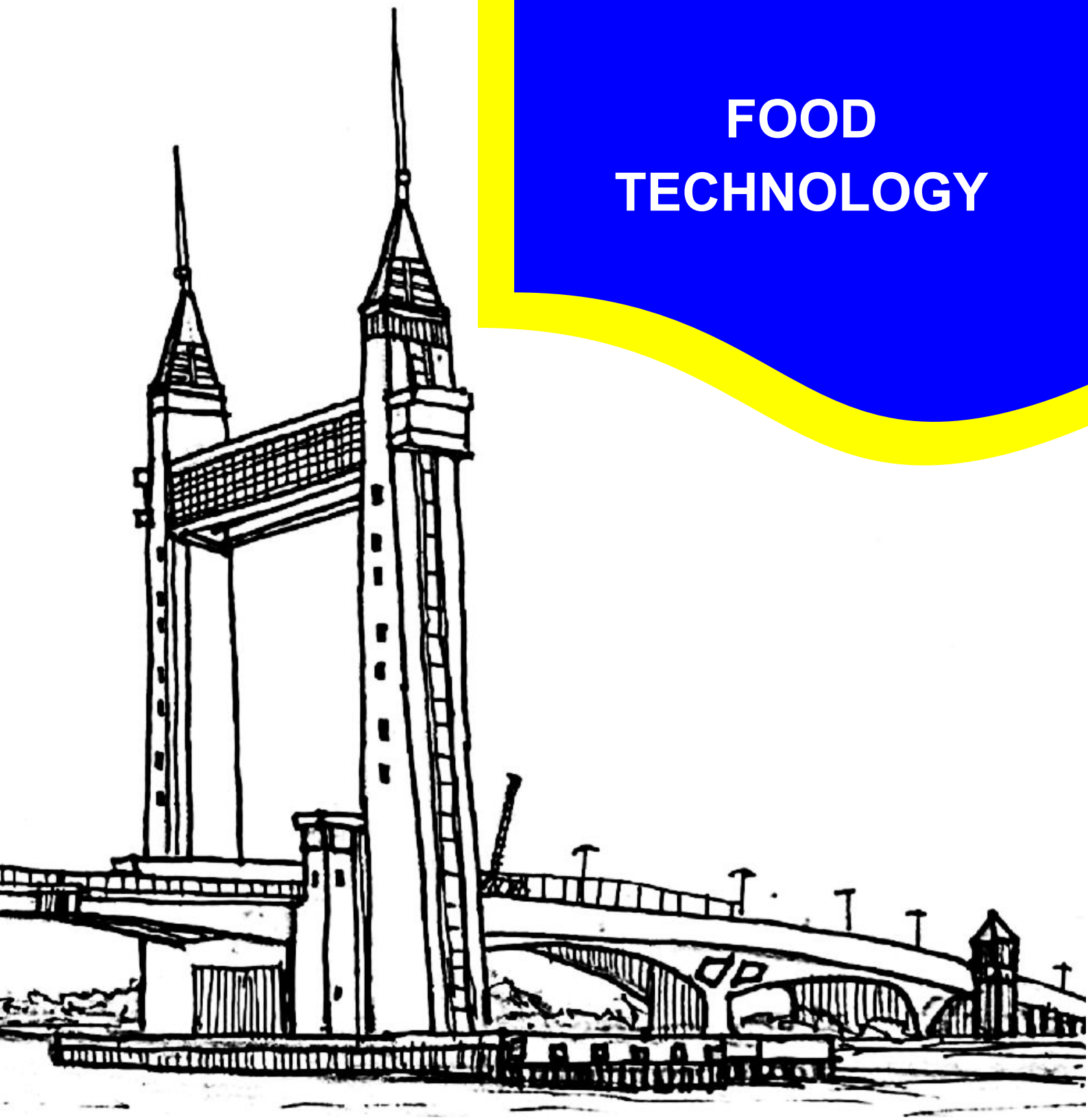
ABSTRACT

Nutritive phagocytes in sea urchin gonads store protein, lipid, and carbohydrates for use during gametes production. The potential for the gonads of local sea urchin to be used as a polyunsaturated fatty acids source is not yet explored. The study of lipid content and the composition of fatty acids in the gonad of the sea urchin *Diadema setosum* and *Salmacis sphaeroides* from coastal waters of Pulau Hujung, Mersing and Tanjung Adang, Johor has been carried out. This study's objectives were to identify the lipid content and the composition of fatty acids in the gonad of both species. The lipid is extracted using chloroform/methanol solution (2:1) by following the Folch extraction method, then undergoes the esterification process by using the FAME method before identifying the composition of fatty acids using the GC-FID. Lipid content (lipid ratio/gonad dry weight ratio) was found to be the highest in *S. sphaeroides* (0.20 g/g) gonads than *D. setosum* (0.14 g/g). The major unsaturated fatty acids were C16:1 and C18:3. The content of n-6 fatty acid was higher in the gonads of both species, followed by n-9 fatty acid and n-3 fatty acids. The content of n-6 fatty acids found in *D. setosum* (28.48%) was higher than *S. sphaeroides* (6.61%). The sea urchin's polyunsaturated fatty acid composition depends on the species, their habitats, and probably food preferences. With this data, sea urchin gonad can be used as an alternative source of polyunsaturated fatty acids.

Keywords: Lipids, Fatty acids, Polyunsaturated, Omega 3, Omega 6

POSTER PRESENTERS

FOOD TECHNOLOGY



ID: FT-EP-73 KKAXY
Category: Food Technology

Characteristic Properties of the Lab-produced Sweet Potato Starch of VitAto Variety

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ABSTRACT

A Malaysian variety of sweet potato named VitAto was introduced more than ten years ago and claimed to have superior qualities compared to the other local varieties. However, its properties, particularly in the starch form are seldomly reported. Hence, this study aims to characterize the physico-chemical properties of the lab-produced local sweet potato starch of VitAto variety. The proximate composition and powder properties of the VitAto starch were determined and compared with two other commercial sweet potato starch. The findings in this study exhibit that the lab produced VitAto starch has a yield of 6.8%. Besides, it has a higher protein (0.365g/100g) and total fat (0.125g/100g) compared to the commercial counterparts, indicating its potentials to be used in bakery products. The VitAto starch has an average particle size of 12.545 um with an acidic pH of 4.0 - 4.4. The starch has high specific surface area granules, which suggest its suitability for snack food products. In the flowability analysis, VitAto starch was categorized as an easy flowing and stable powder. It was also low in bulk density, but high in the water absorption index, which reflects that the starch might be prone to caking. Hence, a proper packaging system and a low moisture content condition during storage and processing are required. Nevertheless, the findings in this study provide evidence that VitAto starch has all qualities at the same par as its commercial counterparts.

Keywords: Sweet potato, VitAto, properties, proximate analysis, powder analysis

ID: FT-EP-108 ZXLDR
Category: Food Technology

Listeria monocytogenes Contamination in Chicken Offal at Wet Market and Supermarket

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ABSTRACT

Listeria monocytogenes is a foodborne pathogen that cause serious illness in vulnerable individuals such as infant, pregnant woman, elderly and immunocompromised patient. This study aimed to determine the prevalence of *L. monocytogenes* in chicken offal samples between wet market and supermarket. A total of 428 chicken offal samples (chicken gizzard=154, heart=131, liver=143) from wet markets and supermarkets in Klang Valley, Malaysia were examined using multiplex polymerase chain reaction (PCR) assay and conventional plating method. Both PCR assay and plating method are equally reliable in detecting the presence of *L. monocytogenes* in chicken offal. The prevalence of *Listeria* spp. and *L. monocytogenes* from total samples was 8.9% and 6.5%, respectively. *L. monocytogenes* in chicken offal was found gizzard, liver, and heart at 10.4%, 7.0%, and 1.5%, respectively. *L. monocytogenes* contamination in samples from supermarkets was significantly higher than those in wet markets which might due to the pathogen psychrophilic characteristic. It can be concluded that refrigerated samples have higher prevalence of *L. monocytogenes* contamination.

Keywords: *Listeria monocytogenes*, chicken offal, prevalence, wet market, supermarket

ID: FT-EP-128 PEHXQ
Category: Food Sciences

Antioxidant Activity and Total Phenolic Content in Immature and Undersized Mature Rock Melon (*Cucumis melo* L.) Peel, Seed and Flesh powder

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ABSTRACT

Cucumis melo L. has high demand in certain areas of Malaysia for its best quality, however these fruits have become waste whereby certain fruits are discarded at immature or mature undersized stages. The present study was conducted to determine the antioxidant activity and TPC of immature and undersized mature *Cucumis melo* L. powder of the peel, flesh and seed parts. Total phenolic compound and antioxidant activity in the undersized mature peel powder was significantly higher than immature peel powder which is TPC (4012.00 mg GAE/100g), DPPH (83.09% inhibition), and ABTS (64.27% inhibition). For the seed, the undersized mature seed powder shows higher TPC and antioxidant activity than immature seed powder where the TPC (1007.60 mg GAE/100g), DPPH (45.94 % inhibition), and ABTS (38.20% inhibition). Flesh of immature rock melon powder had significantly higher TPC and antioxidant activity than undersized mature flesh powder where the immature flesh powder has TPC (1114.40 mg GAE/ 100g), DPPH (42.34%) and ABTS (36.20%). The mature peel, seed and immature flesh powder of *Cucumis melo* L. has potential to be good source of natural antioxidant compounds to be used in food and pharmaceutical industry.

Keywords: *Antioxidant, Cucumis melo* L.*,* mature, immature, peel, seed, flesh.

ID: FT-O-138 YWBBH
Category: Food Science & Technology

Comparison of Phytochemicals, Antioxidant and Antibacterial Activities of Red (*Hylocerues polyrhizus*) and White (*Hylocereus undatus*) Dragon Fruits

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ABSTRACT

Dragon fruit belongs to the genus *Hylocereus* of the Cactaceae family. There are two species that are commonly cultivated; the red (*Hylocerues polyrhizus*) and the white (*Hylocereus undatus*) dragon fruits that have the same red skin but different flesh colours, red and white respectively. Although from the same genus, the phytochemical contents and bioactivities of both fruits may not be the same. This study aims to compare the phytochemical contents, antioxidant and antibacterial activities of *H. polyrhizus* and *H. undatus* to help consumers better choose nutritional fruits and to explore potential natural preservatives. The fruit samples were extracted using 50% ethanol and later were subjected to phytochemical, antioxidant and antibacterial assays. The phytochemical contents were determined using Folin Ciolcalteu and aluminium chloride methods for total phenolic and total flavonoid respectively. The antioxidant activity was determined using diphenyl-picryl hydrazine (DPPH) and 2,2-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) assays. Disk diffusion method was performed to evaluate antibacterial activities against two food-borne pathogens, *Escherichia coli* and *Staphylococcus aureus*. *H. polyrhizus* showed to contain significantly higher phenolic content ($p<0.05$), while *H. undatus* had significantly higher flavonoid content ($p<0.05$). Comparison of antioxidant activities in both fruit samples indicated higher activities were observed in *H. polyrhizus* and both fruit extracts showed inhibition zones against the tested bacteria with *H. polyrhizus* extract was able to inhibit at lower concentration. The results suggest that *H. polyrhizus* may have higher bioactivities compared to *H. undatus* due to the significantly higher phenolic content.

Keywords: *H. polyrhizus*, *H. undatus*, phytochemical, antioxidant, antibacterial

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Strategic Approaches on Traditional Foods Innovation: The Concept and Principles

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ABSTRACT

Malaysian traditional foods are known for their unique and diverse flavors. They represent our cultural background and have high potentials to be marketed worldwide. However, their potential values might be hindered due to the lacking of several factors such as low commercial aesthetic value, and small production scale. Hence, this study aims to introduce 4 principles, describing strategic approaches to increase the commercial values of Malaysian traditional food through innovative concepts. The innovative principles involve formula modification, integration of different products, processing improvement, and physical enhancement. The concept and examples of each innovative principle are discussed, to provide insight into their applications for the innovation of traditional foods with high commercial values. A set of rubrics was also developed to measure the extent of each principle application on any proposed innovated traditional food. The developed innovative principles in this study are expected to be such a guideline for any food producers and researchers involving in the food product development activities to enhance the commercial value of Malaysian traditional foods.

Keywords: Traditional foods, strategic approaches, innovation, product development

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Antibacterial Potential of Honey in Combination with *Nigella sativa* Oil Against *Streptococcus agalactiae*

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ABSTRACT

Mastitis is the most common cause for antibacterial use in lactating dairy cattle which affect the farmers economically. *Streptococcus agalactiae*, a highly contagious pathogen remains the significant cause of bovine mastitis. However, the use of subsequent antibiotics leads to antibiotic resistant in *S. agalactiae*. Therefore, studies on plants with antibacterial effects are underway as alternative. Honey and *Nigella sativa* oil (NSO) have been shown to have antibacterial effects due to the content of phenolics and thymoquinone. This study investigated the synergistic effect of honey with NSO against *S. agalactiae*. Antimicrobial activity of honey, NSO and mixture of both against *S. agalactiae* were determined at 25%, 50% and 100% (v/v) concentrations using agar well diffusion method. *S. agalactiae* showed varying degree of susceptibility to different concentration of honey, NSO and mixture of both. It was found that the antibacterial activity of all tested were concentration dependent. The diameter zone of inhibition ranged from (0.96 ± 0.17) to (2.14 ± 0.05) cm for honey, (0.2 ± 0.14) to (2.24 ± 0.11) cm for mixture of honey with NSO and (0.22 ± 0.18) to (0.88 ± 0.08) cm for NSO as compared with chloramphenicol (1.5 ± 0.07) cm. The lowest minimum inhibitory concentration (MIC) was exerted by the mixture of honey with NSO (3.13%), followed by honey (6.25%) and NSO (12.5%),. The bactericidal activities also showed that the combination mixture of honey with NSO was lower (3.13%) than that of honey (6.25%) and NSO (6.25%) alone. Lower MIC and bactericidal activity values exhibited by the mixture of honey with NSO indicate the potent antibacterial activity. This study revealed that the combination of honey with NSO has promising antibacterial effect against *S. agalactiae* and could be used as an alternative medicine by farmers in treating mastitis caused by *S. agalactiae* in dairy cattle.

Keywords: mastitis, *Streptococcus agalactiae*, honey, *Nigella sativa*, antibacteria

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Physical and Mechanical Properties of Anthocyanin Associated Purple Sweet Potato Starch Films

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ABSTRACT

In food packaging, biodegradable films based on natural resources has been greatly attracted the researchers due to environmental issues and consumer preferences. Sweet potato starch (SPS) is one of the most prominent raw materials and can be easily cast into films. The properties of SPS films can be improved by incorporating various additives into the film matrices. In this study, *Anggun* variety (purple-fleshed) SPS films were elaborated, associating purple sweet potato peel (SPP) together with the incorporation of commercial purple sweet potato anthocyanin (CA). Different proportions of CA (0%, 1%, 1.5% & 2% w/v) were added into the SPS and SPS/SPP (6:4 ratio) films to determine the physical and mechanical properties. The SPS/SPP films were thicker compared to the SPS films and the thickness increased with the increment of the added CA. The SPS films were brighter than the SPS/SPP films with the SPS film containing 1% CA possessed the highest brightness value and appeared to be light purple (L^* = 75.32, a^* = 8.688, b^* = 13.17). The SPS/SPP films with anthocyanin were burgundy in color. The addition of CA remarkably reduced the tensile strength (TS) and increased the elongation at break (Eab) of the films. SPS film with 2% and SPS/SPP films with 1% CA exhibited lowest TS (0.871 MPa and 0.747 MPa respectively), while the highest Eab was demonstrated by 1% CA loading for both SPS and SPA/SPP films. This finding signifies the improvement in the selected physical and mechanical properties of purple SPS films incorporated with CA. Although the SPS films were better than SPS/SPP films, 1% anthocyanin could be successfully implemented in the both films to be used in food packaging.

Keywords: Purple sweet potato starch, anthocyanin incorporation, film casting, physical properties, tensile strength

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Utilization of Vegetables and Tubers Flour in Development of Soft-Textured High Fibre Bar for Healthy Ageing

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ABSTRACT

Development of soft-textured high fibre bar was conducted to utilize the nutrients from vegetables and tubers, as a nutritious snack that easy to consume for the elderly to maintain their health. In a previous study, selected tubers namely sweet potato flour and tapioca flour were successfully substituting wheat flour in the formulation. In this study, the effect of incorporating vegetable flour at different percentage levels on fibre, protein, calcium, vitamin D3, texture and product acceptance of the biscuit were studied using Response Surface Methodology. Green spinach and pumpkin flour were chosen as independent variables (0-4% based on Baker's percent). The result showed that this product had high total dietary fibre (>6%) and source of protein (>5%). Statistical analyses of total dietary fibre, calcium content and vitamin D3 showed a significant ($p \leq 0.05$) increment when percentage level of green spinach flour increased, but protein value was not significantly ($p > 0.05$) affected by both green spinach and pumpkin flours. However, the higher level of green spinach flour used in the formulation was negatively ($p \leq 0.05$) affected the overall acceptability of the product due to the unpleasant taste and smell of the flour. Meanwhile, the texture would become softer and brittle when the percentage level of green spinach flour and pumpkin flour increased. This work demonstrated that the application of vegetables and tubers has the potential to be processed into flour and may replace wheat flour in bar preparation to enhance the nutritional quality of the product.

Keywords: Vegetables flour, tubers flour, soft-textured bar, nutritional quality, elderly

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