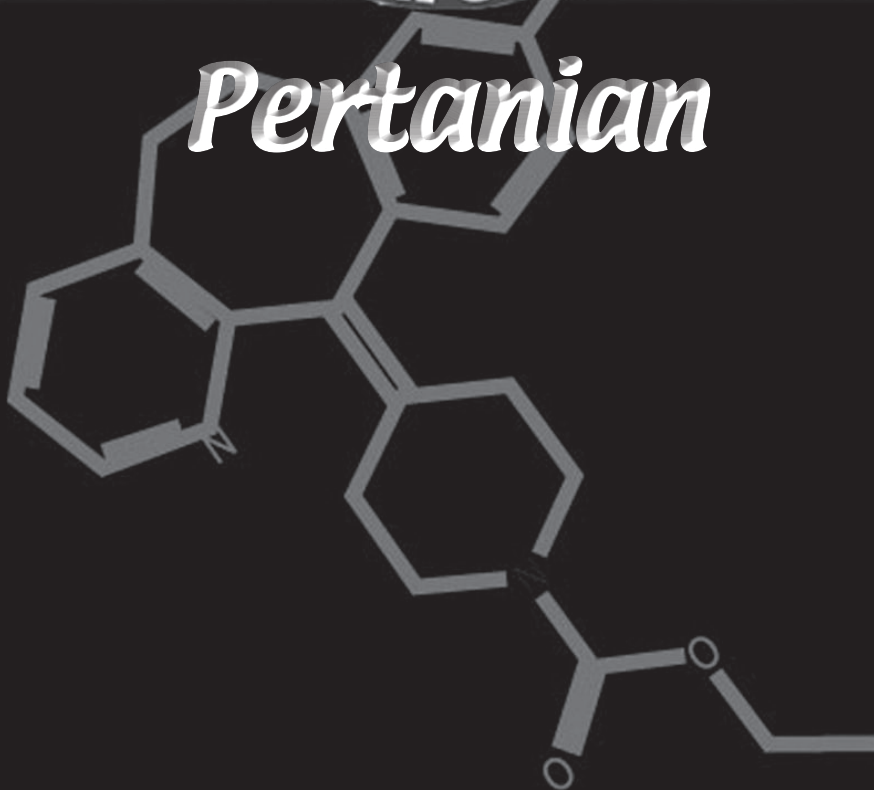




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Consumer Attitude and Perception Toward Purchasing of Marine Fish in Malaysia

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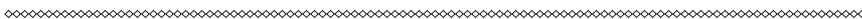
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ABSTRACT

This study analyses the frequency of fresh fish purchases and buying pattern through consumer survey in the Klang Valley, Malaysia. Seven hundred respondents were randomly interviewed with regard to their buying behaviour pattern, attitude and perception on fresh marine fish consumption. Logistic regression was used to analyze the effect of demographic and attitudinal characteristics on fresh fish purchasing behavior more than one time per week. Majority of the respondents state their preference of fish. The study reveals that taste and nutritive value of fish are factors that the consumers consider when making fish purchases. Thus the fish marketers should take advantage on the nutritive and medicinal value of fish as alternative to conventional medicine in preventing and curing of diseases. In regard to demographic factors such as household income, number of household and marital status, some kind of promotional afford should be made to encourage not only higher income bracket or consumer with a large number of household but also to those in lower income bracket. Thus price will play an important role in attracting more consumers to consume more fish or to purchase fish more frequently. It can be hypothesized that consumers are willing to pay more for fish, but if the price is too much higher in comparison to poultry, beef, mutton, and pork, consumers will find alternative to satisfy their needs and wants. In addition, housewife plays a major role in purchasing decision making of food items in the family. Education and awareness of the benefit of fish eating should be inculcated among the housewives in general. Increases in demand for fishery products not only benefit the marketers but also the fishermen as a whole. Thus the two prong policies to eradicate poverty and to increase income among the fishermen can be achieved as more people consume more fish.

Keywords: fresh fish, purchasing behaviour, logit, demographic, malaysian consumer, fish consumption



Polyunsaturated Fatty Acids Delay the Onset of Insulin Resistance

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ABSTRACT

Insulin resistance happens when the body cannot use insulin effectively. Insulin resistance is a common feature 10 – 20 years before the onset of diabetes and its complications. Therefore, delaying or prevention of insulin resistance represents a significant step in the prevention and control of insulin resistance-related disorders. The current study illustrated that it is possible to induce insulin resistance using “bad” fats, and subsequently to delay its onset in the rat model through the use of polyunsaturated fatty acids – the “good” fats. Generally, this approach worked as dietary fats progressively alter the lipid biomembrane characteristics and the signaling capacities of cells during glucose metabolism. Our team have successfully re-engineered the lipid biomembrane composition in animals using oil palm-based agriculture by-products to produce “healthy meat” for human consumption and in the rat model. Therefore, the current research is just an extended application of our earlier findings on the modification of cellular membrane compositions. The knowledge gained from this study will enable animal agriculturist to re-engineer dietary lipid content appropriately to prevent or delay the onset of insulin resistance in human populations. Signaling properties explored in the current research in also relevant in understanding the events and mechanisms of cancer cell pathologies. Through this research, the team has come up with an early concept of lipid prediction index for insulin resistance. This prediction index in itself is a major intellectual property and will represent a major milestone in diabetic and lipid research, as it is expected to play significant role in the dietary management and prevention of diabetes.

Keywords: fatty acids, insulin resistance, rats

N Fertigation by Sprinklers

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ABSTRACT

Manual fertilizer application in a field is non-uniform and causes large spatial variability. Fertilizer application together with irrigation water or Fertigation by sprinklers can provide a more uniform distribution. The impact of nitrogen fertigation through sprinklers on the spatial and temporal variability of soil properties was studied. This was to determine the relationships between fertigation distribution pattern and crop performance as well as field management strategy based on soil and crop spatial variability. The crop was sugar beet grown in the Fesaran village, east of Isfahan city, Iran. The response to the N fertilizer application by sprinklers was studied by analyzing 7 soil elements including N, P, K, CEC, OM, EC and pH as well as 6 crop properties including leaf N content, tuber sugar content, tuber moisture, tuber weight, tuber numbers and yield. N fertigation by sprinklers results in low variability of N leaf content (CV=10.3%) and tuber sugar content (CV=6.4%) through and across the study area. Low variability of soil N as well as leaf N content produces low variability in tuber sugar and yield. Higher sugar content of tubers was achieved compared to previous records of this field for average yield and tuber sugar content for the Isfahan area. Based on Pearson test results, it can be concluded that sugar beet only respond to N fertilizer during vegetative stage in this field and there was no significant effects of P and K on crop performance. Urea fertigation has direct impact on leaf N content, tuber numbers and indirectly on tuber sugar content. It indicates that sugar beet performance depends on factors other than P and K. Improved yield and tuber sugar content was obtained from N fertigation by sprinklers.

Keywords: precision farming, sprinkler irrigation, uniform distribution, crop performance



The Impact of External Shocks on Comparative Advantage of the Malaysian Food Processing Industry

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ABSTRACT

Scheduled liberalisation of trade preferences under the World Trade Organisation and the Asean Free Trade Area has heightened the challenges faced by the Malaysian food producers. To penetrate a wider range of markets, Malaysian food processors have to identify food sub-sectors that are internationally competitive. These sub-sectors should not only withstand internal shocks but also external shocks such as the financial crisis in 1997. This article examines the levels of benefit-cost ratios for various productions of food products to analyze the comparative advantages before and after the 1997 financial crisis. The competitiveness of the food processing industry in Malaysia was determined using the Domestic Resource Cost (DRC) method. Twenty food sectors were assessed using the Malaysian food production and trade data from 1985 to 2001. Processed foods with a high comparative advantage sustained after the crisis can be considered as viable to compete with foreign products in domestic and overseas markets. Meat products in import substitutions, palm oil, kernel oil, sago and tapioca, and cocoa in traditional exports and fish products in emerging exports are examples of food sub-sectors that are gaining competitiveness in the post crisis period.

Keywords: comparative advantage, food processing industry, benefit-cost ratios, domestic resource cost ratio

Agriculture Land Suitability Evaluation based on GIS and Multi Criteria

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ABSTRACT

There is a pressing need to develop an optimal land evaluation method to identify in which part of a region selected crops could be grown successfully. It is very important to build Agriculture Decision Support System based on land evaluation to match the requirement of the land use with the capability of the land, otherwise we may push production to levels beyond the ability of land to support it. The purpose of this study is to develop spatial agriculture decision support system based on land evaluation, Geographic Information System (GIS) and Multi Criteria (MC). The study also considers how to determine the weights of the parameters to be more accurate and objective rather than being subjective. This was based on Sensitivity Analysis. The FAO Framework was selected to conduct the land suitability assessment and modify to suit the local environmental conditions. The FAO framework is a set of guide lines rather than a classification system, and the model used builds upon this. The study area selected is the state of Terengganu in Malaysia. Fourteen land characteristics and their threshold values were determined and brought together in nine land qualities. Soil data and maps, flood potential area, erosion risk map, topographic map, and rainfall interpolation surface were prepared in order to create a land information system. A land information system was implemented. The land suitability model was constructed using GIS capabilities, and visual basic. The model shows how land suitability would change if land improvements were made or if other crops are introduced, the model have the flexibility to evaluate unlimited number of crops. This product will contribute in avoids subjectivity of weight, reducing wrongful and wasteful site selection for agricultural food production, which are then normally followed by an increase in inputs to make the land viable for planting a particular crop. In this respect unnecessary and wasteful application of inputs such as fertilizers and pesticides will be avoided.

Keywords: GIS, multi criteria, land evaluation, suitability, FAO



IBDqxReal Check an Improved Diagnostic Kit for Detection and Differentiation of Infectious Bursal Disease Virus Subtypes

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ABSTRACT

Infectious bursal disease (IBD) is an acute contagious viral disease of young chickens characterized by high morbidity and mortality. Based on antigenic variation and virulence, serotype I IBDV can be divided into several subtypes; attenuated vaccine, antigenic variant and very virulent strains. Although there are many diagnostic methods available in detecting and/or differentiating IBDV subtypes however most of the methods have several limitations. A duplex TaqMan based real-time reverse transcription-polymerase chain reaction (RT-PCR) assay for detection and differentiation of infectious bursal disease virus (IBDV) subtypes was developed. Primers and two specific probes have been designed; probe labeled with FAM was specific for very virulent IBDV detection, while probe labeled with HEX was specific for classical IBDV detection. Beta-actin probe was included and use as a house-keeping gene for normalisation. The primers and probes were carefully designed and optimized in duplex real-time PCR formats for detection and differentiation of IBDV subtypes with and without quantitation of viral load (submitted to Malaysian patent). The developed assays were optimized and vigorously evaluated using two reference IBDV strains, more than 20 previously characterized field and commercial IBDV vaccine strains, 140 bursal samples from experimentally infected SPF chickens and 37 suspected cases of infectious bursal disease obtained from commercial broiler farms through Peninsular Malaysia from 2004 to 2005. The specificity of the developed assay in detecting different IBDV strains was confirmed by sequence analysis of VP2 gene. In addition, the developed assay was more sensitive, rapid and cheaper than ***IBDReal check*** diagnostic kit which uses SYBR Green I based real-time PCR format.

Keywords: IBDV, duplex, TaqMan, real-time RT-PCR

A Sub-fraction from a Malaysia Herbal Plant (*Keladi Tikus*) Arresting Cancer Cells Proliferation through Programmed Cell Death in Leukemia

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ABSTRACT

The plant *Typhonium flagelliforme*, commonly known as 'rodent tuber' in Malaysia, is often used as health supplement and traditional remedy for alternative cancer therapies, including leukaemia. The aim of this study was to evaluate *in vitro* Anti leukemic activity of DCM/F7 fraction extracted from *Typhonium flagelliforme* tuber on CEMss cell line. The Dichloromethane extract of the tuber has been fractionated using column chromatography. The obtained fractions were evaluated for its cytotoxicity towards CEMss cells as well as Human PBL. Assessment of apoptosis produced by DCM/F7 fraction was evaluated using various microscopic techniques. Further confirmation of apoptosis was done by Tunel assay. Phytochemical screening was also done using GC-MS. Seven out of twelve fractions showed significant cytotoxicity against the selected cells line CEMss, in which 3 fractions namely, DCM/F7, DCM/F11 and DCM/F12 showed exceptional anti-cancer activities at 3, 5 and 6.2 µg/ml respectively. Further studies towards the non cancerous PBL exhibited significant selectivity of DCM/F7 compared to the other 2 fractions. Cytological observations showed chromatin condensation, cell shrinkage, abnormalities of cristae, membrane blebbing, cytoplasmic extrusions and formation of apoptotic bodies as confirmed collectively by double staining of AO/PI, SEM and TEM. In addition, DCM/F7 increases cellular DNA breaks on treated CEMss cells. GC-MS revealed that DCM/F7 contains Linoleic acid, hexadecanoic acid and 9-hexadecanoic acid. The current investigation showed that the DCM-7 fraction of *Typhonium flagelliforme* posses a promising antileukemic effect which was able to produce distinctive morphological features of cell death that corresponds to apoptosis.

Keywords: *typhonium flagelliforme*, leukemia, linoleic acid, apoptosis



Feeding Habits and Seasonal Variation in Diet of Fish Larvae (*Osteichthyes: Sparidae*) in the Sungai Pulai Seagrass Bed, Johore, Peninsular Malaysia

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ABSTRACT

Diet composition of most common fish larvae of family sparidae was studied in the Sungai Pulai seagrass bed of Gelang Patah south western part of Johor, Peninsular Malaysia from December 2007 to May 2008. Larvae were collected by subsurface towing of a bongo net. In situ hydrographic parameters were recorded during the sampling cruises. Stomachs were removed from a total of 80 sparidae specimens during the study period and the stomach contents were examined. Analyses of prey in the stomach showed 24 important food items belonging to 8 major groups: phytoplankton, zooplankton, algae, insects, plant like matter, decapod appendages, debris and unidentified matters. The predominant food items found in the stomach were phytoplankton (60.85%). This was followed by algae (11.73%), zooplankton (9.35%), plant matters (7.84%), debris (4.60%), insects (2.84%), unidentified matters (1.96%) and decapod appendages (0.82%). Habitat in situ temperatures were recorded at 26.92-30.83 °C (Mean ± SD, 28.60 ± 1.38); Dissolved oxygen ranged from 4.73 to 6.24 mgL⁻¹ (5.56 ± 0.53) and the salinity fluctuation was between 29.37 and 33.68 ppt (31.31 ± 1.68). Among the food items, phytoplankton was the first rank by Simple Resultant Index (60.85%) followed by algae (11.73%). Therefore it could be concluded that the fish larvae of family sparidae are mainly herbivorous.

Keywords: feeding habits, fish larvae, seagrass, Peninsular Malaysia

Ground-level Ozone: A Threat to Rice Crop in Muda Irrigation Area of Peninsular Malaysia

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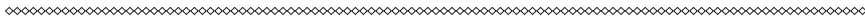
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ABSTRACT

It has been well-known that pollutant gases cause significant impacts on crops and forests in both developed and developing countries. Ground-level ozone (O_3) is recognized as the pollutant most likely to cause widespread crop damage. An AOT40 (Accumulative O_3 concentration above a threshold of 40 ppb) value causing 5% yield lost for all agricultural lost has been established as 3000 ppbh, which is applicable during daylight hours over a growing season (UN-ECE, 1996). In order to have a complete estimate of air pollution damage. In this study, data was gathered from tests in open-top chambers (OTCs), whereby for OTCs were fabricated; two of which were exposed to ambient air pollution (NF) of which ozone is the major perpetrator whilst the remaining were provided with clean air. The response of the popular local rice cultivar, MR-219 to current ambient air pollution of which O_3 is the overwhelming dominant pollutant was investigated for five successive seasons in Muda Irrigation Scheme Area (MADA). The results of the study indicate that at ozone concentration even lower than Malaysian air quality guidelines (60 ppb 8hr mean) level, there exists a significant impact on the growth and yield of the popular rice cultivar MR-219. Even though weeds, diseases, and insect pests were absent, water and nutrients were in abundance, no adverse soil conditions, and that no extreme weather even such as typhoon occurs; the physiological, growth and development performances of rice plants exposed to ambient ozone where found to be significantly ($P < 0.05$) reduced by AOT40 compared to control rice plants in filtered chamber. This study discovered that the root was the most significantly affected component of MR-219 rice plant. Meanwhile, reproductive stage is the most vulnerable period of growth to ozone impact followed by grain filling and vegetative stages, respectively.

Keywords: air pollution, ground-level ozone, open top chamber, rice yield, MADA



Assessment of Putative Bacteria as Probiotics Juvenile Tiger Prawn (*Penaeus monodon*)

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ABSTRACT

Currently, the use of probiotic biocontrol to overcome disease problems in shrimp industries is a well known remedy. Bacteria flora of digestive tract and hepatopancreas, body surface and muscles of juvenile *P. monodon* along with its rearing water and sediment was analyzed. Samples were collected aseptically and homogenized before being inoculated in TSA (Tryptone Soy Agar), TCBS (Thiosulphate Citrate Bile Salt Agar), MacConkey agar and *Pseudomonas*-isolating agar. Eight different genera were isolated in which 7 genera were identified using conventional method followed by Biolog microlog software. Gram negative bacteria were dominant (72%) *Vibrio* was the most dominant genera followed by *Shewanella* and *Burkholderia*. *Clavibacter* followed by *Staphylococcus* were the most dominant gram positive bacteria. The antagonistic ability of 118 separated isolates from different parts of juvenile *Penaeus monodon* were screened against shrimp *Vibrio* pathogens; *Vibrio harveyi*, *Vibrio parahaemolyticus* and *Vibrio alginolyticus*. The most antagonistic effect was observed for an isolate that was primarily identified as *Shewanella algae*. Since production of antagonistic agents rely on cultural conditions, antagonistic ability of candidate probiotic against the mentioned *Vibrios* was assessed using Response Surface Methodology, with central composite design in which four independent variables were assumed: temperature (10 - 50°C), pH (6 - 10), NaCl concentration (0 - 50%) and time (12 - 60 h). The coefficients of multiple determinations (R^2), for the responses of antagonistic effect of *S. algae* against *Vibrio harveyi*, *V. parahaemolyticus* and *V. alginolyticus* values were 0.807 and 0.805, respectively. Concentration of the NaCl exhibited least influence on the antibacterial effect of candidate probiotic while the other independent variables exhibited different degree of affect. The candidate probiotic revealed a reasonable antibacterial response in quite a wide range of temperature and pH in which the maximum levels were in the same range of optimum shrimp culture.

Keywords: probiotic biocontrol, digestive tract, hepatopancreas

Ribonuclease Protection Assay as a Tool for Detection of Coconut *Cadang-cadang viroid* (CCCVd) Variants in Oil Palm

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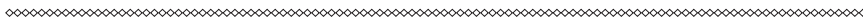
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ABSTRACT

The lethal *cadang-cadang* disease of coconut palm (*Cocos nucifera* L.), which is apparently confined to the Philippines, is caused by *Coconut cadang-cadang viroid* (CCCVd; family *Pospiviroidae*, genus *Cocadviroid*). Estimated total losses exceed 40 million coconut palms. Several species of palm and other monocotyledons in Oceania and South-East Asia have been shown by molecular hybridisation assay to contain CCCVd-related sequences. In African oil palm (*Elaeis guineensis*) plantations in South East Asia and the South Pacific, CCCVd-related molecules were frequently associated with an orange leaf spotting disorder previously described as "genetic" orange spotting (GOS). Recent study conducted in commercial oil palm plantation in Malaysia confirmed that CCCVd variants with sequence similarity greater than 90 % compared with CCCVd from coconut was present in oil palm. However, the concentration was much lower compared to CCCVd in coconut. Some molecular techniques like polyacrylamide gel electrophoresis (PAGE) and hybridisation assay have been developed and reliable for CCCVd detection but were not definitive for the CCCVd variants in the oil palm because of their low concentration in oil palm. Ribonuclease Protection Assay (RPA) has been widely used as a powerful sensitive method to detect and quantify specific RNAs and its variations in nucleotide sequence of a RNA population. We have used RPA to show that the sequence of CCCVd (to an estimated accuracy of >99%) was present in twelve out of eighteen commercial oil palms sampled in Malaysia. Signal intensity varied between the positive oil palms, was generally lower than in CCCVd affected coconut palms, and a comparison of fronds of one oil palm showed it was strongest in the oldest frond assayed. Apart from allowing us to conclude that the CCCVd sequence occurs outside the known *cadang-cadang* area, RPA has potential as a sensitive, simple, robust and specific diagnostic method for studying the pathology, epidemiology and control of CCCVd.

Keywords: ribonuclease protection assay, coconut *cadang-cadang viroid*



The Long Run Relationship between Petroleum and Cereals Prices

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ABSTRACT

In 2008, the world saw an unprecedented increase in the prices of crude oil and cereals (rice, corn and wheat). This is indeed a turning point for cereals, after experiencing price decline in real terms in the last four decades. The recent co-movement of the prices of the two commodities begs the question on the nature of the relationship between them. This study seeks to investigate the presence of a long-term relationship between petroleum or crude oil and cereals prices. To that end, the bivariate cointegration approach using Engle-Granger two-stage estimation procedure is applied. The study utilizes monthly data over the period of January 1980 through March 2008. The results show that there is a strong evidence of long-run equilibrium relationship between the two products prices. The estimated error correction models reveal a unidirectional long-run causality flowing from petroleum to cereals prices.

Keywords: cointegration, causality, crude oil, cereals

Enzyme as Indicators for Anthocyanin Accumulation in Orchids

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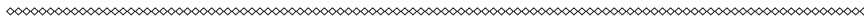
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ABSTRACT

Flower colour is an essential consideration for consumers as it is an important economic factor in determining the market price of commercial orchids. The colour in most orchid petals is due to the accumulation of anthocyanin pigments. Understanding the synthesis of anthocyanins will contribute to the identification of specific steps involved in its regulation. In addition, it helps in developing strategies for colour selections, genetic engineering and manipulation studies. So far, no such reports on orchid anthocyanin pigment evaluation and its relationship to biochemical pathways have been documented. The objectives of this study were: to examine the distribution of key enzymes of the phenylpropanoid pathway, phenylalanine ammonia lyase (PAL; EC 4.3.1.5) and tyrosine ammonia lyase (TAL; 4.3.1.5) in orchid flowers, and to establish their relationship with anthocyanin content. A wide spectrum of orchid hybrids with different flower colour from dark pink to white was examined. The results showed that the total anthocyanin content was found to be high in all the coloured petals of different orchid hybrids. No anthocyanin was detected in white or yellow orchids of the same genus. Likewise, the activity of PAL and TAL were found to be significantly high in the coloured petal extracts and this was found to be parallel with the accumulation of anthocyanin content. Both PAL and TAL activities were also observed to be high in their respective seedlings, protocorm-like bodies (PLBs) and leaves of orchids. The enzymes shared similar pH optimum, temperature, and incubation time. Their metal requirements and kinetics have also been determined. Our studies have indicated that these two enzymes, PAL in particular can serve as bioindicators for selection of colour intensity in orchids. In addition, early and rapid selection can be carried out since high enzyme activity in PLBs, leaves and seedlings is consistently correlated with high anthocyanin content in flower petals.

Keywords: phenylalanine ammonia lyase (PAL), tyrosine ammonia lyase (TAL), anthocyanins, orchids



Alleviation of Aluminum in Acidic Soils and its Effect on Growth of Hybrid and Clonal Oil Palm (*Elaeis Guineensis*, Jacq) Seedlings

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ABSTRACT

Aluminum (Al) toxicity is an important factor in limiting crop production. The present study examined the aluminum (Al) alleviation effects on the growth of hybrid (breeding) and clonal (tissue culture) of D X P oil palm seedlings. The experiment was performed using calcium carbonate (CaCO_3) and ground magnesium limestone (GML) and magnesium Carbonate (MgCO_3) as soil-amendments at different rates in Colombia and Malaysia, respectively. The effects of the treatments were evaluated monthly on vegetative variables and visual symptoms. Chlorophyll concentrations were recorded in Malaysia at the fifth month growing stage. The different amendments improved the soil fertility and it was reflected on better performance of shoot and root growth. The chlorophyll content in the frond number 3 for both materials enhanced significantly when Al saturation was low (0 - 30%). The results from the experiment revealed the importance of neutralisation of Al in reducing its toxicity in oil palm.

Keywords: chlorophyll concentration, clonal, oil palm seedlings, plant growth, soil acidity, soil amendments

Reducing the Rate of Abnormality Index in Tissue-cultured Banana Cultivars

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ABSTRACT

Banana is a staple food for millions of people in the tropical and subtropical parts of the world. In most countries banana is grown on a plantation scale and the planting materials are largely obtained from tissue culture. However, banana micropropagation using shoot tip culture generally resulted in low multiplication rate, high somaclonal variation and even abnormalities. Among the components considered as abnormal were hyperhydricity, deformation and undifferentiated tissues. The use of plant growth regulators is believed to be one of the factors contribution to these conditions. Cytokinins are commonly used hormones in banana tissue culture. In this study we investigate systematically the effects of different cytokinins on the multiplication rate and the abnormality index of different banana cultivars. The objective of the study was to identify the most suitable cytokinin for a specific banana cultivar which will be mass propagated and exhibiting low abnormality index. The five banana cultivars used were Berangan, Berangan Intan, Rastali, Nangka and Baka Baling all of which have a big market in Malaysia. The results obtained showed that TDZ at 0.5 μM is suitable for rapid micropropagation and BAP at 22.2 μM is most effective for elongation of shoots and maintenance of cultures for both dessert and cooking bananas. We have, therefore, successfully identified the most suitable cytokinin to be used in mass propagation of banana and at the same time overcoming the problems associated with abnormalities.

Keywords: *musa spp*, abnormality, micropropagataion, benzylaminopurine, thidiazuron



RT-MECa: Real Time Mapping of Apparent Soil Electrical Conductivity for Precision Farming

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ABSTRACT

Precision Farming requires the use of some high-tech equipment for assessing field conditions and applying chemicals, water and fertilizers. The technologies include Global Positioning System (GPS), Differential Global Positioning System (DGPS), electronic sensors, Remote Sensing, controllers, Geographical Information System (GIS), and other sophisticated software. The concept of precision farming is managing each crop production input on a site specific basis to reduce waste, increase profit and maintain the quality of the environment. An EC sensor is a useful tool in mapping bulk soil electrical conductivity (EC_a) in order to identify areas of contrasting soil properties. The existing soil EC_a mapping system is stored the acquired data in the logger and its map can be displayed only after transferring from the logger to the mapping software via a diskette which is available on the computer. The tractor driver or operator could not view the result in the field, but at the office. This can create missing data points and it needs to repeat the data collection. Real Time Mapping of Apparent Soil Electrical Conductivity (RT-MECa) involved two important parts namely, RT-MECa hardware and software. The RT-MECa software was developed on a control software known as labVIEW and the RT-MECa hardware was developed using current inverter and Data Acquisition (DAQ) hardware. The RT-MECa system comprised of Apparent Electrical Conductivity (EC_a) probe, RT-MECa hardware, DGPS and a robust computer installed with RT-MECa software mounted in a tractor cab. It allows the EC_a map to be plotted on real time basis and display on a robust computer system mounted on the vehicle according to the coordinates retrieved from DGPS. It also has the option to plot EC_a data based on column and row numbers when working without DGPS. The retrieved data can be classified and displayed in various color (class post map) so that the operator can observe the variability within a field directly. Moreover, RT-MECa can store EC_a and DGPS data into two different forms namely, image graphic and text forms. This data acquisition system will later on be processed using Management Zone Delineation using Apparent Electrical Conductivity (MAZDAEC) technique.

Keywords: site specific management, crop production, apparent electrical conductivity, robust computer, management zone delineation

The Impact of Asian Financial Crisis on the Trend of Comparative Advantage in the Malaysian Food Processing Industry

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ABSTRACT

This paper aims to examine the effect of the 1997 Asian financial crisis on the levels of competition for various productions of food products. The study is undertaken using the concept of comparative advantage and long term trend analysis. In the context of competitiveness of the Malaysian food processing industry the evaluation of comparative advantage has been undertaken with special reference to the prior implementation of the scheduled liberalisation of trade preferences under the WTO and AFTA. In order to penetrate a wider range of foreign markets, Malaysian food processors have to identify food sub-sectors that are internationally competitive. These sub-sectors should not only withstand internal shocks but also external shocks such as the Asian Financial Crisis in 1997-1998. The competitiveness of the food processing industry in Malaysia was determined using the Domestic Resource Cost (DRC) method and the trend estimates. Twenty food sectors were assessed using the Malaysian food production and trade data from 1985 to 2001. Processed foods with a high comparative advantage and positive annual growth sustained after the crisis can be considered as viable to compete with foreign products in the domestic and overseas markets.

Keywords: comparative advantage, asian financial crisis, food processing industry, benefit-cost ratio, trend analysis



Utilisation of Wild Aquatic Macrophytes by Indigenous Population in Sarawak

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ABSTRACT

Wild plants are genetically pure natural foods, containing essentially complete germ plasma untampered by human hands. Our ancestors by trial and error have discovered which plants were edible and which plants were poisonous. In Sarawak, wild plants are commonly used by rural population as food, and usually when available in large quantities, they are offered for sale in local produce and native markets. The indigenous people are very familiar and have considerable plant knowledge with wild plants as they utilize them for their daily uses, diet, livelihood and culture. These are some of the observations noted based on field surveys over two years from 2007-2009 covering coastal areas of Bintulu, Miri, Mukah, Sarikei, Sibul, Betong, Sri Aman and Kuching, Sarawak. Wild aquatic macrophytes gain their importance as edible plants and ingredients that are being traded and available widely to urban populations. A total of 31 species of wild harvested aquatic plants are traded as vegetables for human consumption by various ethnics; the Malays, Chinese, Melanau, Iban and Bidayuh. Some species of wild aquatic plants e.g. *Limnocharis flava*, *Blyxa aubertii*, *Neptunia oleracea*, *Colocasia esculanta* are considered unique due to their edible young shoots, leaves, stems, inflorescences, tubers/corm or whole plant. Aquatic plants such as *Neptunia oleracea* have been domesticated for market continuous supply. Non local aquatic plants e.g. *Trapa bispinosa* and *Eleocharis dulcis* are imported from overseas and also traded in the local produce markets. These plants can be raw eaten as salad or cooked in various ways as dishes as they are rich source of micronutrients. More edible wild aquatic plants and ingredients are being traded and available widely to urban populations as people have become adventurous in their eating habits and are exploring new food resources, cooking styles, both in the home kitchen and in specialty restaurants. Wild aquatic plants as food once restricted to the rural and culture are spreading to other corners of the country.

Keywords: wild aquatic plants, vegetables, edible, indigenous people, Sarawak

Regulation of Lignin Degrading Enzymes to Control *Ganoderma Basal Stem Rot* of Oil Palm

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ABSTRACT

Oil palm plantations are under continuous threat due to losses caused by *Ganoderma* basal stem rot with no known effective control. Basal stem rot involves fungal attack to the lignin component of tissues leaving the white cellulose exposed. The fungus grows within palms by utilizing cellulose in the tree leading to severe infection. Thus, altering the lignin degrading activity of *Ganoderma* would be a possible approach to mitigate the spread of *Ganoderma*. Therefore, a study was conducted to determine the ability of *Ganoderma* spp to produce lignin degrading enzymes; lignin peroxidase (Lig PO), Manganese peroxidase (MnPO) and laccase (Lac) produced by. Six isolates (*G. boninense* 1, *G. boninense* 2, *G. lucidum*, *G. zonatum*, *G. tomatum* and *G. miniatocinctum*) were cultured on malt extract agar amended with 0.05% Remazol Brilliant Blue R (RBBR) to evaluate their lignolytic potential by decolorisation of the dye. All the isolates were able to degrade lignin with different efficacies with *G. boninense* 2 being significantly higher ($P \leq 0.05$) (92.50%) followed by *G. zonatum* (90.25%), *G. miniatocinctum* (76.25%), *G. boninense* 1 (58.32%), *G. lucidum* (57.62%) and *G. tomatum* (38.25%). The isolates were then cultured on liquid medium (2% MEB) to determine the lignin degrading enzymatic activities. The maximum activities of Lig PO, MnPO and Lac were detected in *G. boninense* 2 with values of 1.494, 1.188 and 1.105 U μg^{-1} protein, respectively. The effect of various enzymatic inhibitors (NaCl, EDTA, 2-mercaptoethanol, H_2O_2 , Cu^{+2} , Fe^{+2}) on the production of lignolytic enzymes was also investigated *in vitro* as a possible effective chemical control of *Ganoderma* infection. Compounds giving high inhibitory activity can be used as soil and spray treatments in field applications for the management of basal stem rot.

Keywords: *ganoderma* sp, lignin peroxidase, manganese peroxidase, laccase, enzyme inhibitor, basal stem rot

Variability of *Fusarium* Species in Section Liseola associated with Rice-based on Vegetative Compatibility Groups

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ABSTRACT

Vegetative compatibility also known as heterokaryon compatibility, is another functional tool for identifying fungi and it also reveals the genetic diversity of several genera, including *Fusarium*. A total of 127 strains of *Fusarium* species in Section Liseola were isolated from rice and initially identified based on morphological and biological characteristics for species delimitation i.e. *F. fujikuroi* (79 strains), *F. proliferatum* (13 strains), *F. sacchari* (13 strains), *F. subglutinans* (4 strains) and *F. verticillioides* (18 strains). The objective of this study was to investigate genetic diversity of the *Fusarium* strains isolated from rice by generating nitrate non-utilizing (*nit*) mutants, followed by phenotyping the mutants on diagnostic media, and pairing on minimal media. Results of the pairing experiment revealed that the strains of *F. fujikuroi*, *F. verticillioides*, *F. proliferatum*, *F. sacchari* and *F. subglutinans* were grouped into 26, 8, 8, 7 and 4 VCGs, respectively. About 97.6% of the strains were classified as heterokaryon self-compatible based on their ability to produce a stable heterokaryon while the remaining strains were classified as heterokaryon self incompatible based on their inability to form a heterokaryon, even after repeated attempts. The ratio of VCGs to strains of *F. fujikuroi*, *F. proliferatum*, *F. sacchari*, *F. subglutinans* and *F. verticillioides* in these samples were 0.29, 0.62, 0.54, 1.0 and 0.44, respectively. Based on these findings, it is concluded that the strains of *Fusarium* in Section Liseola associated with rice in Malaysia and Indonesia are genetically diverse.

Keywords: *fusarium fujikuroi*, section liseola, vegetative compatibility, heterokaryon compatibility

A Transient Assay to Evaluate the Expression of Polyhydroxybutyrate Genes Regulated by Oil Palm Mesocarp-specific Promoter

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ABSTRACT

The promoter of the oil palm metallothionein-like gene (*MT3-A*) demonstrated mesocarp-specific activity in functional analysis using transient expression assay of reporter gene in bombarded oil palm tissue slices. In order to investigate the tissue-specific expression of polyhydroxybutyrate (PHB) biosynthetic pathway genes, a multi-gene construct carrying PHB genes fused to the oil palm *MT3-A* promoter was co-transferred with a construct carrying GFP reporter gene using microprojectile bombardment targeting the mesocarp and leaf tissues of the oil palm. Transcriptional analysis using RT-PCR revealed successful transcription of all the three *phbA*, *phbB*, and *phbC* genes in transiently transformed mesocarp but not in transiently transformed leaf tissues. Furthermore, all the three expected sizes of PHB-encoded protein products were only detected in transiently transformed mesocarp tissues on a silver stained polyacrylamide gel. Western blot analysis using polyclonal antibody specific for *phbB* product confirmed successful translation of *phbB* mRNA transcript into protein product. This study provided valuable information, supporting the future engineering of PHB-producing transgenic palms.

Keywords: transient expression assay, microprojectile bombardment, transgenic plant, polyhydroxybutyrate, tissue-specific promoter