PRPi 2012

UPM's Research & Innovation

Universiti Putra Malaysia Press
Serdang • 2012

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Pameran Rekacipta, Penyelidikan dan Inovasi (2012 : Serdang, Selangor)
PRPi 2012 : UPM's research & innovation
ISBN 978-967-344-290-4
1. Universiti Putra Malaysia--Research--Exhibitions.
2. Education, Higher--Research--Exhibitions.
3. Educational innovations--Research--Exhibitions. I. Judul.
378.00720595

Type face: Times New Roman PS
Type size: 8/10.5

Page Layout: Ku Ida Mastura Ku Baharom
Cover Design: Anuar Pairan

Printed by
Universiti Putra Malaysia Press
43400 UPM Serdang
Selangor Darul Ehsan

Tel: 03-89468851/89468854
Fax: 03-89416172
E-mail: penerbit@putra.upm.edu.my

Contents

Preface

UPM's largest research exhibition, PRPI Malaysia will be held at its Main Hall, the Sultan Salahuddin Abdul Aziz Shah Cultural and Arts Centre from 17th to 19th July, 2012.

Organised for the tenth time under the flagship of the university's Office of Vice-Chancellor (Research and Innovation), this annual university level event has undergone major repositioning into a national event and has been aptly renamed as PRPI Malaysia. Carrying the theme,Channeling Innovation towards Wealth Creation and Societal Well-being, the PRPI Malaysia is all set to take UPM's research and development initiatives to a whole new level.

Featuring the works of UPM lecturers, research fellows, post-doctoral students, graduate students and research officers, all of whom have entered their research projects for the research invention competition that forms a key part of the exhibition, the PRPI Malaysia will also see participation from other higher learning institutions and research centres. Novel R&D and technological innovations with potential for commercialization form the highlight of the exhibition with the objective of creating the much needed awareness among the public and market sector of the university's and nation's growth and advancement in the R&D sector.

It is hoped that the exhibition and its many competitions will project to the public the escalating quality of UPM's prolific research outputs, and will serve as a benchmark for the university to participate in other exhibitions on national and international levels. At the same time, the exhibition is also seen as a means to fortify strategic relationship between the university and the community which can pave the path to answer the government's call to consolidate efforts to spur high-income economy through the strengthening of the nation's research, development and innovation activities. It is also hoped that through events such as this, stakeholders and industry players can be convinced to contribute towards research funds and commercialisation efforts.

This book is a compilation of 315 research and innovation abstracts from UPM's 26 faculties and centres as well as 8 other higher learning institutions and research centres which will be participating in the tenth Malaysian Invention, Research & Innovation Exhibition (PRPI Malaysia).

The abstracts are divided into three research categories – Fundamental Research, Applied Research and Products/Innovations and encompass UPM's 6 main research clusters; agriculture (57), food (37), forestry and environment

(22), health (18), science, technology and engineering (119) and social science (47).The remaining 15 abstracts are from Universiti Utara Malaysia (2), Malaysia Palm Oil Board (1), Universiti Tun Hussien Onn Malaysia (1), Universiti Tenaga Nasional (1), Universiti Teknologi Mara (4), Universiti Malaysia Perlis (1), Malaysian Nuclear Agency (2), Universiti Pertahanan Nasional Malaysia (2) and Islam Malaysia Universiti Sains (1).

It is our sincere hope that you benefit from the publication of this book, and find the content useful for your reference. The organising committee would also like to take this opportunity to express its appreciation of the panel of reviewers who have worked hard to identify, select and evaluate all the participations and arrive at the publication of this book. Without them, this book would not have materialized.

Thank You.

Assoc.Prof.Dr. Samsilah Roslan
Research and Innovation Promotion Division
Putra Science Park (PSP)
Office of Deputy Vice Chancellor (Research and Innovation)
Universiti Putra Malaysia

Panel of Reviewers

Assoc. Prof. Dr. Samsilah Roslan
Prof. Dr. Aziz Arshad
Assoc. Prof. Dr. Mohamed Zakaria Hussin
Prof. Dr. Mohd Hair Bejo
Assoc. Prof. Dr. Alias Radam
Prof. Dr. Mohd Adzir Mahdi
Prof. Dr. Zaidatol Akmaliah Lope Pihie
Assoc. Prof. Dr. Abdul Halim Abdullah
Prof. Dr. Son Radu
Dr. Mariani Mansor
Assoc. Prof. Dr. Nurdeng Deuraseh
Assoc. Prof. Dr. Ezhar Tamam
Assoc. Prof. Dr. Ain Nadzimah Abdullah
Prof. Dr. Hashim Musa
Prof. Dr. Chan Swee Heng
Dr. Raja Ahmad Azmeer Raja Ahmad Effendi
Prof. Dr. Zamberi Sekawi
Assoc. Prof. Dr. Hamidah Ibrahim
Prof. Dr. Raha Abdul Rahim
Assoc. Prof. Dr. Zuriati Zulkarnian
Prof. Dr. Mohamad Pauzi Zakaria
Prof. Dr. Abdul Rahman Omar
Prof. Dr. Robiah Yunus
Assoc. Prof. Dr. Abdul Rashid Mohamed Shariff
Assoc. Prof. Dr. Roziah Atan
Dr. Ahmad Rizal Hj. Abd Rahman
Dr. Ahmed Razman Abdul Latiff
Prof. Dr. Tengku Aizan Hamid
Prof. Dato' Dr. Kamel Ariffin Mohd Atan

Assoc. Prof. Dr. Mahendran Shitan
Assoc. Prof. Dr. Zainidin Eshkurator
Prof. Dr. Russly Abdul Rahman
Assoc. Prof. Dr. Shuhaimi Mustafa
Prof. Dr. Fatimah Mohamed Arshad
Prof. Dr. Paridah Md. Tahir
Assoc. Prof. Dr. Bahaman Abu Samad
Prof. Dr. Zulkifli Idrus
Prof. Dr. Muhammad Nazrul Hamin Abdullah

PRPI 2012

UPM's Research & Innovation

FACULTY OF AGRICULTURE

Consumers' Awareness and Consumption Intention Towards Green Foods

Category: Applied Research (B)

Dr Golnaz Rezai
Phuah Kit Teng, Zainalabidin Mohamed and Mad Nasir Shamsudin
Faculty of Agriculture
rgolnaz@putra.upm.edu.my
03-89474899

Consumers' food consumption patterns are changing rapidly. Consumers are becoming more concerned about the food they consume. They tend to consume food that is nutritious, healthy, safe and friendly to the environment and animals. Thus, the green concept is now steadily being disseminated among consumers in conjunction with the sustainability and conservation of agricultural development. Green foods refer to foods that are safe for consumption, fine in quality and are nutritious in meeting the principle of sustainable development. This paper focuses on the consumers' awareness and intention towards green foods consumption in Malaysia. The theory of planned behavior (TPB) is applied in this study. A structured questionnaire was designed and used as an instrument to gather information on green food consumer behavior. A survey was conducted in late 2010 and 1355 respondents were used in the questionnaire. Descriptive statistics and chi-square analyses were used to analyze the data collected. The results indicate that most of the respondents are aware of the green concept. The results also show that there are significant differences among the respondents' awareness towards green food and age, geographical area, education level and income. The respondents also indicated that green food is not only about being organic but it also encompasses the concept of food safety, health issues, environmental hazard as well as animal welfare. Thus, most of the respondents were aware of the green concept which is a strong indicator of consumers' intention to go green in food consumption.

Keywords: Consumers, awareness, intention, green concept, foods, sustainable agriculture

Demographic and Attitudinal Variables Associated with Consumers' Intention to Purchase Green Produced Foods in Malaysia

Category: Applied Research (B)

Dr. Golnaz Rezai
Zainalabidin Mohamed, Mad Nasir Shamsudin and Phuah Kit Teng
Faculty of Agriculture
rgolnaz@putra.upm.edu.my
03-89474899

The green concept and green foods are developing and are still at their infancy stage in Malaysia. Therefore, there is a need to examine Malaysian consumers' attitude, perception and intention towards green food consumption. Thus, the objective of this study is to determine the extent to which selected socio-economic/demographic characteristics and attitudes influence the consumers' intention to purchase green foods in Malaysia especially since there are emerging global issues concerned with the environment, food safety and animal welfare. A survey was conducted in Peninsular Malaysia where 1,355 respondents were interviewed using structured questionnaires to gather important information on their perception and intention to purchase green food in Malaysia A binary logistic model was used to obtain the coefficients applied to the calculations of the marginal effects and probabilities. The results indicate that educational level, income and other factors such as food safety and environmental friendliness significantly influence Malaysian consumers' green foods purchasing intention.

Keywords: Binary logistic model, consumers' intention, demographic variables, green foods

Household Income Structure among Paddy Farmer in the Granary Area of Malaysia

Category: Applied Research (B)

Prof. Dr. Zainalabidin Mohamed
Rika Terano
Faculty of Agriculture
zainal.mohamed@gmail.com
03-89474816

Economic disparity between rural and urban areas is one of the persistent issues that have been discussed among politicians, academics and especially among paddy farmers. Traditionally, paddy farmers have been mired in poverty and their livelihood largely relied on on-farm and off-farm incomes. However the industrialization revolution has encouraged the manufacturing sector to set up factories in the rural paddy granary areas especially on the West Coast of Peninsular Malaysia. Thus these farmers have the opportunity to become employed as part-time factory workers. Since most of the development has been concentrated on the West Coast, the East Coast has been left behind from industrial development. Hence the opportunity for East Coast farmers to seek part-time jobs to earn an off-farm income as a factory worker is not readily available. Therefore it is imperative to investigate the impact of off-farm income disparity between paddy farmers on the West Coast and East Coast with regards to their household livelihood and the situation of the rural economy. The study focuses on the actual income distribution, structure and differences between on-farm and off-farm incomes at the household level. A structured questionnaire was designed to capture the information needed and surveys were conducted among five rice granary areas on the West and East Coasts. The results showed that the average farm household income is RM1,824 in Kelantan, followed by RM2,947 in Kedah, RM2,969 in Terengganu, RM4,792 in Penang and RM4,895 in Selangor. Income inequality in Kelantan is the highest at 0.49 as measured by the Gini Coefficient. Out of the five granary areas, Kelantan's farmers have suffered from having the least amount of opportunities for generating on-farm and off-farm income which has led to a widening of income inequality amongst these farmers.

Keywords: Income disparity, paddy farmers, on-farm income, off-farm income, Gini Coefficient

The Impact of Fertilizer Subsidy on Malaysia Paddy/Rice Industry Using a System Dynamics Approach

Category: Applied Research (B)

Prof Dr. Mad Nasir Shamsudin
Zainal Abidin Mohamed, Alias Radam and Nurul Nadia Ramli
Faculty of Agriculture
mns@putra.upm.edu.my
03-89474801

The Malaysian paddy and rice industry has always been given special treatment based on the strategic importance of rice as a staple food commodity. This study attempts to simulate the impacts of changes in government intervention policy, namely the fertilizer subsidy on the Malaysian paddy and rice industry using system dynamics model. Simulation result indicates that fertilizer subsidy does give a significant impact to the paddy and rice industry. Fertilizer subsidy increases the yield obtained and hence increase paddy production. The removal of fertilizer subsidy decreased the paddy production and consequently, decrease the self-sufficiency level (SSL). With the removal of fertilizer subsidy the importation of rice seem inevitable due to the reduction in productions. Meantime the growth in population will further put a pressure to the government to increase importation and to find alternative policies to sustain production and to increase yield.

Keywords: System dynamics, fertilizer subsidy, paddy/rice industry, policies, importation

……..

Microalgae as Bacterial Control Agent in Fish and Crustacean Larviculture

Category: Applied Research (B)

Dr. Natrah Fatin Mohd Ikhsan
Faculty of Agriculture
natrah@putra.upm.edu.my
03-89474972

Bacterial disease is one of the major problems in aquaculture. Pathogenic bacteria such as V. harveyi and Aeromonas spp. infect various host species. In this work, disruption of bacterial communication or quorum sensing (QS) is investigated as a novel approach to control bacterial infections in aquaculture.The ability of micro-algae to interfere with QS was investigated through screening the effect of algal extracts on different bacterial QS reporter strains, including V. harveyi. The screening results showed that extracts from different micro-algal strains were able to interfere with QS regulated gene expression

in the reporter strains. The interference activities were dependent on the QS signal type (unsubstituted, oxo-substituted and hydroxyl-substituted). The most interesting micro-algal strain was found to be C. saccharophila CCAP211/48 as it was able to inhibit QS-regulated gene expression in all three reporters used in this study. In another study, freshwater micro-algae (C. saccharophila CCAP211/48 and C. reinhardtiiCCAP11/45) were also able to protect burbot larvae from Aeromonas disease.In conclusion, the results presented in this study showed quorum sensing disruption through QS antagonists and micro-algae are promising as novel methods to control bacterial pathogens in aquaculture.

Keywords: Micro-algae, quorum sensing interference, larviculture

……..

Dietary Saturated and Omega-3 Fatty Acids Affect Growth and Fatty Acid Profiles of Malaysian Mahseer

Category: Applied Research (B)

Assoc. Prof. Mohd Salleh Kamarudin
Ehsan Ramezani Fard, Sharr Azni Harmin and Che Roos Saad
Faculty of Agriculture
msalleh@agri.upm.edu.my
03-89474817

The current study was conducted to determine optimal levels of dietary saturated fatty acids (SFA), n-3 PUFA and to study potential n-3 sparing effect of dietary SFA for Malaysian mahseerTor tambroides. Juvenile T. tambroides were fed four trial diets with similar basal composition but different oil mixtures in a 2*2 factorial experimental design for 10 weeks. The two factors were the levels of dietary SFA and the levels of dietary n-3 PUFAs. Growth performance and fatty acid profile of tissues were analyzed at the end of the experiment. Significant differences in growth performance were observed among treatments, and fish fed the diet low in n-3 and high in SFA showed the best growth performance. T. tambroides fed the high n-3 diets showed a significantly higher ($p<0.05$) muscle total n-3 PUFA content compared to fish fed the low n-3 diets. The highest 22:6 n-3 and total n-3 PUFA content of the liver were also observed in fish fed the low n-3 and high SFA diet. However, the significant interaction ($p<0.05$) between dietary SFA and n-3 PUFA levels was observed for the total n-3 PUFA content of both muscle and liver tissues, suggesting an n-3 sparing action by dietary SFA. The results of this study suggest that 2.5% n-3 PUFA in the diet of T. tambroides, with an SFA to n-3 ratio of 15.3, is sufficient to provide the best growth performance and to retain the n-3 content of tissues.

Keywords: Saturated fatty acid, polyunsaturated fatty acid, mahseer, growth, Tor tambroides

Selection and Identification of Non-Pathogenic Bacteria Isolated from Fermented Pickles with Antagonistic Properties against Two Shrimp Pathogens

Category: Applied Research (B)

Assoc. Prof. Dr. Che Roos Saad
Hadi Zokaeifar, Jose Luis Balcazar, Mohd Salleh Kararudin, Kamaruzaman Sijam and Aziz Arshad
Faculty of Agriculture
cheroos@agri.upm.edu.my
03-89474885

In this study, potential probiotic strains were isolated from fermented pickles based on antagonistic activity against two shrimp pathogens (Vibrio harveyi and Vibrio parahaemolyticus). Two strains L10 and G1 were identified by biochemical tests, followed by 16S ribosomal RNA gene sequence analysis as Bacillus subtilis and characterized by PCR amplification of repetitive bacterial DNA elements (rep-PCR). Subsequently, B. subtilisL10 and G1 strains were tested for antibacterial activity under different physical conditions, including culture medium, salinity, pH and temperature using the agar well diffusion assay. Among the different culture media, LB broth was the most suitable medium for antibacterial production. Both strains showed the highest level of antibacterial activity against two pathogens at 30℃ and 1.0 % NaCl. Under the pH conditions, strain G1 showed the greatest activity against V. harveyi at pH 7.3-8.0 and against V. parahaemolyticus at pH 6.0-8.0, whereas strain L10 showed the greatest activity against two pathogens at pH 7.3. The cell-free supernatants of both strains were treated with four different enzymes in order to characterize the antibacterial substances against V. harveyi. The result showed considerable reduction of antibacterial activity for both strains, indicating the proteinaceus nature of the antibacterial substances. A wide range of tolerance to NaCl, pH, and temperature was also recorded for both strains. In addition, both strains showed no virulence effect in juvenile shrimp Litopenaeusvannamei. Based on these results and safety of strains to L. vannmei, they may be considered for future challenge experiments in shrimp as a very promising alternative to the use of antibiotics.

Keywords: Aquaculture, Shrimp, Vibriosis, Probiotics, Antibacterial activity, *Bacillus subtilis*

Effects of Dietary Fish Oil Replacement by Various Vegetable Oils on Growth Performance, Body Composition and Fatty Acid Profile of Juvenile Malaysian Mahseer, Tor Tambroides

Category: Applied Research (B)

Assoc. Prof. Dr. Mohd Salleh Kamarudin
Ehsan Ramezani Fard, Che Roos Saad and Sharr Azni Harmin
Faculty of Agriculture
msalleh@agri.upm.edu.my
03-89474817

The continuous increase of world population and growth of aquaculture industry put severe pressure on the marine origin resources such as fish oil and fishmeal and finding replacements for these ingredients has become the aim of several studies. The current study was carried out to investigate the effects of replacing dietary fish oil with different vegetable oil sources and ratios on the growth performance and tissue fatty acid profiles of juvenile Tor tambroides. Three different vegetable oils (sunflower oil, linseed oil and palm oil) were used in two different substitution ratios (50% and 100%). A diet without replacement (100% fish oil) was used as a control. Triplicate groups of T. tambroides juveniles (5.0 ± 0.4 g) were fed the test diets for nine weeks. The highest weight gain was observed in fish fed palm oil diets. Palm oil is the second largest volume of vegetable oil produced in the world and has been considered as a potential replacement for fish oil due to high level of 16:0 and 18:1n-9, which is preferred rather than PUFAs in mithochondrialβ-oxidation. Palm oil, therefore, can be used as a source of energy for fish and this study showed the advantages of using palm oil as a lipid source in the diet of Malaysian mahseer instead of using fish oil or other vegetable oils.

Keywords: Dietary lipid, growth, fatty acid, mahseer, Tor tambroides, vegetable oil

Effects of *Bacillus subtilis* on the Growth Performance, Digestive Enzymes, Immune Gene Expression and Disease Resistance of White Shrimp, *Litopenaeus vannamei*

Category: Applied Research (B)

Assoc. Prof. Dr. Che Roos Saad
Hadi Zokaeifar, Jose Luis Balcazar, Mohd Salleh Kamarudin, Kamaruzaman Sijam, Aziz Arshad and Naghmeh Nejat
Faculty of Agriculture
cheroos@agri.upm.edu.my
03-89474885

We studied the effect of two probiotic Bacillus subtilis strains on the growth performance, digestive enzyme activity, immune gene expression and disease resistance of juvenile white shrimp (Litopenaeusvannamei). A mixture of two probiotic strains, L10 and G1 in equal proportions, was administered at two different doses 105 (BM5) and 108 (BM8) CFU g-1 feed to shrimp for eight weeks. In comparison to untreated control group, final weight, weight gain and digestive enzyme activity were significantly greater in shrimp fed BM5 and BM8 diets. Significant differences for specific growth rate (SGR) and survival were recorded in shrimp fed BM8 diet as compared with the control; however, no significant differences were recorded for food conversion ratio (FCR) among all the experimental groups. Eight weeks after the start of the feeding period, shrimp were challenged with Vibrio harveyi. Statistical analysis revealed significant differences in shrimp survival between probiotic and control groups. Cumulative mortality of the control group was 63.3%, whereas cumulative mortality of the shrimp that had been given probiotics was 20.0% with MB8 and 33.3% with MB5. Subsequently, real-time PCR was employed to determine the mRNA levels of prophenoloxidase (proPO), peroxinectin (PE), lipopolysaccharide- and ?-1,3-glucan- binding protein (LGBP) and serine protein (SP). The expression of all immune-related genes studied was significantly up-regulated ($P< 0.05$) in the shrimp fed BM5 and BM8 diets compared to the control group. These findings demonstrate that administration of B. subtilis strains, L10 and G1, can improve growth performance and disease resistance through an enhanced immune response in shrimp.

Keywords: Aquaculture, *Litopenaeus vannamei*, probiotic, *Bacillus subtilis*, Vibriosis, immune gene

Novel Antioxidant Activities and Secondary Metabolite Enhancement of Different Varieties of Labisia Pumila Benth. Under Manipulation of Greenhouse Irradiance

Category: Applied Research (B)

Prof. Dr. Hawa ZE Jaafar
Ehsan Karimi
Faculty of Agriculture
hawazej@gmail.com
03-89466922

Natural phytochemicals that are obtained from plants have been reported to have wide range of biological activities, including antioxidant activity. The antioxidative activity may be due to these compounds, which act as free radical scavengers and metal chelators. As exhibited by positive correlation between the high phenolic and flavonoid content and the strong antioxidant activity. Labisiapumila (Myrsinaceae family), commonly known as Kacip Fatimah in Malaysia, contain high bioactive compounds and demanded for its medicinal value as female tonics and health products. There are three varieties of L. pumila namely, L. pumila var. pumila, alata and lanceolata and each has its own use. This research was performed to evaluate the effect of different light intensity (310 and 630 630 µ mol m-2 s-1) on antioxidant properties and phenolic and flavonoid analysis from the leaves, stem and root in three varieties of L. pumilaBenth. Antioxidant activity in all three varieties consistently recorded higher values when exposed to high irradiance (70% IR). The obtain result showed that Total Flavonoid accumulation was highest in the leaf of L. pumilavarpumila (2.94±0.11 mg rutin equivalent /g DW) under 630 µ mol m-2 s-1and Total Phenolic was high in variety of L. pumilavaralata (3.92 ±0.06 mg Galic acid equivalent (GAE)/g DW) under light intensity of 630 630 µ mol m-2 s-1. HPLC analyses of phenolics and flavonoids in all three varieties also revealed the presence of gallic acid, caffeic acid, kaempferol, naringin and myricetin in the leaves of three varieties of L. pumilaBenth. and these compounds have increased under 630 µ mol m-2 s-1 light.

Keywords: *Labisia pumila* Benth, Irradiance, Secondary metabolites

Novel Carbon Dioxide Enrichment Techniques for Growth Enhancement of *Labisia pumila* Benth (Kacip Fatimah)

Category: Applied Research (B)

Prof. Dr. Hawa ZE Jaafar
Mohd Hafiz Ibrahim; Asmah Rahmat and Zaharah Abdul Rahman
Faculty of Agriculture
hawazej@gmail.com
03-89466922

The production of *Labisia pumila* seedling in nursery took about 16 - 36 months before the seedling can be used in pharmaceutical industry. The long acclimatization time in nursery increase management and maintenance cost of herbal propagators. Recently, CO_2 enrichment techniques have been adapted to L. pumila seedlings to speed up the growth process under close top chamber system. The experiment used three levels of CO_2 levels (400 µmol/mol CO_2; control, 800 µmol/mol CO_2 (2x ambient; 1200 µmol/mol CO_2; 3x ambient) to enrich the L. pumila seedlings. Vegetative parameters such as total leaf area, plant height, basal diameter and leaf numbers was measured for 15 weeks. Carbon dioxide enrichment significantly enhances vegetative characteristics such as total plant leaf area, plant height, basal diameter and leaf number of L. pumila in all weeks measured. During the study enrichment with 1200 µmol/mol CO_2 produced superior vegetative parameters compared to 800 and 400 µmol/mol CO_2. The enriched plant is more uniform and vigour in the growth. It was observed that, the vegetative characteristics of 16 months L. pumila seedling was not statistically significant from the oil palm seedling that just been enriched in 7 months in CO_2 chamber thus, give reduction for 9 months in the nursery. This technique have the potential to reduce the time in nursery and have the potential to be commercialized in wide and open area using Free air carbon dioxide enrichment.

Keywords: Carbon dioxide enrichment, growth enhancement, *Labisia pumila*

Seed Priming Influences Weed Competitiveness and Productivity of Aerobic Rice

Category: Applied Research (B)

Assoc. Prof. Dr. Abdul Shukor Juraimi
Md. Parvez Anwar, Adam Puteh, Ahmad Selamat, Md. Moshiur Rahman
and Batoul Samedani
Faculty of Agriculture
ashukor@agri.upm.edu.my
03-89474807

Growing rice under aerobic soil conditions is a promising water-wise technology under the context of ever-mounting water scarcity, but it is subject to poor stand establishment and high weed pressure. The present study was, therefore, designed to explore the possibility of adopting seed priming as a sustainable tool for weed management in aerobic rice. The trough experiment was established with aerobic rice line Aeron 1 considering four priming techniques: hydropriming, hardening, Zappa™ priming and untreated control; and two weeding regimes: weed-free and weedy. Treatments were arranged in a randomized complete block design with four replications. Seed priming significantly improved germination attributes, weed suppressive ability and yield of rice, whilst unprimed control exhibited inconsistent germination, poor stand establishment and less weed competitiveness resulting in poor yield. Seed priming resulted in reduced mean germination time and increased germination percentage, germination index and seedling vigour index. Weed dry matter reduction by primed stand of rice ranged from 22% to 27% compared with control. A positive influence of seed priming was also evident in rice yield with an average increment of 0.4 t ha_1 over control. Weed-inflicted relative yield loss of rice was minimized by 10% as a consequence of seed priming. Zappa™ solution emerged as the best priming agent, which demands its incorporation as a viable component in an integrated weed management strategy for aerobic rice.

Keywords: Aerobic soil condition, rice yield loss, seed invigoration, seedling vigour, weeds management.

Novel Co_2 Enrichment Techniques for Improvement of Pharmaceutical Qualities of *Labisia pumila* Benth (Kacip Fatimah).

Category: Applied Research (B)

Prof.Dr.Hawa ZE Jaafar
Mohd Hafiz Ibrahim and Ehsan Karimi
Faculty of Agriculture
hawazej@gmail.com
03-89466922

A split plot 3 by 3 experiment was designed to examine the impact of three concentrations of CO_2 fertilization (400, 800 and 1200 µmol mol-1 CO_2) on the profiling of phenolics and flavonoids compounds, phenyll alanine lyase (PAL) and antioxidant activity in three varieties of LabisiapumilaBenth (var. alata, pumila and lanceolata) after 15 weeks of exposure. The high performance liquid chromatography (HPLC) revealed a strong influence of increased CO_2 concentration on the modification and alteration of phenolics and flavonoids profiling, which intensity depended on the interaction between CO_2 levels and L. pumila varieties. Gallic acid and quercetin were the most abundant phenolics and flavonoids commonly present in all the varieties. With elevated CO_2 (1200 µmol mol-1) exposure, gallic acid increased tremendously especially in bothvaralata and pumila (948~936 µg g-1 dry weight, DW), whilst acute quercetin increase was registered in varlanceolata (260%) followed closely by alata (201%). Kaempherol, although were detected in CO_2 ambient condition, went undetected in all varieties after exposure. Instead, caffeic acid was tremendously improved in varalata (338~1100%) and pumila (298~433%). Meanwhile, pyragallol andrutin were only revealed in varalata (810 µg g-1 DW) and pumila (25 µg g-1 DW), respectively, under ambient condition; but the former compound went undetected in all varieties while rutin continued to increase by 262% after CO_2 enrichment. Interestingly, naringenin that was present in all varieties under ambient condition went undetected under enrichment except for varpumila where naringenin was enhanced by 1100%. PAL activity, DPPH and FRAP also increased with increasing CO_2 levels from 400 to 1200 µmol mol-1 implying the possible improvement of pharmaceutical quality of Malaysian L. pumila under high CO_2 enrichment

Keywords: Carbon dioxide enrichment, primary and secondary metabolites, phenolics and flavonoid profiling

Competitive Ability of Some Cover Crop Species against Asystasia Gangetica and *Pennisetum polystachion*

Category: Applied Research (B)

Assoc. Prof. Dr.Abdul Shukor Juraimi
Batoul Samedani, Md. Parvez Anwar, Mohd Rafii Bin Yusop,
Sheikh Awadz Sheikh Abdullah and Anuar Abdul Rahim
Faculty of Agriculture
ashukor@agri.upm.edu.my
03-89474807

Asystasia gangetica and *Pennisetum polystachion* are the most troublesome weeds in oil palm plantations in Malaysia and establishment of cover crops under oil palms is an integral part of sustainable weed management in plantations. Replacement-series experiments were conducted to evaluate the mode and strength of competitiveness of four legume cover crop species, *Calopogonium caeruleum*, *Centrosema pubescens*, *Mucuna bracteata* and *Pueraria javanica*, and one soft grass species, *Axonopus compressus*, against *Asystasia gangetica* and *Pennisetum polystachion*. Relative yield, relative yield total and relative crowding coefficient were calculated with reference to shoot biomass. *Asystasia gangetica* was a consistently weaker competitor than *Pennisetum polystachion*. The legume cover crop species had higher relative yield when grown in mixtures, whereas the yield of *Asystasia gangetica* was lower in mixtures with legumes than in monoculture. The higher competitiveness of legumes was due to greater canopy height and leaf area index. *Centrosema pubescens* was a slightly weaker competitor than the other legumes. Although leaf area per plant of *Centrosema pubescens* did not differ from that of other three legumes, canopy height and photosynthetically active radiation to the soil surface were lower. When grown with a cover crop for 12 weeks, dry weight per plant, leaf area and shoot number of *Pennisetum polystachion* increased as its proportion decreased in mixtures. Relative yield data indicated that *Pennisetum polystachion* is a strong competitor. *Axonopus compressus* was less susceptible to *Pennisetum polystachion* interference than the legumes. All cover crop species studied proved highly competitive against *Asystasia gangetica*, but none could compete against *Pennisetum polystachion*. The study confirms the feasibility of using cover crop for management of *Asystasia gangetica*.

Keywords: Competitiveness, cover crop, relative crowding coefficient, relative yield total, replacement series, weed

Potential Benefits of Vermicompost in Cassava (*Manihot esculenta* Crantz) Production to Human Health

Category: Applied Research (B)

Assoc. Prof. Siti Aishah Hassan
Nur Faezah Omar, Umi Kalsom Yusoff and Nur Ashikin Psyquay Abdullah
Faculty of Agriculture
aishah@agri.upm.edu.my
03-89474836

As an organic fertilizer, vermicompost change phytochemical compounds in cassava roots and leaves. Vermicompost reduces cyanogenic glycosides levels but increases vitamins, minerals, phenolic and flavonoid content and antioxidant activity compared to chemical-based fertilizer. Demand of cassava root in Malaysia by small and medium scale enterprise of tapioca industry is increasing. Tapioca chip is widely sold competitively with potato chip. However, cassava roots with high cyanide content will give bitter chips. The highest frying yields and lowest fat content are obtained from roots with the lowest water and cyanide content. Better root quality produced will produce quality tapioca chips. The roots are also used for production starch and as feed for livestock. Incline to consumer preferences and in line with growing interest in the country to use environmental-friendly technology for food production, potential demand of vermicompost and conventional compost in substituting chemicals will benefit bio-waste recycling industries. It will also ensure continuous productivity without causing any potential long term threat to environment and health.

Keywords: Cassava tuber, cassava leaves, organic fertilizer, phytochemical compounds, antioxidant activity

Effects of Ten Year Application of Empty Fruit Bunches in an Oil Palm Plantation on Soil Chemical Properties

Category: Applied Research (B)

Prof. Dr. Rosenani Abu Bakar
Siti Zauyah Darus, S. Kulaseharan and N. Jamaluddin
Faculty of Agriculture
rosenani@agri.upm.edu.my
03-89474863

The findings from this study indicate the potential uses of oil palm empty fruit bunch (EFB) for mulching and nutrient source for the oil palm industry itself. Oil palm EFB is a major waste product from the oil extraction process. Traditionally, oil palm EFB was incinerated in the mill as fibre fuel and had contributed to severe air pollution problems. Application of oil palm EFB as mulch provides a good and practical alternative method for waste management and also as a source of nutrient in the oil palm industry. The results from the study indicate that oil palm EFB mulch application improves soil fertility and sustains crop production in the long term. The findings from this study have the potential to improve agricultural waste management in the oil palm industry and reduce production cost by cutting down on fertilizer cost (nutrient management).

Keywords: Crop waste management, Mulch, Nutrient cycling, Soil carbon, Soil nitrogen

……..

Leaching of Napropamide under BRIS Soil Amended with Chicken Dung and POME

Category: Applied Research (B)

Dr. Samsuri Abd Wahid
Fardin Sadegh-Zadeh, Radziah Othman and Dzolkhifli Omar
Faculty of Agriculture
samsuri@agri.upm.edu.my
03-89474864

The study has shown that the addition of chicken dung and POME to BRIS soils prevent the leaching of napropamide.

Keywords: BRIS, napropamde, leaching, sorption-desorption

Oleic Acid Rich Fat Derivatives from Fractionation of Palm Oil_Moringa Oleifera Oil Blend

Category: Applied Research (B)

Prof. Dr. Hasanah Mohammed Ghazali
Mohammed Nazrim Marikkar
Faculty of Agriculture
hasanah@putra.upm.edu.my
03-89468345

The objective of this study was to see the effect of Moringaoleifera oil blending on the fractional crystallization behavior of palm oil. Palm oil blended with Moringaoleifera oil at 20% (w/w) was subjected to crystallization using dry process at 21 and 18˚C and solvent process at 15 and 10˚C. After recording the quantitative recoveries of the liquid and solid fractions, their fatty acid and triacylglycerol (TAG) composition, and the thermal profiles were determined by using gas liquid chromatography (GLC), and high performance liquid chromatography (HPLC), and differential scanning calorimetry (DSC), respectively. Results showed that the yield recoveries of liquid fractions under solvent-assisted crystallization are higher than those obtained by dry-crystallization conditions. Almost all the liquid fractions isolated experienced significant ($p<0.05$)which increased in oleic acid as well as triolein contents. Among the solid fractions, those isolated by dry-crystallization are found to higher ($p<0.05$) oleic acid and triolein contents than the reference stearin sample. Although the thermal profiles of the solid and liquid fractions derived by different methods looked similar to those of the two reference samples, remarkable differences are noticed with regard to the onset of crystallization and the positions of the thermal transitions.

Keywords: Dry fractionation,fractional crystallization,Moringaoleifera, palm oil fractions, thermal properties, solvent fractionation

Molecular Diversity of the Foregut Bacteria Population in the Dromedary Camel (*Camelus dromedarius*)

Category: Fundamental (A)

Dr. Anjas Asmara @ Ab. Hadi Bin Samsudin
Rafat Al Jassim and Andre-Denis G. Wright
Faculty of Agriculture
anjas@putra.upm.edu.my
03-89474878

The molecular diversity of the foregut bacterial community in the dromedary camel (Camelusdromedarius) in Central Australia was investigated through comparative analyses of 16S rRNA gene sequences prepared from the foregut contents of 12 adult feral camels fed on native vegetation. The novelty in this foregut environment is remarkable where 97% of the OTUs were unrelated to any known sequence in the public database. Sequence data from the present study represent novel bacterial sequences representing new species, several new genera and likely a new family. Furthermore, this research should not only contribute to our knowledge about the poorly understood microbial ecosystem of the camel gastrointestinal tract but also should enable us to understand the inter-relationships of these microorganisms to the animal's productivity and performance.

Keywords: Bacterial diversity, 16S rRNA clone library, rumen, dromedary camel

.....

Species Composition and Distribution of Sergestid Shrimps (Acetes spp.) in Malaysian Waters

Category: Fundamental (A)

Dr. S. M. Nurul Amin
Aziz Arshad and M. Aminur Rahman
Faculty of Agriculture
smnabd@gmail.com
03-89474891

Five species of sergestid shrimps viz. Acetesindicus, Acetesjaponicus, Acetesintermedius, Acetes vulgaris and Acetesserrulatus were identified from the different coastal region of Peninsular Malaysia and East Malaysia. Acetesindicus was recorded from the coastal waters of KlebangBesar in the state of Malacca and also in Kuala Gula Perak. The widely distributed shrimp A. japonicus was identified from the coastal waters of KlebangBesar (Malacca), Kuala Gula (Perak), BaganAjam (Pulau Pinang), Kuala Sala (Kedah) and Sungai Berembang (Perlis). Acetesintermedius was collected from the coastal waters of KlebangBesar

(Malacca), SeberangTakir (Terengganu) and Bintulu (Sarawak). Acetes vulgaris and A. serrulatus were restricted to the coastal waters of Pontian and Kukup in southwestern Johor

Keywords: Taxonomy, Acetes, sergestid shrimp, Peninsular Malaysia

……..

Phylogenetic of Southeast Asian Horseshoe Crab, Tachypleus Gigas in East Coast of Malaysia Revealed Using Mitochondrial Dna

Category: Fundamental (A)

Mr. Rozihan Mohamed
Endom Ismail
Faculty of Agriculture
rozihan@agri.upm.edu.my
03-89474887

An attempt was made to scrutinize the influence of Malaysian continental drift on the genetic and haplotype diversity of Malaysian horseshoe crab (Tachypleusgigas [Muller, 1785]) distributed along the east coast of Peninsular Malaysia and distant Borneo Island. Mitochondrial DNA (AT rich region = 369bp) analysis showed that T. gigas has higher haplotype diversity in peninsular Malaysia compared to east Malaysian (Sarawak) samples. Highest haplotype diversity (h±SD) was observed among the Terengganu samples (0.813 ± 0.071) followed by Pahang samples (0.813 ± 0.065). There were no difference in nucleotide diversity (?) noted in east cost of Peninsular Malaysian (PM) samples. Overall haplotype (h±SD) and nucleotide (ϖ±SD) diversity of T. gigas in PM samples including Sarawak was 0.827 ± 0.051 and 0.0078 ± 0.0014 respectively. A total of 6 unique haplotypes were recorded of which 2, 2 and 1 were unique to Terengganu, Sarawak and Pahang samples respectively. Pair wise haplotype frequency (FST) value was not statistically significant (P > 0.05) for all the groups indicating the limited gene flow among the population. In addition phylogenetic scrutiny visibly clustered T. gigas samples from T. tridentatus samples representing sound phylogenetic signals in mtDNA AT rich region. The findings from this study have important implications for proper management and conservation of horseshoe crab in Malaysia.

Keywords: Phylogenetic, Mitochondrial DNA AT-rich region, Tachypleusgigas, genetic conservation

Isolation, Screening and Characterization of Potential Probiotics from Farmed Tiger Grouper (*Epinephelus Fuscoguttatus*)

Category: Fundamental (A)

Dr. Ina Salwany Md Yasin
Nurhidayu Al-saari, Hassan Mohd Daud, Sharr Azni Harmin
Faculty of Agriculture
salwany@putra.upm.edu.my
03-89474932

Rapid development in today's aquaculture industries have expanded to the level of commercial scale and has indirectly led to environmental degradation and catastrophic losses due to bacterial diseases. Thus, the application of probiotics was proposed as an environmental-friendly preventive measure. This study was carried out specifically to search for probiotic candidates for use in the larviculture of Epinephelusfuscoguttatus. In the present study, a greater emphasis was given to the selection and screening of potential bacterial probiotics for grouper larviculture. The intestines of healthy individual grouper which were randomly collected from three geographically distance farms in Malaysia. Preliminary screening on 123 isolates revealed that 40 (32.5%) bacteria displayed strong antagonistic activity when tested against four fish pathogens. Most of them (n=32; 80%) are Gram-positive. Only nine (22.5%) out of the 40 isolates showed gamma haemolysis. From nine isolates, 16S rRNA gene sequence analysis and antibiotic susceptibility test were used to eliminate potential pathogenic nature to human and sequences similarity from which they were considered identical. The results showed three promising probiotic candidates' namely B. cereus JAQ04 and Micrococcus luteus JAQ06 and JAQ07 after assessed by BLIS assay. Further in vivo effect and some molecular studies might be helpful and recommended for understanding a novel probiotic strains prior their application in aquaculture.

Keywords: *Epinephelus fuscoguttatus*, intestinal microflora, aerobes, facultative anaerobes, probiotics

Changes Over Timein Muscle Fatty Acid Composition of Malaysian Mahseer, Tor Tambroides Fed Different Dietary Lipid Percentage

Category: Fundamental (A)

Assoc. Prof. Mohd Salleh Kamarudin
Ehsan Ramezani Fard, Che Roos Saad and Sharr Azni Harmin
Faculty of Agriculture
msalleh@agri.upm.edu.my
03-89474817

The effects of four isonitrogenous diets containing different lipid levels on the muscle fatty acid profiles of Malaysian mahseer were evaluated over a period of six weeks from Jun to July, 2010. A general increase of monounsaturated fatty acid contents in the muscle of fish that were fed the test diets was detected after two weeks. Despite the high total content of long chain n-3 PUFA in the formulated diets, the levels of these fatty acids in the muscle did not increase and it may be speculated that the content of long chain n-3 PUFAs in this species was determined by desaturation and elongation of shorter chain fatty acids rather than direct absorption from the diet. Moreover, reduction of muscle n-3 PUFA content after six weeks of feeding shows that a diet containing high level of n-3 PUFA may not be able to provide all the essential fatty acid requirements of T. tambroides.

Keywords: Fatty acid, Lipid, Muscle, Malaysian mahseer, Tor tambroides

.....

Diversity of Ichthyoplankton in the Seagrass Beds of Sungai Pulai Estuary, Johor, Malaysia.

Category: Fundamental (A)

Prof. Dr. Aziz Arshad
Roushon Ara, S.M. Nurul Amin, Mazlan Abdul Ghaffar, Fatimah Md. Yusoff and M. Aminur Rahman
Faculty of Agriculture
azizarshad@putra.upm.edu.my
03-89474805

Larval fish composition, seasonal diversity and their abundance influenced by environmental parameters were investigated between October 2007 and September 2008 in the Sungai Pulaiseagrass beds of Johor, Malaysia. Fish larvae were collected monthly by a bongo net through 30 minutes surface tows in the seagrass beds. In situ environmental variables were recorded during the sampling cruises. Habitat temperatures of fish larvae

ranged from 26.92 - 30.83 0C (Mean ± SE, 29.11 ± 0.34); dissolved oxygen ranged from 4.73 to 7.19 mgL-1 (5.96 ± 0.19) and the salinity fluctuation was between 27.38 and 33.67 ppt (30.64 ± 0.50). In total 2,801 larvae, belonging to 20 families were recorded, with a mean abundance of 79 individuals/100 m3. Top six families (Clupeidae, Terapontidae, Nemipteridae, Sillaginidae, Blenniidae and Gobiidae) occurred consistently around the year. Larvae belonging to family Clupeidae (47.94%) and Terapontidae (17.35%) were the most abundant in the study area. The density of total larval fishes varied significantly ($P < 0.05$) among the different months. The highest diversity index (1.99) was observed in July while the lowest (1.20) was observed in September. Mean body length of larval fishes was 3.34 ± 0.51 mm (mean ± SE) and ranged from 1.20 to 15.52 mm. It was revealed that 45% of the individuals were less than 4 mm and 99% were less than 6 mm (TL). The abundance of dominant families was found to have correlation (positive or negative) with the water parameters. Regular occurrence of larvae of different size range confirms the continuous spawning activity in this seagrass area.

Keywords: Ichthyoplankton, Ecology, diversity, seagrass, Malaysia

……..

Utricularia Species and Their Environment

Category: Fundamental (A)

Assoc. Prof. Dr. Muta Harah Zakaria
Japar Sidik Bujang and Wan Noorazlinda Wan Mohd Rodzi
Faculty of Agriculture
drmuta@btu.upm.edu.my
03-89474890

A total of 22 sites surveyed from Bintulu, Mukah, Sibu and Sarikei districts, Sarawak, were observed and recorded for wetland habitats e.g. marshes, ditches, roadsides, ponds, lakes that harbor insectivores plants, Utricularia. This study compared environmental condition variables among terrestrial and aquatic Utricularia species. Terrestrial Utricularia species; Utricularia bifida L., UtricułariacaerulaeL. and UtriculariaminutissimaVahl., occurred in habitats inhabiting different substrate textures; clay, sandy clay, sandy loam and silty clay loam with distinct pH ranged between 3.81 to 7.78 and nutrients availability such as available P 18.0 to 718.33 µg/L, K 11.83 to 171.27 µg/L, Ca 41.53 to 797.27 µg/L, Mg 2.63 to 210.87 µg/L, and Na 35.87 to 122.87 µg/L, total Nitrogen undetectable to 0.2080 µg/L and Total Organic Carbon 0.0031 to 0.2795 mg/L. Aquatic Utricularia species grew in water of low and high concentrations of Nitrate Nitrogen (NO2-N) 0.002 to 0.1135 mg/L, Total Ammonia Nitrogen (TAN) and Soluble Reactive Phosphorus (SRP) concentration ranged 0.0204 to 1.287 mg/L and 0.003 to 0.137 mg/L respectively. In aquatic environment Utricularia plants; UtriculariaaureaL. and UtriculariagibbaL. were highly adapted to wide range of environmental variables; water pH from as low to 2.82 to those slightly above

neutral 7.78, water temperature, 23.6 to 37.5°C, dissolved oxygen, 3.11 to 14.7 mg/L and turbidity 1.95 to 37.5 NTU. The findings of this study suggested that Utricularia species are highly adapted to wide range of substrates and aquatic environments with low pH and in low nutrient levels.

Keywords: Utricularia sp., wetland habitats, Sarawak

……..

Development and Validation of Enzyme-Linked Immunosorbent Assay (ELISA) Vitellogenin in Lates calcarifer

Category: Fundamental (A)

Prof. Dr. Siti Shapor Siraj
Sharr Azni Harmin, Ina Salwany Md Yasin, Noor Fazielawanie Mohd Rashid
Faculty of Agriculture
shapor@putra.upm.edu.my
03-89471471

A study was conducted to develop and validate a competitive enzyme-linked immunosorbent assay (ELISA) for detection of plasmatic vtg in Asian Sea bass, Latescalcarifer. Highly specific polyclonal antibodies against purified vtg (antigen) were employed for quantifying the concentration of plasma vtg. The working ranges of the assay were 31.2 to 1000 ng/ml with the sensitivity of 6.9 ng/ml. Antigen concentration of 250 ng/ml and antibody dilution of 1:1000 were selected as a workable ELISA after several preliminary test. The ELISA demonstrated precision with intra- and inter-assay coefficient of variations (CVs) at 90, 80 and 50% of binding were less than 8.4% (n=9) and 12.1% (n=5), respectively. Serial plasma dilutions from natural vitellogenic females and E2-treated were paralleled to the vtg standard curve (purified vtg) as analyzed by ANCOVA ($p < 0.05$). No cross-reaction was observed in analyses of male's plasma, indicating non-specific binding. The assay was validated by measuring plasma vtg levels in matured females and males (n=5) obtained during the reproductive season in captive condition. Female's plasma vtg ranges from 0.9 to 1.54 mg/ml, while no vtg was detected in males plasma. Our results indicated that vtg levels proposed as an indicator for maturing female Asian sea bass, L. calcarifer as well as in female species from genus Lates.

Keywords: ELISA, Lates calcarifer, Vitellogenin

Performance of Selected Chemical Compounds in Eliciting Feeding of Asian Buffalo Leech, *Hirudinaria manillensis*

Category: Fundamental (A)

Assoc. Prof. Dr. Mohd Salleh Kamarudin
Teh Jun Chin, Abdullah Abd Rahim and Che Roos Saad
Faculty of Agriculture
msalleh@agri.upm.edu.my
03-89474817

The understanding of appetitive and foraging behavior of medicinal leeches is important for successful breeding and culture of healthy leeches. This study was conducted to determine the response of Asian buffalo leech, Hirudinariamanillensis to combinations of selected chemical compounds. Five solutions with different combinations of sodium chloride, arginine, glycine and glucose were filled into rubber sacs and fed to the leeches in 3 replicates each. Heparinized cattle blood was used as the control. The percentages of leech that approached the sacs and the average volume consumed per individual were estimated. After feeding, the survival of leeches in each treatment was monitored daily for seven days. The results showed that a solution containing 150mM sodium chloride, 1mM L-arginine, 50mM glycine and 1mg/ml glucose gave significantly higher ($P<0.05$) approach percentage and feed consumption than other solutions. Its performance was equivalent to the cattle blood. Poor feeding consumption was observed when only L-arginine or glycine was added to the saline solution. Nevertheless, mortality up to 40% was observed among the feeding leeches while the survival of non-feeding leeches was nearing or at 100%.

Keywords: Asian buffalo leech, *Hirudinaria manillensis*, feeding response, chemical stimuli.

……..

Population Genetic of Horseshoe Crab (Tachypleus Gigas) in East Coast of Malaysia Revealed Using Microsatellite Markers

Category: Fundamental (A)

Mr. Rozihan Mohamed
E. Ismail and S.M.N. Amin
Faculty of Agriculture
rozihan@agri.upm.edu.my
03-89474887

We examined the genetic structure of horseshoe crab (Tachypleusgigas) population using 18 microsatellite markers. Samples were collected from 2 stations of east coast

of peninsular Malaysia and one station from Borneo Island (East Malaysia). All the observed allelic frequency showed no significant variation between sampling stations ($P > 0.05$). Mean allelic richness (Ar) was greater in Sarawak population (4.83) followed by Pahang (4.24) and Terengganu (3.57) samples with the overall mean allelic richness of 4.21. Mean inbreeding coefficient (FIS) value was higher in Sarawak population (0.37) followed by Terengganu (0.31) and Pahang population (0.17). The genetic differentiation (FST value) and genetic distance between geographically closer populations was smaller compared to geographically isolated populations. Due to the dwindling population size of horseshoe crabs in Malaysian coast line, present data would help in proper management and conservation of this living fossil along the east coast of Malaysia.

Keywords: Horseshoe crabs, fishery management, microsatellite markers, population genetics

.....

Description and Evaluation of Imposex in Strombus canarium Linnaeus, 1758 (Gastropoda, Strombidae): A Potential Bio-indicator of Tributyltin Pollution

Category: Fundamental (A)

Prof. Dr. Aziz Arshad
Zaidi Che Cob, Japar Sidik Bujang, S.M.Nurul Amin and Mazlan Abd. Ghaffar
Faculty of Agriculture
azizarshad@putra.upm.edu.my
03-89464118

Strombuscanarium Linnaeus, 1758 is an important gastropod species within the study area and was traditionally collected for food by the locals. The objectives of the present study were to assess the incidence of imposex and its severity in this species. Adult conchs were sampled during their reproductive period, from October 2005 to January 2006, at Sungai Pulai estuary, Johor, Malaysia. A total of 32.81% of adult females showed imposex characteristics, with varying degrees of severity through. Relative penis size (RPS), index ranged from 1.74 to 33.29 (mean = 13.40 ± 2.27, n = 21), while the relative penis length (RPL), index ranged from 6.28 to 55.19 (mean = 13.40 ± 2.27, n = 21). The use of vas deferens sequence (VDS) index was however cannot be applied as the presence of egg groove obscured any vas diferens development in affected females. Sequence of imposex (male penis) development in female conch, from merely a small stump to an advance male penis homologous was therefore carefully analyzed and described, and an alternative imposex classification scheme was proposed. S. canarium can be a good indicator for monitoring of organotin pollution within the study area.

Keywords: Dog conch, imposex scheme, Strombidae

Development of a Potential Lignocellulolytic Resource for Rapid Bioconversion of Rice Straw

Category: Fundamental (A)

Prof. Dr. Sariah Meon
Md. Kausar Hossain, H. Mohd Saud, M. Razi Ismail and M. Zahangir Alam
Faculty of Agriculture
sariahm@putra.upm.edu.my
03-89474850

Rice is the most important crop in the world which accumulates huge amount of straw as by-product. The disposal of rice straw is a problem due to the huge bulk material, slow degradation rate and harboring of diseases. Moreover, it cannot be used as animal feed due to its low digestibility, low protein, high lignin and silica content. In many countries including Malaysia, the huge amount of straw is disposed through open burning, which causes serious environmental problems as well as a threat to public health. Attention has been focused on nonhazardous, environment friendly and sustainable techniques for safe disposal of rice straw in a short period of time. Microbial composting is an effective environmentally sound alternative for the recycling of rice straw into compost. Actinobacteria are well known for their ability to decompose lignocellulosic components, which make them important agents in composting process. They can survive in the high temperature during composting and generate soluble carbohydrate from rice straw. Fungi and bacteria are reported to dominate in the mesophilic phase for the utilization of the soluble and easily metabolized carbohydrates. Whereas actinobacteria gradually replace the mesophilic populations and dominated in the thermophilic phase for the mineralization of most recalcitrant components to simple sugar during the composting of lignocellulosic wastes. Hence, composting of rice straw preinoculated with potential lignocellulolyticactinobacteria perhaps play important role in the efficient and rapid composting of bulky rice straw.

Keywords: Rice straw, lignocellulase, Micromonosporacarbonacea, actinobacteria, biodegradation

Cryopreservation of Oil Palm (*Elaeis Guineensis* Jacq.) Polyembroids Using Encapsulation Dehydration Technique

Category: Fundamental (A)

Assoc. Prof. Dr. Uma Rani Sinniah
Sharrmila Rengeswari Palanyandy, Maheran Abdul Aziz and Sreeramanan Subramaniam
Faculty of Agriculture
umarani@agri.upm.edu.my
03-89474839

In this study, the cryopreservation of oil palm polyembryoids has been successfully demonstrated using encapsulation dehydration method. It is the technology developed for producing synthetic seeds, i.e. the encapsulation of explants in calcium alginate beads. Somatic embryogenesis of oil palm for synthetic seed production has been reported by other researchers but cryopreservation of oil palm polyembryoids using encapsulation dehydration method has not been reported yet. There have been few cryopreservation methods that employed for oil palm somatic embryos but the survival rate that obtained was not that satisfactory. Thus, in this study encapsulation dehydration technique has been employed in order to identify the optimum success rate. Based on the results obtained, 73.3% survival percentage was obtained with 23.3% optimum water content for encapsulated polyembryoids that subjected for gradual sucrose preculture for 1 week and desiccated under laminar air flow prior to liquid nitrogen exposure.

Keywords: Cryopreservation, encapsulation, polyembryoids

……..

Enhancement of *In Vitro* Flowering In Vitex Negundo Via Physico-Chemical Treatments

Category: Fundamental (A)

Assoc. Prof. Dr. Uma Rani Sinniah
Saikat Gantait
Faculty of Agriculture
umarani@agri.upm.edu.my
03-89474839

Vitex negundo L, an economically prominent woody aromatic small medicinal tree, is credited with various pharmacological activities. The essential oil extracted from flowers of *V. negundo* has been proven to be successful for the treatment of various digestive disorders. Notwithstanding the medicinal importance, flowering is season specific and irregular, appearing only after a long vegetative phase of its growth. This limits its

extensive availability of phytomedicinal components throughout the year. The present study sought to gather further information related to the control of in vitro flowering in *V. nugando* L. The effect of various physical (photoperiod and temperature) and chemical (gibberellic acid (GA3) and pH) factors on in vitro flower induction was evaluated. The integrated use of both physical and chemical factors provides an improved protocol for flower induction in *V. negundo in vitro*. Besides inducing a greater number of flowers per microplant, this particular study proved to be superior as it resulted in the highest percentage of flowering (98.6%). It is significant from the study that the inclusion of a suitable level of GA3 in the culture medium played the key role in controlling the in vitro flowering of *V. negundo*. The effect of GA3 was further improved by correct implements of other factors like pH, photoperiod and temperature. The results obtained indicated the in vitro flower induction process to be extremely effective and proved to be a helpful system for further sophisticated research in the field of flowering regulation mechanisms.

Keywords: Gibberellic acid, micropropagation, Murashige and Skoog medium, pH, photoperiod, temperature regime

……..

Population Characteristics and Fecundity Estimates of Short-Spined White Sea Urchin, Salmacis sphaeroides from Johor, Malaysia

Category: Fundamental (A)

Prof. Dr. Fatimah Md. Yusoff
M. Aminur Rahman, A. Arshad, S.M.N. Amin, Shater Zakaria and Mariana Nor Shamsudin
Faculty of Agriculture
fatimahyus@gmail.com
03-89474966

An attempt was undertaken to describe the size frequency distribution, length weight relationships and fecundity estimates of short-spined sea urchin, Salmacissphaeroides from Peninsular Malaysia. In total 355 specimens of S. sphaeroides were collected from the inter-tidal reef of TanjungAdang of Johor during the breeding season in March-August 2011. For each individual, the total length (TL) was measured using digital slide calipers and individual body weight (BW) was also taken through a digital balance. Mean length of S. sphaeroides was estimated as 72.85 mm and the mean weight was 143.01 g. Among the 355 specimens measured, 158 were males and 197 were females, indicating a sex ratio of 1 male to 1 female (1: 1.25). The logarithmic form of length-weight relationship of S. sphaeroides was LogW = 2.4396 LogTL - 2.3958. The exponential form of equation obtained for the length-weight relation was W = 0.004 TL2.4396. The value of regression co-efficient (r2) estimated for the species was 0.77. The mean fecundity was estimated at 76,76,000 (± 2,47,773) with a range between 72,60,000 and 81,50,000 eggs. The regression coefficient between the absolute fecundity (F) and total length (TL) was 0.76 and between

the fecundity and drained body weight (DW) was 0.89 that revealed that linear regression model with a positive and significant relationship. This study presents for the first time results on the total length-body weight relationships and fecundity estimates of this sea urchin from Johor, Malaysia. The findings from the designated study would immensely be helpful towards the understanding of growth patterns and fecundity, which will ultimately facilitate us to develop the breeding, larval rearing and aquaculture of sea urchins.

Keywords: Population growth, Fecundity, Salmacis sphaeroides, Peninsular Malaysia

……..

Use of Artificial Neural Networks (Anns) for Modelling the Behaviour of Environmental Contaminants through Fish Biomarkers

Category: Fundamental (A)

Dr. Annie Christianus
Ali Karami and Simon C. Courtenay
Faculty of Agriculture
annie@putra.upm.edu.my
03-89474884

To develop a reliable prognosis model of water contamination, African catfish (Clariasgariepinus) were injected intramuscularly (i.m.) or intraperitoneally (i.p.) with 10, 30 or 50 mg/kg body weight benzo[a]pyrene (BaP). Fish were sampled 24, 48 and 72 h post-injection to measure the selected biomarkers hepatic glutathione S-transferase (GST) and four metabolites of BaP in the bile. From these biomarkers, artificial neural network (ANN) models were developed including linear neural network, feed forward multilayer perceptron (MLP) and radial basis function (RBF). Models were employed to estimate injection method, time, and dosage of BaP injection (output variables in the models). Performance criteria for selecting the optimum structure were: correlation coefficient (r), mean error (ME), and mean-square error (MSE). The MLP neural network resulted in the most accurate prediction of the output variables. Though RBF neural network showed reliable performance in prediction of dosage and injection method, higher variation (SE) among the different replications was the main drawback of this model compared to MLP model. Lowest precision was obtained with the linear network. Sensitivity analysis runs on the MLP model showed more precise prediction of time and dosage of BaP injection by removing some input variables. However, accurate prediction of method of injection required retaining all the input variables, highlighting the necessity of using the battery of biomarkers in some ecotoxicological studies. This was the first study to model the behaviour of environmental contaminants by using fish biomarkers through ANNs

Keywords: Neural network, biomarker

Composted Recycled Paper Mill Sludge as Plant Nutrients Source

Category: Product / Innovation (C)

Assoc. Prof. Dr. Che Fauziah Ishak
Rosazlin Abdullah, Wan Rasidah Kadir and Rosenani Abu Bakar
Faculty of Agriculture
fauziah@agri.upm.edu.my
03-89474919

Recycled Paper Mill Sludge (RPMS) is the final processed wastes from pulp and paper industries generated from different stages of papermaking. At present, Malaysia generates about 1 million metric tonnes of RPMS annually from 19 mills. All paper industries produce sludge and these quantities are accumulating every year which leads to environmental problems in the country. Some of the wastes from the paper manufacturing mill are categorized under hazardous toxic waste by the Department of Environment, Malaysia and therefore, these wastes are classified as scheduled waste and unutilized in Malaysia. This study was carried out to investigate the potential use of RPMS as a value added product, an approach that may partly solve the disposal problem. We believe that composting will play critical role in integrated waste management as populations continue to grow and financial, material, environmental resources become scarcer. The RPMS were mixed with EFB (as a bulking agent) in 3 ratios, that is 1:1, 1:2 and 1:3 (RPMS: EFB) based on volume/volume. These composts mixtures had no toxicity effects on plants, had 100% seed germination, high in nutrient contents, low in C/N ratio and had fine particle size of <18 mm. The concentrations of heavy metals were also within the recommended level of the Council of European Communities (CEC) for compost. Based on the results of this study, compost with 1:1 volume ratio is recommended for land application as compared to 1:2 and 1:3 (RPMS: EFB). Moreover, usage of compost with 1:1 ratio over the other ratios will allow greater utilization of RPMS in the effort of the paper mill industries to recycle their wastes. The production of this compost can solve the waste disposal problems, perhaps generate income to the paper mills as well as produce soil amendment and nutrients supplement to plants for higher yield.

Keywords: Compost quality, plant nutrients, heavy metals, phytotoxicity test

PRPI 2012

UPM's Research & Innovation

FACULTY OF FORESTRY

Bioaugmentation of Pectin Decomposting Bacteria and Catalyst on *Musa sapientum* Pseudostem Fibre

Category: Applied Research (B)

Dr. Rasmina Halis
Naimah Mohd Salleh, Norhaslida Razali and Low Joo Choo
Faculty of Forestry
rasmina@putra.upm.edu.my
03-89467213

The banana fibers can obtain from the wasteful part of the plant by mechanically, chemically and biologically. It would indeed be beneficial and yet not fully exploited. The fiber is off-white and very good lustre especially for textile industry. The upper and lower portions of Musa sapientum pseudo-stem sheaths were exposed in four type of treatments; additional pectin decomposing bacteria, Magnesium Oxide (MgO), both pectin decomposing bacteria and MgO and control. Retting periods were based completed day of retting plus additional of 0-d, 5-d and 10-days. The fiber strength properties were tested using SIRIM Standard (MS 441:76) and color changes using gray scale for color change (ATCC 1976). All effluent treatments were discoloration, slightly acidic and had foul smells. The bioaugmentation of pectin decomposing bacteria together with MgO additions found out enhanced retting process by reducing retting periods 52% compare to control. Treatments gave lower time to degrade and better strength on the fibers compare to control. There were significant effects on the fiber elongation and tensile strength on retting periods. The highest fiber strength was on day 5. Based the portion, lower portion gave the higher strength than upper portion. Color changes showed that the bioaugmentation of pectin bacteria enhanced the degradation coloring compound in banana fibers.

Keywords: Banana pseudo-stem, banana fiber, retting, bioaugmentation, pectin decomposing bacteria, catalyst, MgO

A Novel Method for the Detection of *Aquilaria* (Thymelaeaceae) DNA in Agarwood and Products using Real-time PCR for Implementing CITES Control

Category: Applied Research (B)

Dr. Rozi Mohamed
Tan Hang Yen and Siah Chai Har
Faculty of Forestry
rozimohd@putra.upm.edu.my
03-89467183

Agarwood has been used traditionally in religious ceremonies and medicines, and in modern times the essential oil is used in fine perfumery and contemporary medicines. This resinous wood originates from tropical trees, belonging taxonomically to the Thymelaeaceae. In the South-East Asia region, Aquilaria is the major producer. High demand for agarwood and its products leads to over-harvesting and causes declination of Aquilaria population. Therefore, the genus Aquilaria is CITES-protected (CITES 2011). However, criminal traders often provide false declarations of the species involved to circumvent CITES control. To overcome this problem, DNA method can be adopted to provide evidence leading to the identity of the species. Although agarwood is dry wood, some potentialities in genetic analyses on dry wood is possible as chloroplast, mitochondrial and nuclear DNA sequences could all be recovered through PCR amplification. Successful amplification of DNA fragments from dead wood of several tropical trees has been reported (Rachmayanti et al. 2009; Finkeldey et al. 2010). This means that the geographical origin or taxonomic status of wood samples can be checked, provided some surveys and databases are available (Deguilloux et. al. 2002). This study describes the development of real-time PCR (RT-PCR) technique for detecting the trnL-trnF DNA sequence fragment in agarwood and its products.We demonstrated the use of qualitative RT-PCR assay for detecting DNA presence of Thymelaeaceae origin for the purpose of implementing CITES control. Because many important agarwood-producing species come from this family, and the Appendix II of CITES is not species-specific, this method is useful for identifying the family origins of agarwood chips and products even when the product has undergone extensive processing. It could be used as a rapid tool to check on culprits who do not adhere to CITES regulations.

Keywords: Conservation, CITES, DNA detection, endangered tropical tree, real-time PCR

Evaluation of Four Tropical Tree Species as Phytoremediators for Heavy Metal in Sewage Sludge Contaminated Soil

Category: Applied Research (B)

Prof. Dato Dr. Nik Muhamad Ab Majid
M.M. Islam, Arifin A. and Ghafoori M.
Faculty of Forestry
nik@forr.upm.edu.my
03-89467211

There are so many potentially harmful substance found in sludge particularly heavy metals. Heavy metals are dangerous environmental pollutants that can be transferred and accumulated in human and animal bodies causing DNA damage and carcinogenic effect. Rapid urbanization, a consequence of economic development and increased population has led to production of huge quantities of sewage sludge in Malaysia and has posed serious environmental problems for their disposal. Sewage sludge contains heavy metals which cause threats to soil quality and human health and high concentrations of heavy metal are harmful to plants, animals and humans. These contaminants need to be cleaned up for a safe environment. The experiment was conducted to evaluate the potential of Jatrophacurcas, Justiciagendarussa, Dyeracostulataand Pluheaindica as phytoremediators to absorb heavy metal from sludge contaminated soils. Seedlings were planted on six different growth media (soil + sludge) as follows: 100% soil, 80% soil+20% sludge, 60% soil+40% sludge, 40% soil+60% sludge, 20% soil+80% sludge and 100% sludge. Among treatment combinations, 40% soil+60% sludge was found to be best in terms of growth, biomass production and heavy metal absorption. After harvest heavy metal concentration was decreased significantly in the growth media. Copper and iron was highly concentrated in the roots, Pb in the stems, Zn in the leaves, Al both leaves and stems. Among the plant species, Jatrophacurcas and Dyeracostulata showed maximum absorption of heavy metal. Dyeracostulata showed highest translocation factor than the other species. All species have high translocation factor (TF) and low bioconcentration factor (BCF) in the contaminated soil. Heavy metal tolerance with high TF and low BCF values was suggested for phytoaccumulators of contaminated soils. Therefore, among the four species, Jatrophacurcas and Dyeracostulata can be used as phytoremediators for multi-metal contaminated soils and to mitigate soil pollution.

Keywords: Heavy metal uptake, contaminated soil, translocation, tropical tree species

Automated Roadside Trees Hazard Risk Assessment by Using UPM-MUTIS ver 1.0

Category: Applied Research (B)

Dr. Alias Mohd Sood
Ismail Adnan Abdul Malek, Amat Ramsa Yaman and Jonathan Teng Yi Chuon
Faculty of Forestry
ms-alias@putra.upm.edu.my
03-89467168

UPM-MUTIS (Universiti Putra Malaysia-Malaysian Urban Trees Information System) is a comprehensive roadside tree inventory and management system that provides decision support system in determining the hazard risk and suggesting abatement for subsequent actions as well as generating conforming reporting. Upon data input, hazard risk of each tree will be automatically determined and abatement will be prescribed for the Local Municipal council to take remedy actions. Interactively, maps can also be generated based on user requirements such as mapping of all severe hazard roadside trees in an area. This program will assist the Local Municipal council staff in evaluating, determining and locating trees that are hazardous to the public for fast remedy action, thus avoiding fatal incidents of uprooted roadside trees or fallen branch. The purpose is to guarantee safety of public nearby roadside trees.

Keywords: GIS, decision support system, roadside trees management, urban forestry

……..

Optimisation of the Process Parameters Affecting Properties of Compreg Wood Using Response Surface Methodology (RSM)

Category: Fundamental (A)

Assoc. Prof. Dr. Zaidon Ashaari
Paridah Md Tahir, Kim Gyu Heok and Edi Suhaimi Bakar
Faculty of Forestry
zaidon@putra.upm.edu.my
03-89467174

The depletion supply of high quality timbers from natural and plantation forests have led manufacturers seeking for timber species which have not been fully utilized due to their poor properties in nature. A series of work has been conducted at Faculty of Forestry, Universiti Putra Malaysia to improve the properties of low density wood of sesenduk (Endospermumdiadenum) through compregnating the wood strips with low molecular weight (approximately 600) phenol formaldehyde and subsequently followed by laminating the product under hot press. The treated product which is also known as

compreg laminate was found to be suitable for parquet flooring, paneling and furniture components. High quality compreg laminates can be produced by optimizing the processing variables.Central composite design (CCD) using response surface method (RSM) with three process variables namely, phenol formaldehyde concentration (PC), pre-curing time (PCT) and compression ratio (CR) was employed in a pre-determined region of the independent variables, which will later be analysed to locate the optimum values of independent variables for the optimum response. Wood strips (25 mm x 150 mm x 5 mm) were impregnated with phenol formaldehyde (mw 600) using a vacuum-pressure process. The process involved 30 min vacuum, filling of solution and left soaking in the solution at 690 kPa pressure for 30 min. After treatment, they were pre-cured at 65ºC followed by assembled parallel to each other into three layer laminates prior to compressing at several compression ratios under hot press at a temperature of 150±2ºC for 20 min. The results showed that RSM was successfully applied to predict the change of properties under various optimal operational conditions. Quadratic equations were constructed to predict the density, WPG, TS and RWA and a linear equation was developed for ASE.

Keywords: central composite design, response surface method, phenol formaldehyde, compreg

……..

V-Grooving: A New Conversion Method of Bamboo Culms into Flat Bamboo Sheet

Category: Product / Innovation (C)

Assoc. Prof. Dr. Edi Suhaimi Bakar
Zaidon Ashaari, Thilagawathy Maniam, Nicolas Anthony and Ma Sui Chan
Faculty of Forestry
edisuhaimi@putra.upm.edu.my
03-89467165

The present invention relates to the method and the apparatus for converting cylinder shaped bamboo culms into flat, solid bamboo sheets that can be further processed into various high value-added products. The culm internodes are cut in a series of V-shaped grooves at its outer-side by a special design grooving machine at a predetermined grooving interval. The optimum grooving intervals, which are the function of culm diameter, thickness and the grooving angle, are tabulated in a Grooving Table for simple operator use. Each grooving has 0.5-1.0mm depth grooving cease that serves as pivoted connector to maintain the culm intact and provides pivoted hinge function necessary for flattening process. After series of grooving being completed and the last groove is cut through, the grooved culm is opened up by hand and simply flattened under a pressing machine or clamper. The hinge function of the grooving cease transfers the vertical forces of the pressing into lateral forces that facilitate each the groove to close tightly and can be fixed become flat sheet upon they has been previously coated with certain glue. Since the flattened culm is wide and laterally

straight, it can be efficiently and practically planed by a planing machine on one or both of its surfaces and then used for producing of laminated bamboo boards or planks. The advantage is that the processing steps are shorter and more efficient as compared to the conventional split-and-squaring method. Therefore, the product production cost with this method is expected to be lower than those of the conventional method. On top of that, as the machine used is small and relatively simple in its construction, this method and apparatus will be suitable for medium- and small-scales bamboo processors, especially those from bamboo producing countries such as in Malaysia, Indonesia, India, China, Thailand, and Philippines.

Keywords: bamboo culm, V-grooving, grooving table, grooving cease, flattened culm

……..

The Sawmilling Yield Calculator

Category: Product / Innovation (C)

Dr. Jegatheswaran Ratnasingam
Chong Yen Yoon and Mohamed Kafi
Faculty of Forestry
jegaratnasingam@yahoo.com
03-89467175

This Sawmilling Yield Calculator is based on the MS Excel platform. It is user-friendly and allows the mill operator to ascertain the yield and sawing variations in the mill accurately. It also allows the mill operator to present the data as a graphical illustration to highlight the profitability of the sawmill. The YIELD CALCULATOR has been tested in several sawmills in Malaysia and has received the endorsement of the Malaysian Wood Industry Association (MWIA). The yield in the saw milling industry in the country is relatively low compared to their counterparts in Europe and North America. Studies on saw milling yield is relatively sparse, and most available data are out-dated. The lack of reliable data also deters saw mill operators from taking the necessary remedial measures to boost yield. YIELD CALCULATOR is the first locally developed sawmilling expert system that enables the mill operator to establish the yield/recovery of the mill together with the sawing variations accurately. Being user-friendly, it's use does not require specialist training and can be adopted easily to any sawmilling situations.The YIELD calculator can also be used as a teaching aid, as it provides useful background information about the sawmilling sector in the country. It also provides information on quality issues related to the industry.The YIELD CALCULATOR provides useful data that can be shown as graphical illustrations, which can be printed for future references. This will allow the mill operator to monitor the sawmill productivity closely.The YIELD CALCULATOR has a large potential as it is applicable in any sawmilling situation in the country. It is estimated that this expert system has a market value of about US$ 500,000 throughout the region.

Keywords: Sawmill, Yield, Costing, Sawn Timber Defects

PRPi 2012

UPM's Research & Innovation

FACULTY OF VETERINARY MEDICINE

Novel Cytomegalovirus as a Potential Carriero of Transgene Delivery Carrier for Rat Control

Category: Fundamental (A)

Dr. Zeenathul Nazariah Allaudin
Quah Yi Wan, Mohd Azmi Mohd Lila, Abdul Rahman Omar,
Wan Fahmi Wan Mohamad Nazarie, Siti Nazrina Camalxaman,
Loh Hwei San, Zuridah Hassan and Lo Sewn Cen
Faculty of Veterinary Medicine
zeenathul@putra.upm.edu.my
03-89463462

Rat infestation is a prevailing problem worldwide. Damages caused by rats include food contamination, crop losses, rat-borne zoonoses and building defects. Since rats live and thrive in a wide variety of climates and conditions, it is crucial to control the populations of the rat. Studies revealed that mammalian zonapelluida 3 (ZP3) is a potential immunocontraceptive antigen. Previously, a recombinant adenovirus ZP3 was developed and tested in vivo. However, this viral vectored ZP3 only manage to reduce 30% of the fertility rate. Recently, rat cytomegalovirus (RCMV) ALL-03 was discovered from the placenta of a house rat (Rattusrattusdiardii). This virus has the advantages of infecting rats asymptomatically as well as transmitting the virus to the fetus transplacentally. Prevalence of RCMV ALL-03 among wild rats by in house PCR method show high infection rate of 96.6%. This high infectivity rate intrigues the possibility of substituting adenovirus with RCMV ALL-03 as viral vector for delivering ZP3, which might reduce the rat population more efficiently. Thus, the understanding of the RCMV ALL-03 genome is essential. Concentrated and purified viral DNA of RCMV ALL-03 was sent for Illumina whole genome sequencing. Genomic informatics analysis computed that RCMV ALL-03 has an estimated size of 198,895 bp, which encompass 136 genes. This pioneer study serves as an important platform for the future development of recombinant cytomegalovirus ZP3, which promise a potential effective management of rat population and benefiting public welfare.

Keywords: Rat cytomegalovirus, whole genome sequencing, immunocontraception, de novo sequencing

PRPI 2012

UPM's Research & Innovation

FACULTY OF ECONOMICS AND MANAGEMENT

The Impact of Knowledge Sharing and Islamic Work Ethic on Innovation Capability

Applied Research (B)

Dr. Naresh Kumar
Raduan Che Rose
Faculty of Economics and Management
naresh@putra.upm.edu.my
03-89467632

The purpose of this paper is to present an in-depth analysis of the knowledge sharing enablers and the moderating role of Islamic work ethic (IWE) on the relationship between knowledge sharing and innovation capability in the public sector organizations. The foundations of knowledge sharing capability, IWE and innovation capability were assessed using a validated survey instrument. A total of 472 Administrative and Diplomatic Service Officers from the Malaysian public sector organizationsparticipated in the survey. The empirical results indicated that the intrinsic motivation to share knowledge is significant in the public sector organizations. The relationship between knowledge sharing capability and innovation capability of employees in the public sector organizations was found to be contingent on IWE. While the study was salient and confined to the Malaysian public sector organizations, it has considerable implications for the development of an optimistic workforce in other regions and across sectors. Cross-sectional studies are encouraged to further confirm the results. An understanding of the pledge of the workforce to knowledge sharing, IWE and its consequences for innovativeness facilitates public sector organizations in designing and implementing modernization initiatives. In response to the substantial need to examine IWE and workplace outcomes in a non-Western environment, the paper embraces the extent to which IWE sways the link between knowledge sharing and innovation capability in the public sector organizations. Both scholars and practitioners will find the study valuable.

Keywords: Malaysia, public sector organizations, employeesbehaviour, knowledge sharing, knowledge sharing capability, Islamic work ethic, innovation capability

How Did the Malaysian Real Exchange Rate Misalign During the 1997 Asian Crisis?

Applied Research (B)

Mr. Mohd Naseem Niaz Ahmad
Zulkornain Bin Yusop and Tajul Ariffin Bin Masron
Faculty Of Economics And Management
naseemniaz@econ.upm.edu.my
03-89467622

A currency overvaluation seems to be the prominent explanation for the 1997 - 98 Asian financial crisis. Notwithstanding, the reinstatement to managed float exchange rate regime in mid-2005, as well as the instability of commodity prices and the recent 2008 - 2010 global economic crisis, leads to the question of how far the fluctuation in the Malaysian ringgit is consistent with the changes in its economic fundamentals. Based on the theory of the real equilibrium exchange rate, this paper estimates the NATREX approach to modeling the Malaysian equilibrium exchange rate, which covers from 1991 to 2009. The empirical results showed that the ringgit took a U-turn from being overvalued during the pre-crisis (1991 - 1997) to being undervalued in the post-crisis (1997 - 2002), before fluctuating around its long-run equilibrium for the rest of the period. This corroborated the hypothesis that an overvaluation leads to a currency crisis, which is followed by substantial currency devaluation. The misalignment rates then reduce and remain close to the equilibrium path.

Keywords: Asian currency crisis, global financial crisis, real exchange rate misalignment,natrex model, Malaysia

……..

Accounting Earnings Response Coefficient: An Extension to Banking Shares in Asia Pacific Countries

Fundamental (A)

Assoc.Prof.Ir.Dr.Cheng Fan Fah
Mohd Arif
Faculty of Economics and Management
chengfanfah@yahoo.com
03-89467706

This paper reports new finding on earnings response coefficients for banking firms on how disclosures on total earnings and disaggregated fee earnings are used by investors to change share prices prior to earnings disclosures. The information relating to total earnings influences share prices significantly in all four banking sectors studied, all of which have

sufficiently liberalized capital markets. Australian investors appear to use information on disaggregated non-interest fee income to revise share prices significantly: not so in other markets. The investors in Malaysia and South Korea appear to consider changes in fee income as bad news with negative price impact, anomalous to theory. The Australian investors appear to regard both total and fee incomes as equally important whereas investors in other markets either ignore or consider changes in fee income as bad news for share valuation. This study extends the literature on this topic from non-bank to banking firms.

Keywords: Value relevance, earnings response coefficient, Interest and non-interest incomes, unexpected earnings, bank share prices, Asia Pacific region

……..

The Relationship between Director-Auditor Link and Audit Opinion.

Fundamental (A)

Dr. Mazrah Malik @ Malek
Ayoib Che Ahmad
Faculty of Economics and Management
mazrah@prpi.mail.com
03-89471634

The auditor-auditee relationship has become a concern due to its possible effect on auditor's independence. One common form of relationship is the director-auditor link generated by interlocking directorates. Therefore the objective of this study is to examine the effect of director-auditor link on audit opinion. Analysis was conducted by using Probit regression on a sample of 759 companies listed on the Bursa Malaysia for the year 2007. The results showed that the issuance of audit opinion is influenced by the director-auditor link, whereby it is found that auditors have higher possibility to issue unqualified audit opinion to interlink companies (interlocking companies sharing a common auditor). The findings are consistent with the attachment theory which suggests that attachments create mutual dependence and mutual trusts between the parties involved.

Keywords: Director-auditor link, audit opinion, interlocking directorates, auditor independence, audit quality.

Disclosure of Shariah Compliance by Malaysian Takaful Companies

Fundamental (A)

Assoc. Prof. Dr Nor Aziah Abu Kasim
Faculty of Economics and Management
noraziahabukasim@gmail.com
03-89467744

This paper seeks to explore the disclosure of Shariah compliance as reported by the Shariah Committee (SC) in the annual reports of takaful companies in Malaysia. The paper also aims to discuss whether the advisory role constrains the SC members to improve disclosure which can boost consumers' confidence and companies' accountability. Content analysis of the SCs' reports in the 2008/2009 annual reports of seven takaful operators in Malaysia were conducted and the findings discussed with three officers from Bank Negara Malaysia (BNM). The findings were further clarified and confirmed with a former member of the SC. Disclosure of Shariah compliance by the SC reflects high conformance to the BNM guidelines. Although the high level of conformance promotes comparability, it does not necessarily fully address disclosure issues such as providing adequate and relevant information. Shariah compliance by takaful companies seems to develop in much the same manner as other disclosure practices, that is, a tendency to comply with rules rather than with principles. Related to the disclosure issue, SC members are constrained by the advisory role and part-time basis of appointment from fully participating in every stage of product process. Insights drawn from this study suggest the need to enhance disclosure on Shariah compliance in the SC reports and to further strengthen the role of the SC members. Both the SC reports and SC members can be utilised to enhance the identity of Islamic businesses and fulfils the religious obligations. This paper highlights the need for increased transparency through adequate and relevant disclosure of Shariah compliance information in the SC report of takaful companies. It also raises the concern that the advisory role entrusted to SC members might not be adequate for them to effectively ensure that compliance with Shariah principles are adhered to at all times as expected by BNM.

Keywords: Disclosure, Shariah compliance, Malaysia, Takaful, Islamic identity, governance

PRPI 2012

UPM's Research & Innovation

FACULTY OF ENGINEERING

Smart Sampling Design for Agricultural Field Measurements Using Spatial Analysis

Category: Applied Research (B)

Dr. Samsuzana Abd Aziz
Brian L Steward, Manoj Karkee and Siti Khairunniza Bejo
Faculty of Engineering
suzana@eng.upm.edu.my
03-89464326

Field sampling can be a major expense for planning within-field management in precision agriculture. An efficient sampling strategy should address knowledge gaps, rather than exhaustively collect redundant data. Modification of existing schemes is possible by incorporating prior knowledge of spatial patterns within the field. In this study, a novel technique to locate smart re-sampling regions in the field was developed using spatial uncertainty of prior estimates. The addition of smart re-sampling technique substantially reduced the time required to resample and resulted in spatial map with lower error. For the widest sampling pass width, the RMSE of 0.46 m of the map produced from an initial coarse sampling survey was reduced to 0.25 m after a smart re-sampling survey, which was close to that (0.22 m) of the map produced with a traditional all-field re-sampling survey. The estimated sampling time for the smart re-sampling technique was less than 50% of that for traditional all-field re-sampling technique. Use of smart re-sampling technique may efficiently aid field attribute estimation for site-specific management practices in precision agriculture. The method could help reduce data collection time, which may result in lower cost while maintaining the accuracy of the measurements. The method is general and thus not limited to elevation data but can be extended to other spatially variable field data.

Keywords: Adaptive sampling, digital elevation model, sequential gaussian simulation, spatial uncertainty

On-the-Go Soil Properties Sensing System

Category: Applied Research (B)

Dr. Aimrun Wayayok
Mohd Amin Mohd Soom, Ezrin Mohd Husin, Nor Azi Asminda Johari, Zareen Zulkifli and Azhareenshah Aman
Faculty of Engineering
aimrun@eng.upm.edu.my
03-89464823

This study was conducted to determine the ability of digital camera to measure soil chemical properties under controlled lighting. A system equipped with LEDs light source and a color digital camera was used. This system was developed to determine the spatial variability of a field by a quick system where it will be utilized in precision farming practice by pulling behind a tractor across a field. Captured image represented in values of 0 to 255 for each red, green and blue bands were retrieved using MATHLAB and stored in JPEG format. Determination of relationship between paddy soil chemical properties and RGB values was done using statistical software, SPSS 16.0. Result indicates that the highest correlation was found for organic matter, organic carbon and iron with the best light intensity of 2410 lux while pH, Cation Exchange Capacity(CEC) and sulphur were at 36.7 lux. Regression analysis was also done to develop models for prediction of these parameters. Linear models gave significant performance for pH, CEC, organic matter, organic carbon and iron while cubic model was significant for sulphur. Thus, use of digital camera to determine these soil chemical properties would gave some advantages such as reduce time consuming, easy to operate, cheaper and less laborious technique.

Keywords: Paddy soil properties, spatial variability, quick assessment, precision farming, on-the-go ground sensing, light intensity.

A Dynamic Method for Establishing Efficient and Scalable Rekeying Algorithm in Mobile WiMAX

Category: Applied Research (B)

Prof. Dr. Borhanuddin Mohd Ali
Mohammad Mehdi Gilanian Sadeghi
Faculty of Engineering
borhan@eng.upm.edu.my
03-89467533

A method of establishing dynamically key management protocol in Mobile WiMAX network is provided. The method includes the steps of dividing into subgroups based on the current number of Mobile Stations using two tree data structures, wherein the first tree is a special binary tree structure called Set-pruning Trie, and the second tree structure is a B-tree of order 2. In the proposed method, the number of subgroups can be dynamically changed based on the available bandwidth, storage and the operational capability of the Mobile Stations. The method focuses on improving key management performance in terms of efficiency and scalability. In this way, the number of transmitted messages over the communication channels (broadcast/unicast) is optimized; it also provides scalability with dynamic group member changing. The results showed that the proposed method has a better performance in terms of efficiency and scalability compared to existing methods.

Keywords: Key Management, Mobile WiMAX

.....

Method and Composition for Making Mesoporous Carbon Coated Monolith

Category: Fundamental (A)

Assoc. Prof. Dr. Thomas Choong Shean Yaw
Soraya Hossinie,Mohamad Rasool Malekbala and Luqman Chuah
Faculty of Engineering
tsyc2@eng.upm.edu.my
03-89425913

Various approaches towards the synthesis of mesoporous carbon coated monoliths have been conducted by organic-organic self-assembly method via a solvent evaporation-induced self-assembly (EISA) process. Furfuryl alcohol, F-127, pyrrole, nitric acid and ethanol are used as carbon source, non-ionic surfactant, binder, catalyst and solvent, respectively. The optimum ratio of compositions is obtained by methylene blue adsorption test and then it is confirmed by BET surface area method. A series of experimental are carried out based on

to vary an ingredient of composition. The rest of ingredients are considered to be constant when an ingredient changed. Furfuryl alcohol, F-127 and pyrrole are separately changed in the ranges 1 - 10 g, 1 - 3.5g and 0.5 - 2g, respectively. The optimum value of each stage is considered being constant in the next stage. The different polymer solutions are used to coat honeycomb monolith by dip-coating method. The monoliths coated with the polymer were carbonized at 973 K under flowing N2 gas for 4 h. The monoliths can be used as an adsorbent in the most applications due to more advantages compared to activate carbon. Therefore, the methylene blue adsorption test is applied for the monoliths. The methylene blue adsorption capacity increased with improving the ingredients of the polymer solution. The optimum ratio furfuryl alcohol/F-127/Pyrrole/ethanol/HNO3 is according to the composition with molar ratios of 1 / 0.0066 / 0.2137 / 0.5602 /0.0259, respectively. Some techniques are used to characterize mesoporous carbon coated monolith such as SEM/ EDX, BET, FTIR and TGA.

Keywords: Mesoporous carbon;Honeycomb Monolith;furfuryl;Surfactant (F127)

……..

A Pneumatic Seeding Machine for Kenaf

Category: Product / Innovation (C)

Prof. Ir. Dr. Desa Ahmad
Dr. Jamarei Othman and Prof. Datin Dr.Napsiah Ismail
Faculty of Engineering
desa@eng.upm.edu.my
03-89466426

A 4-row, tractor mounted,kenaf pneumatic seeding machine was designed and developed based on physical, mechanical and aerodynamic properties of kenaf seed (Hibiscus cannabinus L.). The machine is made up of: (a) a chassis which is supported to move across and over fields by at least one drive wheel and one driven wheel (two transportable wheels); (b) four units of planters each consisting of a vacuum seed metering system; furrow opener (furrower); seed opener; seed cover; press wheel; and seed hopper. The vacuum seed metering system (each unit planter has one vacuum seed metering system) includes a seed container, a seed plate having a plurality of circular array openings and tabs, and a cover. The seed container has an adjustable upper brush and lower brush to dislodge any extra or double seeds picked up by the seed plate; and a first and second separators; (c) a pulley and vacuum fan to provide negative pressure for vacuum seed metering system; (d) a transmission power system holding a gearbox; chains and sprockets; and pinions and crown wheels to transfer power from drive wheel to the rotating seed plate of the vacuum seed metering system.The pneumatic seeding machine was evaluated both in the laboratory and field using kenaf seeds. The most suitable opening diameter and opening angle for planting kenaf seed are 3.5 mm and 120o respectively. The most suitable vacuum pressure

to pick up and keeping kenaf seed to plant in the soil was more than 3 kPa and the most suitable linear speed belonged to speed range of less than 1.5 km/hr.The average field efficiency of the 4-row pneumatic seeding machine was found to be 74%. The total fixed (ownership) cost calculated was RM4950/year; while the total variable (operating) cost was found to be RM55.26/hour.

Keywords: Pneumatic, seeder, machine, kenaf

……..

Web Smart Farmer

Category: Product / Innovation (C)

Prof. Ir. Dr. Mohd Amin Mohd Soom
Ezrin Mohd Husin, Aimrun Wayayok and Mohd Faizal Abdul Basir
Faculty of Engineering
ezrinhusin@gmail.com
03-89467570

Web Smart Farmer is a Web Based System to help the farmer to view their field soil variability maps and keep the record of their farming activities through a web portal and take remedial actions using variable rate treatment of their management zones with the help of "rice check" available on-line. The system also allows farmers to keep the record of their farming activities such as amount and cost of fertilizer and chemical uses. The system finally will determine the profit of their farming based on Return of Investment (ROI). This will enhance the farmers' understanding on their cost of productions and real profit being gained by them for each particular season. The target group for these systems is for the farmers and farm managers. The farm manager can view which lot produces the highest yield with the lower cost of expenses. This will help the managers to determine which lot with the low produced yield and overcome the problems. This system has the potential to be used in the granary area and also by the government agencies involved in the national rice industry like MADA, KADA and others. Due to the use of open-source technologies, the cost for development of this system is reduced.

Keywords: Precision farming, paddy, rice check, recommendation map

Smart Grader

Category: Product / Innovation (C)

Dr. Asnor Juraiza Dato Ishak
Rosnah Shamsudin
Faculty of Engineering
asnorji@eng.upm.edu.my
03-89464323

The present invention proposes to be applicable for indoor and outdoor usage because it is a portable device. This invention relates to weight grading process in which uses an electromechanical weighing system, a smart processing system and data communication system as required by the Federal Agriculture Marketing Authority (FAMA). Beside this invention assists the farmers from small scale industries to accurately grading the freshly post-harvest fruit. Then, this invention is user friendly which means easy to operate it by all range of ages. Furthermore, this invention can solved the problem to differentiate between two almost similar weights of fruit but have different grades.Therefore, it is the intention here to introduce the easier and simpler automated fruit weight grader. The smart processing system assists the farmers to accurately grading the freshly post-harvest pineapple. Furthermore in this invention the system is designed in portable type, easy to handling, save time and energy, decrease operation cost, adjustable stand within 1 meter, adjustable stand can be dismantle, other fruits can also be used by using function switch, maximum loading up to 10kg, applicable for indoor and outdoor usage, special security for calibration by authorized user and contain communication system. Beside, the development of this invention is inexpensive and no maintenance needed.

Keywords: Smart controller system, weight classification, fruit grading process

……..

Mixing Blade for Wet Solid

Category: Product / Innovation (C)

Dr. Rosnah Shamsudin
Wong Siew Chan, Azhari Samsu Baharudin and Mohd Shamsul Anuar
Faculty of Engineering
rosnahs@eng.upm.edu.my
03-89466366

Mixing or stirring is a common process in industries especially in food industries. However, wet solid is hardly to be well-mixed during the process. Wet solid normally high in density which leading them hard to stir or agitate during the process. Wet solid is sticky in nature

and has high tendency to accumulate on the mixer or wall of the tank. Solid or semi-solid material that contains high moisture tends to aggregate during the mixing process. Materials that accumulate on the wall surface of the mixing tank have high possibility to get burnt during the drying process and indirectly affected the quality of final product or turned to waste products as the worst consequences. The overall process efficiency will be affected. The main objective of this mixer is to agitate or stir the wet solid or semi-solid during the mixing, heating, or cooling process in a cylindrical tank. The present invention of the mixing blade has the ability able to overcome the problem of accumulation of solid on the wall of the cylindrical tank during the process and thus ease the cleaning process. A good mixing blade enables to optimize the mixing, heating or cooling process equally. The present invention of this mixing blade is simple, user friendly, economic and it is suitable to apply in any cylindrical tank mixer.

Keywords: Mixing blade, wet solid, cylindrical tank

……..

UVTREAT Machine

Category: Product / Innovation (C)

Dr. Rosnah Shamsudin
Noranizan Mohd Adzahan and Gan Kok Yong
Faculty of Engineering
rosnahs@eng.upm.edu.my
03-89466366

The designed UVTREAT Machine is capable of treating fresh tropical juices such as pineapple juice to inactivation of the bacteria at least 5 log10 reduction as required by the Foods and Drugs Administration (FDA). Dean vortex flow concept was adapted in this machine to increase the mixing effect as well as exposure of the microorganism to UV, thus, increase the lethality rate of microorganism. The machine is simple, feasible and a cost saving piece of equipment. It consists of an inlet, UV reactor and outlet. The UV reactor consists of 6 UV lamps in which five of the units are arranged in a circular pattern to minimize the size of the process system yet ease to handle and maintenance. A lamp in the centre of the five lamps are arranged in the circular pattern to boost the effectiveness of the processing system to give extra UV-C wavelength. The UV lamps are able to switch on/off individually by using the control panel. Juice is pumped in by hydraulic pump and it is treated at the UV reactor (254 nm) prior packaging at the outlet. The production rate of this machine is depending on the characteristic of the juice and the number of lamp uses.

Keywords: UVTREAT Machine, non-thermal, pasteurization, juices

Intellignet Structural Control System for Buildings Against Tsunami

Category: Product / Innovation (C)

Dr. Farzad Hejazi
Mohd Saleh Jaafar, Fakhrul-Razi Ahmadun and Iraj Toloue
Faculty of Engineering
farzad@eng.upm.edu.my
03-89466379

Tsunami falls in the categories of the hazards which have low frequencies of occurrence in a specific area but highly disastrous. According to the collected data, classical lateral resistance systems are failing during tsunamis. So, it is needed to develop the advance technique to protect the buildings against tsunmai.In this study, a novel system is proposed to protect the buildings against tsunami via intelligent structural control system. In the proposed system, early-warning system can transfer the tsunami data to tsunami hazard center by satellites. Then the transferred data are analysed, and the impact force (first touch of wave) can be calculated for each structure by high performance computational system. Furthermore, the data which are included of time of tsunami arrival, impact force, height and speed of the tsunami for each structure are analysed and the optimal structural control system properties is send to main structural via wireless connection. So the structural control system is changed based on calculated optimal control system to protect the buildings against tsunami. The developed system is applicable for any kind of structural buildings in tsunami prone zone area of Malaysia such as Penang, Langkawi, Sarawak and Sabah for mitigate buildings against tsunami.The proposed novel system has high market potential in the all countries which located near coastal zone and fault lines such as Indonesia, Japan, Sri Lanka, India, etc.

Keywords: Finite element, tsunami, structural dynamic, structural control system

CROPS - A Decision-Making Aid Tool for Product Redesign

Category: Product / Innovation (C)

Dr. Fairuz Izzuddin Romli
Cheang Kian Hou, Chew Junxian, Shazmira Azwa Sauli and Azmin Shakrine Mohd Rafie
Faculty of Engineering
firomli@eng.upm.edu.my
03-89466399

Product redesign is hardly a straightforward process, especially for complex products. The existence of intricate interrelationships between different components of product design architecture makes it more susceptible to change propagation phenomenon. In this case, redesign risk is not easy to predict since the change effects are being propagated to other components from the initiating change component. Due to this condition, choosing the right initiating change component is essential to control redesign process risks, apart from being able to successfully satisfy the product requirements. With this notion, this paper proposes a method that systematically ranks all components of an existing product design based on their estimated redesign risk. By having this information, designers can make a better redesign planning. The demonstration of this method is presented through an example aircraft redesign case study.

Keywords: Subsystems ranking, product redesign, strategic redesign, redesign planning

.....

The Melody to Musical Notation Translating System

Category: Product / Innovation (C)

Assoc. Prof. Dr. Nor Kamariah Noordin
Nor Kamariah Noordin, Ng Chee Kyun and Si Toh Chooi Ling
Faculty of Engineering
nknordin@eng.upm.edu.my
03-89466021

This invention presents a system that translates the captured or recorded melody into musical notations automatically and instantly into a developed stave whereby a musician can compose music directly without any extra process or procedure, in real-time environments. In this translating system, the frequency of a captured or recorded melody is first analyzed through a microphone or musical instrument for its fundamental frequency. The analyzed fundamental frequency is then compared with the predefined frequency of musical notes. The matched musical note frequency will be distinguished at the developed musical stave interface instantly. This invention will facilitate a composer in automatically

translate his melody to musical notes without having to manually writing it down based on the melody he/she plays.

Keywords: Musical Translating System, Musical Composing System, musical notation, melody, fundamental frequency.

……..

A Novel High Thrust Density Transverse Flux Linear Motor

Category: Product / Innovation (C)

Assoc. Prof. Dr. Norhisam Misron
Mohammad Reza Zare and Raja Nor Firdaus Kashfi Raja Othman
Faculty of Engineering
norhisam@eng.upm.edu.my
03-89466299

A novel transverse flux linear motor with high thrust density structure is presented in this paper. The magnetic circuit of High thrust Density Transverse Flux Linear Motor (HDTFLM) is different in compare to the conventional three phase linear motor with four separate magnetic circuits for each of the phases. The flux density in air gap is increased by the use of permanent magnet to generate high thrust. The use of the three phases leads to low cogging force and because of the symmetrical structure of motor the normal force is zero.

Keywords: High Density linear motor, transverse flux motor, hybrid transverse flux motor, linear motor

High Torque Density Brushless DC Permanent Magnet Motor for Oil Palm Electrical Cutter Application

Category: Product / Innovation (C)

Assoc. Prof. Dr. Norhisam Misron
Norhisam Misron, Raja Nor Firdaus Kashfi Raja Othman, Mohd Harizan Misron and Ng Seng Shin
Faculty of Engineering
norhisam@eng.upm.edu.my
03-89466299

This product is about a new type high torque density permanent magnet motor (H_BLDC) for oil palm electrical cutter application. The product specifically is intended to overcome the limitation of effective cutting as oil palm height increases in existing mechanical cutter. This drawback is due to extra weight and pole bending as longer pole is required for higher oil palm trees existing mechanical cutter. Thus, adopting an electrical motor known as H_BLDC could solve this limitation. H_BLDC is a special designed motor that could operates with high torque and speed. The developed H_BLDC has high potential and huge markets which involve the whole oil palm industry worldwide.

Keywords: High torque density, brushless DC permannet magnet motor, electrical cutter

PRPI 2012

UPM's Research & Innovation

FACULTY OF EDUCATIONAL STUDIES

Music Intervention Programme: Facilitating Motivation and the Flow of Creativity in the Intellectually Challenged

Applied Research (B)

Assoc. Prof. Dr Samsilah Roslan
Amanallah Soltani
Faculty of Educational Studies
samsilah@educ.upm.edu.my
03-89471241

Optimal challenge is an influential factor in promoting various aspects of intrinsic motivation as propounded by some well-known intrinsic motivation theories. Due to their history of repeated failures, the intellectually challenged usually have a low tendency to seek-out optimal challenge and consequently promote their intrinsic motivation. It could be assumed that providing optimal challenge or stimulating them to look for challenge might assist in promoting aspects of intrinsic motivation. This study attempted to investigate the effect of manipulating optimal challenge among the intellectually challenged, in a music intervention program on some aspects of intrinsic motivation, such as effectance motivation, flow experience, situational intrinsic motivation, extension, and innovation. Optimal challenge was manipulated across four conditions: providing optimal challenge for the first time, providing no optimal challenge, providing optimal challenge for the second time, and stimulating to seek-out optimal challenge. Thirty participants were randomly sampled from 120 accessible population around Klang Valley, Malaysia. The observational indicators of effectance motivation, flow experience, and situational intrinsic motivation checklist was used as the instrument. The raw data were analyzed using repeated measure ANOVA, Friedman test and comparisons of pairs. The results of repeated measure ANOVA revealed that there were significant differences across the four conditions of the experiment in effectance motivation scores, $F(1.928, 55.91)= 117.9$, $P<.001$, $eta2=.80$. The Friedman test revealed that there were significant differences in innovation scores across the four conditions of the experiment, $X2(3, n=30)=77.03$, $P<.001$. These findings proved the importance of optimal challenge in increasing effectance motivation, promoting flow experience, improving situational intrinsic motivation and the low tendency of the intellectual challenged to look for challenge, when no optimal challenges are provided. The findings showed that stimulating these people to seek-out challenge through involving in innovative behaviors could increase their challenge seeking behaviors and it might enhance their intrinsic motivation aspects.

Keywords: Intellectually challenged, intrinsic motivation, flow experience, music intervention programme

Gender and Managerial Level as Career Success Moderators: The Role of Managers Proactive Career Behaviours

Applied Research (B)

Dr. Roziah Mohd Rasdi
Faculty of Educational Studies
roziah.mr@gmail.com
03-89467922

Proactivity is increasingly considered essential to individual success and has become a particularly relevant concept in the context of the new career. The individual regardless of gender and management level is increasingly considered to have the primary responsibility for managing his or her career. The career literature have noted that gender and management level have pervasive impact on managers' career success. In the interest of broadening career theory so that it has relevance in a global context, it is important to understand how proactive career behaviours in terms of individual career management, networking behaviours and proficiency in computer skills influence career outcomes in a non-western context. This study therefore aims to examine the influence of proactive career behaviours on managers' career success and whether these relationships are moderated by gender and management level. This study included organisations from the Malaysian government ministries. A total of 288 samples of managers (Administrative and Diplomatic Officers) self-administered the surveys. The measurements of proactive career behaviours which comprise of individual career management, networking behaviours and computer skills were adopted and adapted from established instruments with acceptable reliabilities. The results indicated that proficiency in computer skills and networking behaviours had significantly contributed to the variation in managers' objective career success. In addition, the results revealed that individual career management and networking behaviours had significantly contributed to the variations in managers' subjective career success. Proficiency in computer skills did not significantly contribute to managers' subjective success. This study also found that gender and managerial level moderated the relationships between proactive career behaviours and career success (objective and subjective). Implications for research and human resource development are put forth.

Keywords: Proactive career behaviour, career success, gender, management level, managers, Malaysia

Assessing Learning Organization Dimensions and Demographic Factors: Implication for Improving Higher Education Institution Leadership and Management Practices

Fundamental (A)

Prof. Dr. Zaidatol Akmaliah Lope Pihie
Khosrow Nazari
Faculty of Educational Studies
zalp@educ.upm.edu.my
03-89468111

People in organizations have critical key roles in creating sustainable development. The purpose of this study is to assess the level of learning organization dimensions and differences based on age and education level. Data was collected in four provinces of Fars, Khuzestan, Boushehr, and Kohgilouyeh and Boyerahmad in Iran, all full and part time lecturers in Technical and Vocational Colleges were participated in the study. Survey method and ANOVA analysis were employed to analyze data. Findings showed that the perception levels of respondents were rated from low, moderate to high with significant differences based on education level and age. The results can be utilized by educational leaders and administrators to improve their leadership and management practices.

Keywords: Learning organization dimensions, demographic variables, technical and vocational colleges

……..

Program j-QAF : Satu Inovasi dalam Pendidikan Islam

Fundamental (A)

Assoc. Prof. Dr. Asmawati bte Suhid
Kamariah Abu Bakar, Muhd. Fauzi Muhammad and Lukman Mutalib
Faculty of Educational Studies
asmawati@putra.upm.edu.my
03-89467907

Pelbagai usaha telah diambil untuk memantapkan lagi sistem pendidikan agar bertaraf dunia. Pendidikan Islam tidak ketinggalan dalam hal ini, agar dapat mempersiapkan murid dengan cabaran akan datang. Untuk itu, pada tahun 2005 berasaskan kepada idea YAB Perdana Menteri Malaysia pada masa itu, Tun Abdullah Ahmad Badawi maka kerajaan telah mengambil inisiatif memperkenalkan program j-QAF bagi memperkasakan Pendidikan Islam. J-QAF bermaksud jawi, al-Quran, Bahasa Arab dan fardhu ain. Justeru, program j-QAF dilaksanakan dengan harapan agar murid sekolah rendah akan dapat khatam Quran, mempelajari Bahasa Arab yang merupakan bahasa al-Quran,

menghayati dan mengamalkan asas-asas fardhu ain dengan sempurna dan mahir serta minat dengan tulisan jawi. Bagi memberikan panduan yang jelas berhubung program j-QAF, pihak KPM telah membekalkan bahan-bahan kurikulum pengajaran ke sekolah-sekolah termasuklah Sukatan Pelajaran j-QAF, Buku Panduan Model-model Pengajaran dan Pembelajaran dan Kurikulum j-QAF. Program ini telah mula dilaksanakan pada tahun 2005 secara berperingkat-peringkat dan akan selesai pelaksanaannya pada tahun 2010. Beberapa model telah digubal dan digunakan dalam pengajaran dan pembelajaran menerusi program j-QAF. Antaranya Kelas Pemulihan Jawi, Model Tasmik dan Model 6 Bulan Khatam al-Quran, Peluasan Bahasa Arab Komunikasi dan Model Bestari Solat. Guru j-QAF perlu menggunakan model-model ini dalam pengajaran mereka. Maka, kajian ini penting untuk meninjau di peringkat awal pelaksanaan program j-QAF dan keberkesanan model-model j-QAF yang digunakan dalam proses pengajaran dan pembelajaran. Seramai 309 orang guru j-QAF dan 206 orang guru pakar Pendidikan Islam di Selangor telah dilibatkan dalam kajian ini. Berdasarkan dapatan kajian yang diperoleh, pengkaji dapat mengenal pasti kelemahan dan kekuatan program j-QAF serta model-model yang digunakan dalam pelaksanaan program j-QAF. Seterusnya dapat berkongsi pengalaman dengan banyak pihak dan mengetengahkan pandangan serta cadangan bagi memantapkan lagi program j-QAF dan model-model yang digunakan oleh guru dalam pengajaran j-QAF.

Keywords: Program j-QAF, Model j-QAF

……..

Predictor of Leadership Effectiveness at Research Universities

Fundamental (A)

Prof. Dr. Zaidatol Akmaliah Lope Pihie
Amir Sadeghi
Faculty of Educational Studies
zalp@educ.upm.edu.my
03-89468111

Success of higher education institutions and academic departments directly depends on the effectiveness of their head. This study is an attempt to determine predictor of leadership effectiveness at Malaysian Research Universities (RUs). By using Multifactor Leadership Questionnaire 5x (MLQ), this study employed 298 lecturers of three Malaysian RUs in Kelang Valley area. Results indicated that lecturers perceived their heads of departments exhibited combination of leadership styles. The result of regression analysis demonstrated that contingent reward, idealized influence (attribute), inspirational motivation, individualized consideration, laissez-faire, intellectual stimulation, and management-by-exception active are significant predictors of leadership effectiveness. These factors accounted for 82% of the variance in leadership effectiveness. In addition, the results suggested that contingent reward has important effects on leadership effectiveness.

Keywords: Transformational leadership, leadership effectiveness, higher education, head of academic department

“Pinjami Saya Telinga Anda” (Lend Me Your Ears)

Product / Innovation (C)

Dr. Fadzilah Abd Rahman
Rusdi Mat Nor dan Nurul Aini Yahya
Faculty of Educational Studies
fadzilah@educ.upm.my
03-89468227

Kegagalan seseorang individu mengamati sesuatu bunyi dengan baik menyebabkan mereka tidak dapat memproses maklumat yang didengari dengan berkesan. Masalah pengamatan pendengaran juga akan menyebabkan seseorang itu mentafsir maklumat dengan salah dan seterusnya menyebut semula maklumat dalam konteks dan pengertian yang berbeza daripada apa yang diperdengarkan kepadanya. Kesukaran untuk memproses maklumat auditori juga boleh menyebabkan murid-murid berasa tertekan semasa proses pembelajaran di dalam bilik darjah kerana tidak dapat mengikuti dengan baik apa yang cuba disampaikan oleh guru. Keterhadan kajian terhadap tahap pemprosesan auditori malahan instrumen untuk menguji tahap pengamatan auditori amat ketara. Sehubungan itu, berdasarkan kajian Kent Rowe (2007,2003), kajian ini bertujuan untuk membangunkan instrumen pemprosesan auditori versi Bahasa Melayu khususnya untuk murid rendah pencapaian. Pembinaan instrument bertajuk Lend Me Your Ears ini dilaksanakan mengikut prosedur pembinaan instrumen yang dicadangkan oleh Cohen dan Swerdlik (2002) berdasarkan fasa sebelum pembinaan, semasa pembinaan, dan selepas pembinaan. Setelahitu melalui reka bentuk kajian kesdeskriptif, pengkaji menjalankan pengujian bagi mengenal pasti kesesuaian instrument yang dibina. Hasil dapatan kajian memperlihatkan penggunaan alat pengujian pemprosesan auditori merupakan alternatif penting bagi mengenal pasti masalah kefahaman pendengaran. Oleh itu, adalah dicadangkan supaya Instrumen Ujian Pemprosesan Auditori digunakan sebagai alat ujian untuk menyaring murid-murid rendah pencapaian di peringkat awal persekolahan supaya tindakan penambahbaikan boleh dilaksanakan secepat mungkin. Selain itu, dicadangkan kajian lanjutan pembinaan instrumen pemprosesan auditori yang lebih interaktif berupaya mendiagnosis masalah pengamatan auditori dengan lebih sistematik untuk semua peringkat umur.

Keywords: Kefahaman mendengar, instrumen pemprosesan auditori, murid rendah pencapaian

Emotional and Spiritual Intelligences as a Basis for Evaluating the National Philosophy of Education Achievement

Product / Innovation (C)

Dr. Aminuddin Hassan
Habsah Ismail, HabibahAbd. Jalil, IsmiArif Ismail and Steven Eric Krauss
Faculty of Educational Studies
aminuddin@putra.upm.edu.my
03-89468227

The concept of philosophy of education is derived from the integration of two main components, stem from the views of the importance of education to everybody, and the received wisdom on the purpose of education (Allen, 1988). In the context of education at any level in Malaysia, National Philosophy of Education (NPE) which was formulated in the year 1988 is the most important document that guides educational practices from primary to tertiary level in Malaysia. As a document which elements permeate the implementation of the educational policies, the principles of the NPE should be translated into the nation's educational aims and objectives. At the tertiary education level, the principles of the NPE should be adhered to if the aim of producing graduates who are knowledgeable, competent, responsible and capable is to be actualized. Thus, the NPE is an important contributing factor in Higher Education Institutions (HEI) especially in making Malaysia a world-class nation as espoused in Vision 2020. The NPE clearly states the importance of producing well-rounded individuals, having a balanced intellectual, emotional, physical and spiritual intelligences. Emotional intelligence and spiritual intelligence (SQ) play a much greater role in solving problems and making decisions in any context.

Keywords: Emotional intelligence, spiritual intelligence, Philosophy of Education

PRPI 2012

UPM's Research & Innovation

FACULTY OF SCIENCE

Preparation of Hippurate-Zinc Layered Hydroxide Nanohybrid and its Synergistic Effect with Tamoxifen on Hepg2 Cell Lines

Category: Applied Research (B)

Prof. Dr. Mohd Zobir Hussein
Samer Hussein Hassan Al Ali, Mothanna Al-Qubaisi, Zulkarnain Zainal and Muhammad Nazrul Hakim
Faculty of Science
mzobir@science.upm.edu.my
03-89466603

A new simple preparation method for a hippurate-intercalated zinc-layered hydroxide (ZLH) nanohybrid has been established which does not need an anion-exchange procedure to intercalate the hippurate anion into ZLH interlayers. The hippuric acid nanohybrid (HAN) was prepared by direct reaction of an aqueous suspension of zinc oxide with a solution of hippuric acid via a one-step method. The basal spacing of the nanohybrid was 21.3, indicating that the hippurate anion was successfully intercalated into the interlayer space of ZLH, and arranged in a monolayer fashion with the carboxylate group pointing toward the ZLH inorganic interlayers. A Fourier transform infrared study confirmed the formation of the nanohybrid, while thermogravimetry and differential thermogravimetry analyses showed that the thermal stability of the nanohybrid was markedly enhanced. The loading of hippurate in the nanohybrid was estimated to be about 38.7% (w/w), and the release of hippurate from the nanohybrid was of a controlled manner, and therefore the resulting material was suitable for use as a controlled-release formulation. HAN has synergistic properties with tamoxifen toward a HepG2 cell line, with an IC50 value of 0.35 compared with hippurate. In the antiproliferative assay, the ratio of viable cells account for cells treated by the combination tamoxifen with HAN to untreated cells was sharply reduced from 66% to 13% after 24 and 72 hours, respectively. The release of hippuric acid anions from HAN occurred in a controlled manner, and the resulting material is suitable for a controlled-release formulation.

Keywords: Hippurate-zinc layered hydroxide nanohybrid,synergistic effect, tamoxifen,HepG2 cell lines, drug delivery

Development of Antiproliferative Nanohybrid Compound with Controlled Release Property Using Ellagic Acid as the Active Agent

Category: Applied Research (B)

Prof. Dr. Mohd Zobir Hussein
Samer Hussein Hassan Al Ali, Zulkarnain Zainal and Muhammad Nazrul Hakim
Faculty of Science
mzobir@science.upm.edu.my
03-89466603

A series of brucite-like materials, undoped and doped zinc layered hydroxide nitrate with 2% (molar) of Fe3+, Co2+ and Ni2+ were synthesized. Organic-inorganic nanohybrid material with gallate anion as a guest, and zinc hydroxide nitrate, as an inorganic layered host was prepared by ion-exchange method. The nanohybrid materials were subsequently heat-treated at various temperatures, 400-700 °C. X-ray diffraction, thermal analysis and Fourier transform infrared results shows that incorporation of the doping agents within the zinc layered hydroxide salt layers has enhanced the heat-resistivity of the nanohybrid materials in the thermal decomposition pathway. Porous carbon materials were obtained by heating the nanohybrids at 600 and 700 °C. Calcination of the nanohybrids at 700 °C under nitrogen atmosphere produces high pore volume, mesoporous carbon materials.

Keywords: Thermal decomposition,zinc layered gallatenanohybrid, doped,Fe3+, Co2+ and Ni2+, mesoporous carbon material

……..

Dynamic Multifunctional Magnetic Graphene (One for All, All From One)

Category: Applied Research (B)

Dr. Lim Hong Ngee
Teo Peik See and Huang Nay Ming
Faculty of Science
hongngee@putra.upm.edu.my
03-89467497

Iron oxide/graphenenanocomposite is synthesized via a simple, cost-effective, efficient and green approach. Low cost magnetic iron oxides nanoparticles exhibit super-paramagnetic nature and have low toxicity hence are biocompatible. However, heavy aggregation of the nanoparticles may limit their magnetic properties and structural stability, thus reducing their applicability. By creating an iron oxide/graphenenanocomposite, the clumping of the iron oxide nanoparticles is reduced, preserving their unique properties. The nanocomposite is applicable in waste water treatment, drug delivery system, sensing platforms and energy

storage device. This magnetic product might interest industries related to processing and manufacturing of pharmaceutical products, food and beverages, and electronics. This magnetic product is affordable as the syntheses of graphene oxide as the raw material and the nanocomposite are inexpensive, and the energy consumption during the syntheses is all-time low.

Keywords: Graphene, iron oxide, magnetite, nanocomposite

……..

A Novel Optical Sensor for Sensitive Detection of Essential Metal Ions

Category: Applied Research (B)

Prof. Dr. W. Mahmood Mat Yunus
Yap Wing Fen and Zainal Abidin Talib
Faculty of Science
mahmood@science.upm.edu.my
03-89466646

The present invention proposes a novel optical sensor for sensitive detection of essential metal ions with potential for toxicity: copper, zinc and manganese ions. This novel optical sensor is successfully developed by introducing a sensor layer as an active layer in combination with surface plasmon resonance technique. The results show that the change in the resonance angle is directly proportional to the concentration of essential metal ions solution, ranging from 0.5 ppm to 100 ppm. The sensitivity of this optical sensor for the studied essential metal ions is in following order: Cu2+ > Zn2+ > Mn2+. This sensor is highly sensitive for these essential metal ions with detection limit as low as 0.5 ppm. This novel optical sensor has a high sensitivity towards copper, zinc and manganese ions. Another advantage of the present invention is that the low cost of the optical instrument, i.e. surface plasmon resonance spectroscopy. The present invention also has the advantages of size, no sample preparation required, fast measurement capability and no necessity of reference solution. In addition, this novel optical sensor is suitable for in situ field monitoring due to its portability. The present invention has a high potential in R&D sections in medical diagnostic industry, environmental monitoring and food and drinking water industries.

Keywords: Novel optical sensor, sensitive, essential metal ions, copper, zinc and manganese ions.

Electrochemical Preparation of Bilayer p-n Junction of n-CdS / p-P3HT for Photoelectrochemical Cell Application

Category: Applied Research (B)

Prof. Dr. Zulkarnain Zainal
Ing Yah Chzeh, Anuar Kassim and Wan Mahmood Mat Yunus
Faculty of Science
zulkar@science.upm.edu.my
03-89464209

Solution processible conducting polymers especially poly(3-hexylthiophene) (P3HT) have been studied extensively because of its interesting optical, electrical properties and chemical stability. It can be used as organic solar cells, polymer light emitting diodes, sensors, and variety of other applications with these properties. However one of the crucial drawbacks in conducting polymer based devices is their low electron mobility. The poor ability of conducting polymer in transporting photogenerated carriers to the charge accepting electrodes leads to charge recombination. Insertion of an inorganic high electron affinity layer such as cadmium sulphide in the device helps delays electron hole recombination after photoexcitation. Also, by inserting a layer of CdS between active polymer layer and Al electrode, the photovoltaic performance and power conversion efficiency of the solar cell were enhanced. A bilayer organic-inorganic p-n junction composed of electrically conducting poly(3-hexylthiophene) (P3HT) and cadmium sulphide (CdS) was prepared by electrodeposition of P3HT on ITO prior to CdS on P3HT by using the same method. Electrodeposition of thin films on conductive substrates is a widely used electrochemical method for its inexpensive instrumentation, easy control of growth parameters through applied potential, current, pH and temperature of the bath. Moreover, electrodeposition of CdS on P3HT can be achieved because of chemical stability of P3HT and its solubility in only organic solvent. This approach provides a low cost route for production of improved charge transfer photovoltaic cells. The optical properties of fabricated bilayer p-n junction of n-CdS / p-P3HT were analyzed by UV-visible spectrophotometry, the combined bandgap energy is between that of P3HT films (1.81 eV) and CdS (2.42 eV). The hybrid CdS/P3HT film presents a higher photocurrent response than that of pure P3HT and absorbs radiation in wider region.

Keywords: Cadmium sulphide, poly(3-hexylthiophene), p-n junction, photoelectrochemical properties

Heavy Metal Sensor Based On Biopolymer Composite

Category: Applied Research (B)

Dr. Mahnaz M.Abdi
Wan Mahmood Mat Yunus and Nor Azah Yusof,
Faculty of Science
mahnaz@putra.upm.edu.my
603-89466684

Optical sensor of polypyrrole-chitosan (PPy-CHI) was fabricated to monitor toxic metal ions with sensitivity enhancement by chitosan. The binding interactions of Hg2+ and Pb2+ions with PPy and CHI on the gold surface were monitoring using surface Plasmon resonance (SPR) technique. It has been shown that chitosan as a biodegradable, biocompatible, nontoxic and low-cost biopolymer enhanced the sensitivity of the sensor; thereby a lower concentration of Hg2+ and Pb2+ions could be readily detected with less interference. In this work, a thin layer of PPy-CHI was deposited on the gold layer by electrochemical polymerization. The higher RU (SPR angle) results are due to specific binding of chitosan with Hg2+ and Pb2+ ions. The advantage of the present invention is that the operational and investment costs of the surface sensor are low. It can be fabricated in a small device and thus, suitable for in situ field monitoring due to its portability. A small size set up of this sensor include chemicals approximately costs 1680 $ (using CCD, charge coupled device). The other advantages of this sensor are: Easy for preparation, No special knowledge of chemical testing required, User friendly, Environmentally friendly , No harmful reagents are required, Stability of the sensing area (reusable and refreshable) and Small amount of sample is requried (1-4 cc). Mercury and lead have a lot of application in industry such as; Paint industry, Rubber manufacturing, glass industry, dentistry, smeltery factories, battery manufacturers and pesticides and fungicides industry. In all the above mentioned applications, the concentration of heavy metals should be measured to control quality of the product and to detect and measure the poison level in the sewage sludge of the factories. So that, this sensor is useful for sewage treatment, wastewater treatment, Environmental Monitoring Instruments, Soil & Sediment Analysis and so on.

Keywords: Toxic metals, sensor, chitosan, polypyrrole, surface plasmon resonance, electrodeposition

Ni/CeO2-SiO2 Catalyst for Dry Reforming of Light Chain Hydrocarbon to Syngas Production

Category: Applied Research (B)

Professor Dr. Taufiq Yap Yun Hin
Sudarno
Faculty of Science
yap@science.upm.edu.my
03-89466809

To develop the nickel-based catalysts, four kinds of modified CeO2-SiO2 (CS) supports have been synthesized via different methods, i.e. deposition precipitation (DP), Impregnation (Imp), Sol-gel (SG) and ball milling (BM). While, by using the CS supports, the nickel catalysts (5 wt.%) were prepared using via impregnation method. For comparison among the support preparation methods, the catalytic evaluation for biogas reforming and several characterizations i.e. EDX, BET surface area, XRD, H2- TPR, CO2-TPD, TEM, SEM, TGA and CHN were conducted in order to correlate the structural and physicochemical properties with catalyst's activity and stability. It was found that Ni/CS-DP showed the excellent performance of catalysts activity and stability at 800 °C for 10 h reaction, due to it has good properties (morphology, reducibility, basicity and Ni particle size). The order of catalyst activity are Ni/CS-DP > Ni/CS-Imp > Ni/CS-SG. However, in term of carbon deposition, Ni/CS-DP gave the higher amount of carbon deposits than that of Ni/CS-Imp and Ni/CS-BM. Whereas, Ni/CS-SG showed the lowest activity and worst carbon formation due to the bad properties of the catalysts. In addition, a novelty has been found for Ni/CS-BM catalyst, which in the reduced and used catalysts, it showed higher crystallinity with the CeO2 peaks in XRD pattern as compared to the other catalysts. This was expected could give a positive effect of the support system to prevent carbon formation

Keywords: Dry reforming, syngas, ceria, nickel catalyst, ball milling

Natural Products from *Mesua beccariana* and Mesua Ferrea as Growth Inhibitors of Various Cancer Cells

Category: Applied Research (B)

Prof Dr Gwendoline Cheng Lian Ee
Soek Sin Teh, Siau Hui Mah, Mawardi Rahmani, Yun Hin Taufiq-Yap
and Yang Mooi Lim
Faculty of Science
gwen@science.upm.edu.my
03-89466785

A detailed research on the phytochemistry of MesuabeccarianaandMesuaferrea(Clusiaceae) were performed. The stem bark of Mesuabeccarianafurnished four new compounds which are two xanthones, mesuarianone (1) and mesuasinone (2), a coumarin, beccamarin (3) and a cyclodione, mesuadione (4), along with several known compounds including two anthraquinones, 4-methoxy-1,3,5-trihydroxyanthraquinone (5) and 2,5-dihydroxy-1,3,4-trimethoxy anthraquinone (6) as well as a xanthone 6-deoxyjacareubin (7). Meanwhile, seven xanthones were isolated from the root bark of Mesuaferrea three of which are new: mesuaferrin A (8), mesuaferrin B (9) and mesuaferrin C (10). Four known compounds were identified as caloxanthone C (11), macluraxanthone (12), 1,5-dihydroxyxanthone (13) and tovopyrifolin C (14). Structures of these compounds were elucidated by spectroscopic methods which are 1D and 2D-NMR, GC-MS and IR techniques. Preliminary in vitro cytotoxicity tests of all the isolated metabolites against a panel of human cancer cell lines including Raji (human B lymphocyte), SNU-1 (human gastric carcinoma), K562 (human erythroleukemia cells), LS-174T (human colorectal adenocarcinoma), HeLa (human cervical cells), SK-MEL-28 (human malignant melanoma cells), NCI-H23 (human lung adenocarcinoma), IMR-32 (human neuroblastoma) and Hep-G2 (human hepatocellular liver carcinoma) were performed using MTT assay. All the metabolites (1- 14) exhibited significant proliferation inhibition against all the tested cancer cells (IC50 values ranging from 0.1 to 9.4 μg/mL). This investigation suggests that Mesuabeccariana and Mesuaferrea could be a source of lead compounds in drug discovery.

Keywords: Mesuarianone, mesuasinone, beccamarin, mesuadione, mesuaferrin A, mesuaferrin B, mesuaferrin C, cytotoxicity, Mesua beccariana, Mesua ferrea, Clusiaceae

Calophyllum inophyllum and *Calophyllum soulattri*, Source of Anti-Inflammatory and Antioxidant Agents and Anti-Cancer Lead Compounds

Category: Applied Research (B)

Prof.Dr.Gwendoline Cheng Lian
Mah Siau Hui, Teh Soek Sin, Mawardi Rahmani, Yun Hin Taufiq-Yap
and Lim Yang Mooi
Faculty of Science
gwen@science.upm.edu.my
03-89466785

This present work concentrates on the isolation, structural elucidation of four new xanthones and one new coumarin from Calophylluminophyllum and Calophyllumsoulattri. Calophylluminophyllum afforded two new prenylatedxanthones, inophinnin (1) and inophinone (2) while Calopyllumsoulattri gave another two new xanthones, soulattrin (3) and phylattrin (4). One new coumarin, soulamarin (5) was also successfully isolated from Calopyllumsoulattri. Other xanthones present in both plants were caloxanthone C (6), macluraxanthone (7), inophyllin A (8), pyranojacareubin (9), rheediaxanthone A (10), brasixanthoneB (11), trapezifolixanthone (12) and 4-hydroxyxanthone (13). The structural elucidations of these compounds were achieved on the basis of spectroscopic analysis of 1D and 2D NMR spectral data (1H, 13C, DEPT, COSY, HMQC & HMBC) while molecular masses were determined via MS techniques. Compound 1-13 were evaluated for their anti-inflammatory, antioxidant and cytotoxic activities towards nine human cancer cell lines, SNU-1 (stomach), HeLa (cervix), Hep G2 (liver), NCI-H23 (lung), K562 (leukemia), Raji (lymphoma), LS174T (colon), IMR-32 (neuroblastoma) and SK-MEL-28 (skin) cells in vitro using the MTT method. Compounds 1 and 7 showed significant activities in the anti-inflammatory test while compounds 3 and 7 were strong anti-oxidant agents. Moreover, all the xanthones isolated (1-12) exhibited significant cytotoxic activities with very low IC50 values ranging from 0.27 to 9.89 ?g/mL.

Keywords: Calophylluminophyllum, Calophyllumsoulattri, xanthones, anti-inflammatory, antioxidant, cytotoxic

New Palm Esters Nanocosmeceutical for High Radical Scavenging Activity

Category: Applied Research (B)

Prof.Dr.Mahiran Basri
Ng Sook Han, Abu Bakar Salleh, Mohd.Basyaruddin Abdul Rahman, Raja Noor Zaliha Raja Abdul Rahman and Zahariah Ismail
Faculty of Science
mahiran@science.upm.edu.my
03-89467266

Cosmeceuticals are products having cosmetics and pharmaceutical properties, which provide aesthetic appeal as well as able in delivering active ingredient to the skin for effective treatment. Cosmeceuticals are big business in skincare industries especially in prevention and treatment of skin aging. Nanocosmeceuticals due to the extremely small size with large surface area could further enhance the aesthetic appeal as well the efficacy of the cosmeceutical actives. In this study, a new palm esters nanocosmeceutical containing tocotrienol and palm oil esters (POEs) was successfully developed. The palm esters nanocosmeceutical formulations exhibited high kinetic stabilty and good physicochemical properties. The formulation exhibited good aesthetic appeal as well as high radical scavenging activity for better antioxidant property. Advantages: (1) Palm oil-based esters are green-friendly and have the excellent wetting behavior without oily feeling that make the great potentials in manufacturing cosmeceutical products; (2) Surfactants could be added to stabilize emulsions and control its droplet size to optimum value which are crucial for cosmeceutical products penetration; (3) Palm-based tocotrienol are capable of scavenging and quenching reactive oxygen species, also known as free radicals and well known for their antioxidant property and (4) The small droplet size causes a large reduction in the gravitational force and the Brownian motion, thus no creaming or sedimentation occurs during storage.

Keywords: Nano-emulsions, palm oil esters, tocotrienol, polysorbate 80, sorbitan monooleate 80

Enhancement of Hydrogen Production by Secondary Metal Oxide Dopants on NiO/CaO Material for Catalytic Gasification of Empty Palm Fruit Bunches

Category: Applied Research (B)

Prof.Dr.Taufiq Yap Yun Hin
S. Sivasangar and A.Salmiaton
Faculty of Science
yap@fsas.upm.edu.my
03-89466809

Bio-hydrogen regarded as a future potential energy resource that could completely eliminate the global energy scarcity and environmental issues caused by the utilization of fossil fuels. Biomass derived hydrogen through catalytic gasification process highly applicable in Malaysia which produces sustainable biomass feedstock from the vast agricultural activities. This investigation is focused on developing a suitable CaO-based catalyst that would be modified with a selective promoters (Ni, Ba, K,Co, Fe, La) to enhance the reforming and tar cracking ability of the catalyst. The catalyst were synthesized using wet impregnation method by doping 5%wt Ni as a primary and 5%wt (Ba,K,Co,La,Fe) as a secondary dopants into CaO. The physicochemical properties of the prepared catalysts were characterized by XRD, BET and TGA. Gasification were carried out from 50-900 °C in partial oxygen environment with a premixed catalyst biomass sample in a ratio of 2:1 and the product gas were detected through online mass spectrometer. Interestingly, the addition of secondary dopants shows significant effect on the catalytic activity which increased the hydrogen production. Besides tar cracking ability of the CaO were greatly improved with catalyst modification after dopants addition. Among the dopants, Ba added NiO-CaO catalyst shows highest hydrogen production with notable tar cracking property which has great potential to be developed as future primary gasification catalyst that could solve many obstacles in the process.

Keywords: Hydrogen, CaO, promoter, barium, biomass

Study of a Quadrupole Ion Trap with Damping Force by the Two-Point Block Method

Category: Applied Research (B)

Assoc. Prof.Dr.Zanariah Abdul Majid
S. Seddighi Chaharborj, Pei See Phang, Mohd Rizam Abu Bakar and Fudziah Ismail
Faculty of Science
zanariah@science.upm.edu.my
03-89467959

The capabilities and performances of a quadrupole ion trap under damping force based on collisional cooling is of particular importance in high-resolution mass spectrometry and should be analyzed by Mathieu's differential solutions. These solutions describe the stability and instability of the ion's trajectories confined in quadrupole devices. In this case, Mathieu's stability diagram, trapping parameters az and qz and the secular frequency of the ion motion wz, can be derived in a precise manner. The two-point one block method (TPOBM) of Adams Moulton type is presented to study these parameters with and without the effect of damping force and compared to the 5th-order Runge-Kutta method (RKM5). The simulated results showed that the TPOBM is more accurate and 10 times faster than the RKM5. The physical properties of the confined ions in the r and z axes are illustrated and the fractional mass resolutions m/m of the confined ions in the first stability region was analyzed by the RKM5 and the TPOBM.

Keywords: Quadrupole ion trap, block method, Mathieu's differential solutions

.....

SPR Corrosion Sensor

Category: Applied Research (B)

Prof.Dr.Mohd. Maarof Moskin
Amir Reza Sadrolhosseini, Mahnaz M. Abdi and Zainal Abidin Talib
Faculty of Science
sadr@eng.upm.edu.com
03-89454455

Biodiesels are known for its much lower corrosiveness besides less volatile than pure diesel fuels. An ASTM standard copper strip corrosion test that typically utilized to evaluate the corrosiveness of biodiesel toward a copper surface was found unable to distinguish the extent of corrosion attack for low corrosiveness biodiesel. A surface plasmon resonance (SPR) sensor using copper layer was evaluated as a potentially more accurate means of assessing the aggressiveness of low corrosiveness biodiesel. The SPR based sensor was

found to be considerably more sensitive than the ASTM standard and has the ability to detect the corrosion attributed change of thickness better than 1.3 nm.

Keywords: SPRcorrosion sensor, ppy-chi, biodiesel

……..

Optimization of Phase Formation and Superconducting Properties in MgB_2 Prepared by Phase Transformation from MgB_4

Category: Applied Research (B)

Dr. Chen Soo Kien
Tan Kim Lee, Tan Kwee Yong, Lim Kean Pah and Abdul Halim Shaari
Faculty of Science
skchen@science.upm.edu.my
03-89466668

In this work, polycrystalline MgB4 was first prepared, then the presence of MgO in the powder was reduced by using acid leaching. To synthesize MgB2, the MgB4 powder was reacted with Mg at temperatures from 650 °C to 950 °C for 4 h and 8 h. By using the Rietveld method, the MgB2 phase was estimated to be in greater proportion in the sintering temperature range of 650 °C - 750 °C above which it decreased rapidly accompanied by the formation of more of the MgB4 phase. Scanning electron microscopy shows that the samples have reduced porosity compared to those synthesized by direct reaction of (Mg + 2B). Upon increasing the sintering temperature, the superconducting transition temperature is degraded, which is attributed to lattice distortion. The results of this work demonstrate that control of heat treatment is essential in order to optimize the weight fraction of the MgB2 phase to increase the critical current density, Jc. The value of magnetic Jc (5 K, 1 T) for the sample sintered at 750 °C for 4 h is estimated to be 1.00 x 105 A/cm2.

Keywords: MgB_4, MgB_2, phase weight fraction, superconducting properties

Measurement of Very Low Water Concentration in Palm oil and Coconut Oil Based Biodiesels

Category: Applied Research (B)

Prof.Dr. Mohd. Maarof Moskin
Amir Reza Sadrolhossein and Zainal Abidin Talib
Faculty of Science
sadr@eng.upm.edy.my
03-89454455

Water in biodiesel can contribute to problems associated with production of microorganisms and corrosion in fuel injection equipment. The standard method (ASTM D 2079) for determination of water is based on centrifugation which has precision as low as 5 ppm which is inadequate for very low water content biodiesels that is crucial in preventing the growth of microorganisms and corrosion. A surface plasmon resonance (SPR) based sensor has been developed to measuring water concentration as low as 1 ppm. The SPR sensor has the capability to measuring even lower concentration by improving the angular resolution of the stepper motor in the present work to better than 0.01 degree.

Keywords: SPR water sensor , biodiesel , bland biodiesel

.....

The Effect of Cu Exposure on the Bioaccumulation of Zn and Antioxidant Activities in Different Parts of *Centella asiatica*

Category: Fundamental (A)

Assoc. Prof. Dr. Yap Chee Kong
Ong Ghim Hock, Maziah Mahmood and Tan Soon Guan
Faculty of Science
yapckong@hotmail.com
03-89466616

This study was carried out by using Centellaasiatica grown using a hydroponic system under laboratory conditions to determine the effects of Cu exposure on Zn accumulation and antioxidant activities of the plant. The antioxidant activities include superoxide dismutase (SOD), catalase (CAT), ascorbate peroxidase (APX) and guaiacol peroxidase (GPX). The treatments Zn2ppm+Cu0.1ppm and Zn6ppm+Cu0.5ppm reduced the accumulation of Zn in leaves but increased the uptake in roots (Zn6ppm+Cu0.5ppm). This showed that Cu and Zn acted antagonistically to each other in leaves but synergistically on each other in roots. GPX, APX and SOD activity in leaves were increased while in roots only GPX and SOD

activity were increased when Zn was added together with Cu. Therefore, SOD and GPX could be used as biomarkers to monitor the toxicity of Cu and Zn in C. asiatica.

Keywords: Antioxidant enzymes, *Centellaasiatica*, Cu, Zn

……..

Orchids of Cloud Forest in Genting Highlands, Pahang

Category: Fundamental (A)

Assoc. Prof. Dr. Rusea Go
Ng Yong Jin, Rosimah Nulit, Khor Hong Eng, Tan Mui Ching, Farah Alia Nordin, Ahmad Ainuddin Nuruddin and Lee Nam Sook
Faculty of Science
rusea@science.upm.edu.my
03-89466634

An inventory of orchid species diversity was carried out in cloud forest of Genting Highlands, which is one of the most developed highland areas in Peninsular Malaysia. Since 1967, construction of roads and hotel complexes has had a serious impact on its physical environment and vegetation. Habitat destructions together with climate change might have caused some orchid species to be extirpated locally or extinct. The cloud forest of Genting Highlands consists of 4 major peaks, GunungUlu Kali, Gunung Chin Chin, GunungLariTembakau and GunungMengkuang. Combined findings from the current study, previous published works and specimens deposited in local and abroad herbaria, an updated list of orchid species found in the cloud forests of Genting Highlands is presented. A total of 134 orchid taxa were recorded, comprises of 51 genera, 132 species, 1 subspecies and 2 varieties, of which 46 are new records to Genting Highlands. Hymenorchisjavanica, a species previously reported as endemic to West Jawa was recently discovered in GunungUlu Kali. Thirty-three species discovered during this study are currently classified as endemic to Peninsular Malaysia, of which 20 are endemic to Pahang, Perak and Selangor states, and 1 very narrowly endemic species; Corybasvillosusto GunungUlu Kali. Through our observations, most of the orchid species in GunungUlu Kali are very susceptible to disappearance due to loss of habitat and local climate change. An assessment of conservation status according to IUCN criteria revealed that 47 orchid taxa from GunungUlu Kali were threatened with extinction. Conservation actions were suggested to conserve the orchid diversity in the cloud forest region of Genting Highlands.

Keywords: Orchids, cloud forest, climate change, Genting Highlands, Malaysia

Penang Hill Orchids Diversity after a Century of Development Encroached

Category: Fundamental (A)

Assoc. Prof. Dr. Rusea Go
Khor Hong Eng, Muskhazli Mustafa, Janna Ong Abdullah, Ahmad Ainuddin Naruddin, Nam Sook Lee, Chang Shook Lee, Sang Mi Eum, Kwang-Woo Park and Kyung Choi
Faculty of Science
rusea@science.upm.edu.my
03-89466634

A comprehensive study on the orchid diversity in Penang Hill, Penang, Malaysia was conducted from 2004 to 2008, with the objective to evaluate the presence of orchid species listed by Curtis (1894) after more than 100 years. A total of 85 species were identified during this study, of which 52 are epiphytic or lithophytic and 33 are terrestrial orchids. This study identified 57 species were the same as those recorded by Curtis, and 78 species of Turner's (1995) checklist of 118 species for the state of Penang. The preferred account for comparison was Curtis' (1894) list as his report was specifically for the areas around Penang Island especially Penang Hill, Georgetown and Ayer Itam areas. Our study reveals that about 50% of Curtis' collection localities have been converted to residential areas and agricultural land, and this probably explains the decreasing numbers of species found in the current study especially for the terrestrial species as epiphytic species have better adaptation capabilities towards environmental changes. Seven species were identified as new records to Penang Hill as they were not recorded by Curtis (1894). None of the three species recorded as endemic to Penang by Turner (1995) was recollected during the current study, of which only Zeuxinerupestris was in Curtis' (1894) list. Overall, we concluded that Penang hill harbours at least 136 species of orchids of which 85 species or 62.5% were recollected in this study. This also indicates that this area is still suitable for orchid growth even though it is surrounded by rapid development and mass conversion of forested land into fruit orchards and residential area. The designation of Penang Hill as a Permanent Forest Reserve would better guarantee the survival of some orchid species unless human interventions and climatic changes occur.

Keywords: Orchids, diversity, Penang Hill, Malaysia

Protein Patterning by UV-Induced Photodegradation of Poly(oligo(ethylene glycol) methacrylate) Brushes

Category: Fundamental (A)

Dr. Shahrul Ainliah Alang Ahmad
Angus Hucknall, Austosh Chilkoti and Graham J. Leggett
Faculty of Science
ainliah@science.upm.edu.my
03-89466805

One of the biggest challenges in molecular nanoscience is the integration of top-down (lithographic) and bottom-up (synthetic) fabrication methodologies. Various techniques have been developed to pattern films including UV photopatterning. However, the challenge of using optical methods is the fabrication of small structures is limited to the micron scale due to the well known diffraction limit. Thus, a near-field optical technique has been developed, irradiating SAMs within its near field to overcome the diffraction limit. Functionalization of nanofabricated surfaces with proteins offers potential applications such as biochips and nanoarrays. The control of protein adsorption remains a critical challenge in many areas of biotechnology because proteins adsorb strongly and irreversibly to many surfaces. In this work, polymer brushes of oligo(ethylene glycol) methacrylate (OEGMA), recognized as protein-resistant materials, was synthesized using surface-initiated atom transfer radical polymerization (SI-ATRP). Exposure to light with a wavelength of 244 nm caused a loss of polyether units from the brush structure and the creation of aldehyde groups that could be derivatized with amines. This was confirmed with X-ray photoelectron spectroscopy (XPS). Analysis of topographical images (AFM) showed that physical removal of material occurred during exposure, at a rate of 1.35 nm J-1 cm2. Using fluorescence microscopy, the adsorption of labeled proteins onto the exposed surfaces was studied. It was found that protein strongly adsorbed to exposed areas, while the masked regions retained their protein resistance. Exposure of the film to UV light from a scanning near-field optical microscope yielded submicrometer-scale patterns. These data indicate that a simple, rapid, one-step photoconversion of the poly(OEGMA) brush occurs that transforms it from a highly protein-resistant material to one that adsorbs protein and can covalently bind amine-containing molecules and that this hotoconversion can be spatially addressed with high spatial resolution.

Keywords: SAMs, POEGMA, ATRP, SNP, Protein patterning, nanofabrication, biochips

V/III Ratio and Catalyst Particle Size Effects on the Crystal Structure and Opticle Properties of Inp Nanowires

Category: Fundamental (A)

Dr. Suriati Paiman
Qiang Gao, Hark Hoe Tan, Chennupati Jagadish, Kurananda Pemasiri, Mohammad Montazeri, Howard E Jackson, Leigh M. Smith, Jan Yarrison-Rice, Xin Zhang and Jin Zhou
Faculty of Science
suriati@science.upm.edu.my
03-89466661

In this work, we present the results of engineering crystal structure of InP nanowires and their effects on the optical properties by controlling growth conditions (V/III ratio and catalyst size). We show that InP nanowires grow preferably in the WZ crystal structure than the ZB with increasing V/III ratio or decreasing diameter. The photoluminescence (PL) spectra clearly show a dramatic change from ZB emission at low V/III ratios, to WZ-like emission at high V/III ratio. From time-resolved photoluminescence (TRPL) results on single InP nanowire, we conclude that wurtzite nanowires show longer carrier lifetimes than zinc-blende ones. More interestingly, we demonstrate that time-resolved spectra analysis can provide detailed carrier density information to show the mixed ZB and WZ phases in nanowires where the carrier density is able to nearly saturate all available states within these nanowires. By changing the V/III ratio, one can tune the emission wavelength of the nanowires which is attractive for applications in developing novel optoelectronic devices

Keywords: InP nanowires, MOCVD, V/III ratio, catalyst size, zinc-blende, wurtzite, time-resolved

Surface Plasmon Resonance Spectroscopy: Fundamental Studies for High Potential Sensing

Category: Application Fundamental (A)

Prof. Dr. W. Mahmood Mat Yunus
Yap Wing Fen and Zainal Abidin Talib
Faculty of Science
mahmood@science.upm.edu.my
03-89466646

Surface plasmon resonance (SPR) is a quantum electromagnetic phenomenon arising from the interaction of light with free electrons at a metal-dielectric interface. SPR has emerged as a powerful optical sensor based on the sensing of the change in refractive index of a medium adjacent to the metal surface layer. In the present work, the fundamental study of the SPR spectroscopy has been investigated experimentally and theoretically. The data analysis in SPR method which involves determination of optical constants and thicknesses of multi layer thin films was investigated based on Kretschmann configuration. The SPR experimental results (reflectance versus incident angle plots) were analyzed by using Maxwell's and Fresnel's equations. A simulation and automatic fitting program has been invented using Matlab based on matrix method for multi layer system. The calculations involve transfer matrix method where the unknown optical parameters were obtained by fitting experimental SPR plots to calculated theoretical results. The utility of this transfer matrix has also been demonstrated for gold-active layer in contact with copper ion with different concentration ranging from 0 to 100 mg/l. The imaginary part of refractive index increases while the thickness of the active layer decreases as the copper ion concentration increases. The SPR angle shifted to lower value. Therefore, it can be concluded that SPR spectroscopy is high potential in sensing application.

Keywords: Surface plasmon resonance, optical constant, multi layer thin film, transfer matrix method.

Preparation and Elastic Study of Bi_2O_3-PbO-GeO_2 Ternary Glass

Category: Fundamental (A)

Prof. Dr. Sidek Hj Ab Aziz
Hamid-Reza Bahari Pour and Halimah Mohamed Kamari
Faculty of Science
drsidekaziz@gmail.com
03-89466601

This paper reports the elastic properties and structure of GeO_2-PbO-Bi_2O_3 ternary bulk glasses which were successfully prepared by melt quenching technique. The study was performed by density and ultrasonic velocity measurements using Archimedes method and pulse-echo technique respectively. Increasing values of density, ultrasonic velocity and elastic moduli were observed due to substitution of bismuth to lead with fixed composition of GeO2. The Poisson's ratio, in contrast with fractal bond connectivity, is found to vary decreasingly with the Bi_2O_3 concentration. In Pb-rich samples all of the components contributed in the structure as network former; however, in Bi-rich samples lead and bismuth showed modifier behaviour.

Keywords: GeO_2, glass, PbO, Bi_2O_3, Ultrasonic

.....

Studies of type-II GaSb Quantum Dots in GaAs Matrix

Category: Fundamental (A)

Dr. Mazliana Ahmad Kamarudin
Manus Hayne, Qian Dong Zhuang, Oleg Kolosov, Thomas Nuytten, Victor Moshchalkov and Franco Dinelli
Faculty of Science
user@prpi.mail.com
03-89466649

An application of quantum dots (QDs) for memory devices such as flash memory and dynamic random access memory triggers a new phenomenon in the world of nanoscience. The capability of QDs to trap carriers is determined by the thermal activation barrier or localization potential which determines the storage time of a QD memory. The ability of QDs to store a few or even single charge carriers with different retention times is dependent on the material combination. Furthermore, the optical and electrical characteristics of QDs are influenced by important morphological parameters which are the dot size, composition and density. This study investigates the growth condition of GaSb QDs in GaAs matrix. Samples of GaSb/GaAs QDs were grown by solid-source molecular beam epitaxy to

investigate the effect of the GaSb growth temperature and GaAs capping layer temperature. All samples were grown on GaAs (001) substrates at temperatures from 400°C to 490°C with deposition time of 7 s and the same growth temperature was used for the capping layer.

Keywords: Quantum dots, GaSb/GaAs, Molecular Beam Epitaxy

……..

Phenylbutenoids: Potential Anticervical Agents from Rhizomes of *Zingibercassumunar*

Category: Fundamental (A)

Prof. Dr. Mohd Aspollah Sukari
Mohd Zulkhairi Azid, Noorul Adawiyah Mustahil, Sadikah Ahmad, Ahmad Bustamam Abdul, Gwendoline Ee Cheng Lian and Nor Azah Mohamad Ali
Faculty of Science
aspollah@science.upm.edu.my
03-89466797

Zingibercassumunar (Zingiberaceae), locally known as 'bungelai' or 'bonglai' among Malays and 'bengle' in Javanese is widely used in folk traditional medicines to treat skin diseases, inflammation and as one of the ingredients of herbal spices. Phytochemicals study on rhizomes of Z. cassumunar collected from Jogjakarta, Indonesia have yielded phenylbutenoids identified as cis-3-(3',4'-dimethoxyphenyl)-4-[(E)-3''',4'''-dimethoxystyryl]cyclo-hex-1-ene, (E)-4-(3',4'-dimethoxyphenyl)but-3-en-1-ol and 8-(3,4-dimethoxyphenyl)-2-methoxynaphto-1,4-quinone as major constituents, together with 3,4-dimethoxybenzoic acid and beta-sitosterol. All phenylbutenoids isolated have been subjected to cytotoxic screening against human cervical cancer cells (HeLa) and showed significant activity with IC50 values less than 15 Âµg/mL. These finding could be a good basic to give preliminary data on the killing properties of naturally occurring entity against human cancer cells, hence can be developed as new anticancer drugs.

Keywords: Phenylbutenoids, *Zingibercassumunar*, cervical, HeLa, cytotoxic

Cytotoxic Properties of Carbazole Alkaloids Isolated from *Murrayakoenigii* (Rutaceae) Against Human Cancer Cells

Category: Fundamental (A)

Prof. Dr. Mohd Aspollah Sukari
Nur Liyana Ithnin, Halimatul Saadiah Mohammad Noor, Rahayu Utami Umar, Noor Haslizawati Abu Bakar, Abdul Manaf Ali and Mawardi Rahmani
Faculty of Science
aspollah@science.upm.edu.my
03-89466797

A study to assess anti-cancer effect of crude extracts from leaves, stem bark and roots together with several carbazole alkaloids; mahanimbine, girinimbine, murrayacine, murrayanine, murrayafoline-A and 3-methylcarbazole isolated from Murrayakoenigii (Rutaceae) were carried out. The cytotoxic potential of different solvent extracts which were hexane, chloroform and methanol and isolated compounds were screened using MTT (3-[4,5-dimethyl-2-thiazolyl]-2-5-diphenyl-2H- tetrazolium bromide) method against HL-60 cancer cell (human T-promyelocyticleukemia), MCF-7 cancer cell (human breast cancer), HT-29 cancer cell (human colon cancer) and HeLa cancer cell (human cervical carcinoma cancer). Most of the extracts and compounds were found to be active against these four cancer cells with IC50 value less than 30g/ml. All methanol extracts of the leaves, stem bark and roots showed weak activity with IC50 values more than 30g/ml. Whilst, murrayacine and murrayafoline-A exhibited the strongest cytotoxic activity among other isolated compounds with IC50 values of 1.4 and 1.8g/ml against HT-29 and MCF-7 cancer cell, respectively.

Keywords: *Murrayakoenigii*, Rutaceae, Cytotoxic, Carbazole alkaloids

Novel Ruthenium Based Polypyridyl Complexes for DNA Imaging

Category: Fundamental (A)

Dr. Haslina Ahmad
Anthony J. H. M. Meijer and Jim A. Thomas
Faculty of Science
haslina@science.upm.edu.my
03-89467486

In the search for new biological imaging agents, metal coordination compounds able to emit from triplet metal-to-ligand charge transfer (MLCT) states offer many advantages as luminescent probes of DNA structure. In this study, a series of ruthenium(II) polypyridyl complexes has been synthesized and characterized by UV-Visible spectroscopy, luminescence spectroscopy, excited state lifetime and electrochemistry. Ruthenium polypyridyl complexes have unique photophysical properties which make them potentially invaluable as probes for cellular imaging. Fluorescence cell imaging shows great promise in disease diagnosis. However, the conventional imaging measurements are often influenced by intrinsic weaknesses of organic fluorophores, including low emission intensity, short luminescence lifetimes, fast photobleaching and strong photoblinking. A key advantage of ruthenium polypyridyl complexes as imaging dyes are their long lived excited states lifetime and strong emissions which have also shown in this study. On the other hand, the broad range of visible light absorption and this relatively long-lived excited state lifetime render it an attractive sensitizer for homogeneous and heterogeneous redox reactions. Previous research has shown that several ruthenium complexes used in dye-sensitized solar cells (DSSCs) have reached more than 10% solar cell efficiency under standard measurement conditions.

Keywords: Ruthenium, lifetime, luminescence, cellular imaging

Novel Plasticizer for Poly(lactic acid)

Category: Fundamental (A)

Dr. Nor Azowa Ibrahim
V.S.Giita Silverajah 1, Wan Md Zin Wan Yunus , Hazimah Abu Hassan and Chieng Buong Woei
Faculty of Science
norazowa@science.upm.edu.my
03-89466602

One of the most promising and attractive biodegradable plastic being developed is Poly (lactic acid), PLA. PLA is the most innovative alternative for conventional petroleum-based polymer due to its excellent properties, such as good mechanical properties (especially in strength and modulus), easy processability, excellent degradability and transparency. However, the main drawbacks of PLA are due to its high brittleness, low toughness and low tensile elongation. Thus, these works focus on the use of three different epoxidized palm oils (EPO) as plasticizer for PLA. EPO is a renewable, biodegradable, environmental friendly and cheap raw material. The blends were prepared at various EPO contents of 1, 2, 3, 4 and 5 wt% and characterized. The SEM analysis evidenced successful modification on the neat PLA brittle morphology. Tensile tests indicated that the addition of 1 wt% EPO is sufficient to improve the strength and flexibility compared to neat PLA. Additionally, the flexural and impact properties were also enhanced. Further, DSC analysis showed that the addition of EPO results in a decrease in Tg which implies to the increase in the PLA chain mobility. In the presence of 1 wt% EPO, TGA results revealed significant increase in the thermal stability by 27%. Among the three EPO's used EPO(3) showed the best mechanical and thermal properties compared to the other EPO's, with an optimum loading of 1 wt%. Conclusively, EPO showed a promising outcome to overcome the brittleness and improve the overall properties of neat PLA, thus can be considered as a green plasticizer.

Keywords: Melt blending; plasticizer; bioplastic; biodegradable plastic

Preparation of Zn and Ca Doped ErBa2Cu3O7-? Superconductors by Coprecipitation and Their Electrochemical Analyses

Category: Fundamental (A)

Prof. Dr. Zulkarnain Zainal
Elyas Sadeq Alaghbari, Imad Hamadneh, Mohd Zobir Hussein, Tan Wee Tee, Mohammed Zidan and Mohd Haniff Wahid
Faculty of Science
zulkar@science.upm.edu.my
03-89464209

Zn- and Ca-doped ErBa2Cu3O7 were prepared via coprecipitation method using metal acetates as the starting salts. The precipitated samples were calcined for 20 h at 900 °C and sintered at 920 °C for 24 h. All heat treatments were carried out under oxygen environment. Results show that there is a selectivity of the doping site depending on the ionic radius of the dopant. Furthermore, increase in the critical temperature, Tc, was observed in 0.05 mole of calcium and zinc doped samples. The difference in ionic radius of the dopant led to the increase in porosity as the ionic radius decreases. On the other hand, structural distortion increased as the difference of ionic radius became larger. Cyclic voltammetry of the sample on glassy carbon electrodes in 0.1 M NH4Cl at pH 4.12 showed four major peaks attributed to first and second redox couple due to the formation of copper complexes. The highest response was recorded for sample doped with 0.05 and 0.2 mole of Ca and Zn doped samples respectively, and are sensitive to the changes in pH and scan rate. In addition, chronocoulometry and chronoamperometry studies showed that the amount of charge increased from 497 micro C/cm2 for the pure sample to 808 micro C/cm2 for Zn doped and 1231 micro C/cm2 for Ca doped samples. The diffusion coefficient obtained were 7.47 x 10-05, 7.31 x 10-05 and 8.76 x 10-05 cm2/s for the pure, Zn doped and Ca doped samples, respectively.

Keywords: ErBCO, doping, superconductor, cyclic voltammetry, coprecipitation

Stagnation-Point Flow over a Stretching/Shrinking Sheet in a Nanofluid

Category: Fundamental (A)

Mrs. Norfifah Bachok
Anuar Ishak, Roslinda Nazar, Norazak Senu and Norihan Md. Arifin
Faculty of Science
norfifah78@yahoo.com
03-89466849

The steady two-dimensional stagnation-point flow of a nanofluid over a stretching/shrinking sheet in its own plane is investigated. The stretching/shrinking velocity and the ambient fluid velocity are assumed to vary linearly with the distance from the stagnation point. The similarity equations are solved numerically for three types of nanoparticles, namely copper (Cu), alumina (Al2O3), and titania (TiO2) in the water based fluid with Prandtl number. The skin friction coefficient, Nusselt number, and the velocity and temperature profiles are presented graphically and discussed. Effects of the solid volume fraction on the fluid flow and heat transfer characteristics are thoroughly examined. Different from a stretching sheet, it is found that the solutions for a shrinking sheet are non-unique.

Keywords: Nanofluids, stagnation-point flow, heat transfer, stretching/shrinking sheet, dual solutions

.....

Flow and Heat Transfer Characteristics on a Moving Plate in a Nanofluid

Category: Fundamental (A)

Mrs. Norfifah Bachok
Anuar Ishak, Roslinda Nazar, Norazak Senu and Norihan Md. Arifin
Faculty of Science
norfifah78@yahoo.com
03-89466849

This considers the extended Blasius and Sakiadis problems in nanofluids, by considering a uniform free stream parallel to a fixed or moving flat plate, which has more practical significance. It is assumed that the plate moves in the same or opposite direction to the free stream. The resulting system of nonlinear ordinary differential equations is solved numerically for three types of nanoparticles, namely copper (Cu), alumina (Al2O3), and titania (TiO2) in the water based fluid with Prandtl number. The effect of the solid volume fraction parameter of the nanofluids on the heat transfer characteristics is investigated. The results indicated that dual solutions exist when the plate and the free stream move in the opposite directions.

Keywords: Nanofluids, moving plate, heat transfer, numerical solution, dual solutions

Procedures of Generating a True Clean Data in Simple Mediation Analysis

Category: Fundamental (A)

Dr. Anwar Fitrianto
Habshah Midi
Faculty of Science
anwar@science.upm.edu.my
03-89467025

The advantage of the proposed method is the generated dataset is free from the presence of high leverage points, even for larger sample size which is commonly used in social science.

Keywords: Mediation analysis, potentials, Monte Carlo

……..

Enhancement of Magnetoresistance in LCMO/PCMO/LCMO Trilayers Grown on Si-wafer by Pulsed Laser Deposition

Category: Fundamental (A)

Prof Dr Abdul Halim Shaari
Manizheh Navasery, Chen Soo Kien and Lim Kean Pah
Faculty of Science
ahalim@science.upm.edu.my
03-89466648

Trilayers of LCMO/PCMO/LCMO have been successfully grown on Si-wafer substrate by pulsed laser deposition. The room temperature magnetoresistance(MR) value of the trilayers and the single layer are 34.88% and 27.12% respectively. This enhancement is significant because it can increase the sensitivity of the film when engaged as sensor elements in any electronic sensing device. Thus this type of films is very useful in the electronic industry. The costing depends on the use of Si-wafer. Currently the cost of Si-wafer is cheap.

Keywords: Colossal magnetoresistance, manganite, pulsed laser deposition

Room Temperature Ferromagnetic-Insulator Transition in LKMO Prepared via Sol-gel

Category: Fundamental (A)

Prof. Dr. Abdul Halim Shaari
Pan Kai Yap, Manizheh Navasery, Chen Soo Kien, Mohd Mustapha Awang Kechik, Lim Kean Pah and Wan Mohd Daud Wan Yusoff
Faculty of Science
ahalim@science.upm.edu.my
03-89466648

The influence of sintering temperature on the microstructure and transport properties of polycrystalline La0.85K0.15MnO3(LKMO) samples via sol-gel method is studied. Powder X-ray diffraction (XRD) shows that all the LKMO samples have single phase with hexagonal structure. The data obtained from XRD were analyzed by using the Rietveld refinement technique. The increase of the sintering temperature considerably promotes grain growth and improves grains connectivity. The increase of the average grain size throughout the sintering temperatures has affected the transport properties of LKMO samples. The magnetization is improved with the reduction of coercivity. The Curie temperature (Tc) was obtained from AC susceptibility data and the results were inversely proportional to the sintering temperature of the samples because the ferromagnetic properties are reduced by the increase of unit cell volume and Mn-O bond length. The electrical resistance is decreased and the metal-insulator transition temperature (Tp) is shifted towards the high temperature side, due to the improvement of grain connectivity. A phase diagram based on the measurement of Tp and Tc is constructed. All the LKMO samples are in the ferromagnetic-insulator phase at room temperature. Advantages: 1.The increase of the grain size enhanced the magnetization and reduced the coercivity of the samples as the sintering temperature increased. 2. All the samples show soft ferromagnetic characteristics in room temperature. 3. Curie temperature (Tc) is found to decrease with the increase of the sintering temperature while the metal-insulator transition temperature (Tp) shifts towards high temperature side. 4.The result from electronic phase diagram illustrated that LKMO in the sintering temperature range of 750 °C-1000 °C is in ferromagnetic-insulator region in room temperature.

Keywords: Sol-gel, Microstructure, Coercivity, Ferromagnetic-insulator

PRPI 2012

UPM's Research & Innovation

FACULTY OF FOOD SCIENCE AND TECHNOLOGY

Recovery of Valuable Components from Red Pitaya Peel *Hylocereus polyrhizus* Through Spray Drying

Category: Applied Research (B)

Prof. Dr. Jamilah Bakar
Ee Shu Chee, Kharidah Muhammad, Dzulkifly Mat Hashim and Noranizan Adzahan
Faculty of Food Science and Technology
jamilah@putra.upm.edu.my
03-89468368

Red Pitaya (Hylocereuspolyrhizus) is widely grown in Malaysia, Thailand, Vietnam, Taiwan and other parts of the world such as Israel and Colombia due to it increased popularity as a dessert fruit and documented health benefits. However, these are products developed from the flesh of pitaya fruits. The utilization of the peel for its functional component has not been reported. The peel, 22% (w/w) of the fruit is presently discarded during processing. Our study concluded that the peel was very rich in betacyanin pigment, pectin and fiber with a good insoluble to soluble ratio. However, delay and improper preservation technique could result in the loss of these functional components. Spray drying is the most common and economical technique to obtain food powders. However, each spray drying parameters are unique to the commodity to be spray-dried. The spray drying of pitaya peel (Hylocereuspolyrhizus) was optimized to study the effect of inlet air temperature (155-175°C), outlet air temperature (75-85°C) and maltodextrin DE10 concentration (8-22% w/w) on the pitaya peel powder characteristics. Spray dried pitaya peel powders had high betacyanin retention, desirable color, solubility and hygroscopicity properties. The linear term of maltodextrin concentration was found to be the most significant ($p< 0.05$) variable influencing the powder characteristics and the outlet temperature had the least effect. The desirable pitaya peel powder could be produced by spray drying at a combined parameter of inlet air temperature at 165°C, outlet air temperature at 80°C and maltodextrin DE10 at 15% (w/w). The betacyanin was also stabled during storage. Hence, red pitaya peel powder can be a viable commercial source of betacyanin and dietary fiber.

Keywords: Pitaya peel; spray drying; powder characteristics

Novel and Practical Sterilization Approach to Control Major Pathogenic Bacteria on Meat

Category: Applied Research (B)

Prof. Dr. Fatimah Abu Bakar
Mohammed Raftari, Son Radu and Zamberi Sekawi
Faculty of Food Science and Technology
fatim@food.upm.edu.my
03-89468368

Appropriate and safe antibacterial agents able to decontaminate meat surfaces have long been a concern to meat industry. Thus, various intervention strategies have been studied to reduce the level of bacteria on animals' carcass surfaces. In an attempt to manage beef carcass contamination, spray wash treatments utilizing different mixture of three concentrations (1, 1.5 and 2%) of acetic, lactic, propionic and formic acids were performed to evaluate their efficacy in reducing numbers of Salmonella typhimurium, Escherichia coli O157:H7, Staphylococcus aureus and Listeria monocytogenes on meat tissues. Mixture of different concentrations 1, 1.5 and 2% of acetic, lactic, propionic and formic acids at 1:1 ratio were spray washed on inoculated meat to evaluate their efficacy in reducing numbers of Escherichia coli O157:H7, Staphylococcus aureus, Listeria monocytogenes, Salmonella typhimurium on meat tissue at 4±1°C. The beef pieces were decontaminated with hot water and then inoculated with Escherichia coli O157:H7, Staphylococcus aureus, Listeria monocytogenes, Salmonellatyphimurium individually which then were spray washed with treatments for 15 sec separately. There was significant difference ($P<0.05$) on spray wash treatments which involved formic acids as combinations (acetic and formic, lactic and formic and propionic and formic acids), reducing the number of bacteria by 0.26-1.40 log cfu/ml more than combinations of acetic and lactic, acetic and propionic and lactic and propionic acids on meat tissue. The combination of lactic and formic acids showed the highest antibacterial effect with more than 3 log cfu/ml reduction for all concentrations. This will pose a promising and economical method for decontaminating meat surface. At the same time, effective in protecting humans from serious infections caused by Escherichia coli O157:H7, Staphylococcus aureus, Listeria monocytogenes and Salmonella typhimurium transferred via meat which lead to widely distributed health and economic adverse impacts.

Keywords: Meat, formic acid, lactic acid, *Salmonella typhimurium, Escherichia coli* O157:H7, *Staphylococcus aureus, Listeria monocytogenes*

Improvement of Innate Antioxidant Property of Stone Fish (*Actinopyaga lecanora*) Tissue Using Enzymatic Proteolysis

Category: Applied Research (B)

Prof. Dr. Nazamid Saari
Sara Bordbar, Afshin Ebrahimpour, Azizah Abd Hamid and Mohd Yazid Abd Manap
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Reactive oxygen species (ROS) can be formed in the human body as well as in food systems. They attack macromolecules such as membrane lipids, proteins and DNA, lead to many health disorders such as cancer, diabetes, neurodegenerativeand inflammatory diseases. Moreover, ROS reactions lead to deterioration of quality and destroy nutrients in food. This brings about the need for synthetic and natural antioxidantsto prevent these reactionsas well as their deleterious effects.The use of synthetic antioxidants has been restricted due to their induction of DNA damages and toxicity. Hence, a great deal of attention is being paid on finding safe and natural antioxidant with no side effects.Several studies have revealed that protein hydrolysates and peptide fractions can be added as safe and natural functional ingredients in food systems to reduce oxidativechanges during storage. They are proven to be superior to that of a-tocopherol, and in some cases, similar or higher than synthetic antioxidants such as BHA and BHT. Synergistic effects of some antioxidative peptides with tocopherols in food systems have also been reported.Basically, multifunctional nature of peptidic antioxidants, like having the ability to impart other bioactivities such as antihypertensive, opioid, and cholesterol lowering capacity, make them more attractive candidates than non-peptidic antioxidants as dietary ingredients in promoting human health. The current study has highlighted the great potential of proteolysates as well as bioactive peptides derived from stone fish (Actynopyagalecanora) as promising alternativefor synthetic antioxidantsin nutraceutical and pharmaceutical industries.

Keywords: Antioxidant, Proteolysis, *Actinopygalecanora*

A Novel AspergillusoryzaeNSK Efficiently Utilize Native Sugars for High Gamma-aminobutyric Acid (GABA) Production

Category: Applied Research (B)

Prof. Dr. Nazamid.Saari
Siti Hajar Azhari, Safuan Ab. Kadir, Afshin Ebrahimpour and Rosfarizan Mohamad
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

The physiological importance of Gamma-aminobutyric acid (GABA) such as protecting depression and anxiety and reducing hypertension has attracted the attention of food industry to enhance GABA in food systems for functional foods development. Aspergillusoryzae is widely used in traditional fermentation industries in south East Asia. Recently, a novel A. oryzae NSK has been isolated from Koji and characterized for high GABA production capability. Following the finding, the strain was used to produce GABA using native sugars namely nypa, sugarcane and molasses. The fermentation system containing molasses was found to give high GABA yield. This was further confirmed by the kinetic studies in which the strain showed low substrate utilization for each unit of GABA produced compared to other substrate resulted in less substrate consumption for high productivity. These findings could open up the possibility of enhancing GABA in various food systems via fermentation. The selection of these native sugars which is relative abundance, inexpensive materials and renewable natural resources in Malaysia may be used as replacement to commercial carbon source that will reduce the cost in GABA fermentation process.

Keywords: Gamma-aminobutyric acid (GABA), Aspergillusoryzae NSK, sugar substrate, fermentation

The Effect of Different Browning Inhibitors on Shelf Life Extension of Dokong Kering (*Lansium domesticum* Correa) During Storage at 15°C.

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Norkhizan Che Kamala , Siti Hajar Ahmadb, Azizah Osmana and Azimah Hamidonb
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Dokong (lansiumdomesticumcorrea) is a tropical fruit that is gaining popularity in Malaysia. Dokong is one of the fruits listed under the National Agriculture Policy (NAP) for potential commercialization in line with the declaration by FAO that Malaysia as one of the major Southeast Asian countries' tropical fruit producers. However, the fruit has a very short shelf life (5 days) primarily due to the browning of the fruit pericarp. Therefore, the objective of this study was to prolong the shelf life of dokong by inhibiting the browning effects on dokong's skin. The fruit shelf life was successfully extended to 12 days from the initial 5 days storage by combining appropriate preservation technology while retaining the freshness of the fruits.

Keywords: Dokong, browning inhibitors, modified atmosphere packaging, physicochemical, PPO, phenolic compound

……..

Production of Defatted Palm Kernel Cake Protein Hydrolysate as a Valuable Source Of Natural Antioxidant

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Mohammad Zarei, Afshin Ibrahimpour, Azizah binti Abdul Hamid and Farooq Anwar
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Palm kernel cake (PKC) is the main by-product of the palm oil extraction process, which has a poor utility. Its protein content (15-19%), low cost and more availability, has made it as an attractive and promising source of plant proteins especially in Malaysia. PKC is produced around 2.2 million tons per year. With regard to the protein content; its protein will be around 200,000 tons per year. This amount can be a valuable source for many applications such as bioactive peptides production. Demand for bioactive peptides and protein as antioxidants ingredients in food is rapidly increasing due to their low cost,

safety, inherent nutritional, functional value, consumer's preference and concern over the safety of synthetic antioxidants. In this project PKC protein hydrolysate was used to produce the bioactive peptide as a natural antioxidant. Based on our assays the PKC protein hydrolysates generated by papain is a strong antioxidant to scavenge the free radicals and also is a chelating agent to prevent the oxidation of some component and amplify the antioxidant activity.

Keywords: Antioxidant; palm kernel cake; protein hydrolysates; bioactive peptide

……..

An Optimized Sonication Protocol for the Maximum Recovery of Glutamate Decarboxylase (GAD) from *Aspergillus oryzae* NSK

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Audrey Lee Ying Yeng, Hasanah Mohd Ghazali, Raja Zaleha and Afshin Ebrahimpour
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

In this study, different cell permeabilization as well as cell disruption methods have been performed either as a single treatment or a combination of several techniques including enzymatic solubilization, detergent and mechanical lysis to maximize the release of membrane bound glutamate decarboxylase (GAD) from Aspergillusoryzae NSK. Sonication alone gave the highest recovery of GAD and the technique was further optimized by applying one factor at one time approach. The recovery of GAD increased from 997.12 U/mg to 1580.97U/mg under optimized sonication protocol by employing the cell volume of 6 mL, sonication time of 15 min, cell density of 12% at 50W acoustic power. The protocol developed contribute to the much more promising method due to its simplicity, cost effective and environmental compatibility in fulfilling the increasing demand of commercial needs for GAD for GABA production.

Keywords: *Aspergillusoryzae*, Glutamate Decarboxylase, γ-amino-butyric acid, sonication, enzymatic solubilization, Triton-X 114

Angiotensin-converting Enzyme (ACE) Inhibitory Activity of Green Soybean [*Glycine max*] Seed Hydrolysates

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Siti Nadia Hashim, Afshin Ebrahimpour and Bita Forghani
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Defatted green soybean seeds were hydrolysed by four proteases alcalase, papain, flavourzyme and bromelain commercially available for food industry use, and the angiotensin I-converting enzyme (ACE) inhibitory activities of the enzymatic hydrolysates were measured at different hydrolysis times. The non-hydrolysed protein showed no inhibitory activity. Hydrolysates generated with flavourzyme displayed very low ACE inhibitory activity, while those obtained with alcalase exhibited high inhibitory activity followed by papain and bromelain. The highest ACE inhibitory activity with the IC50 value of 0.14 mg protein/mL was found in the hydrolysate obtained with alcalase at 6 h of hydrolysis time. These results indicated that green soybean seed protein is a good protein source of ACE inhibitory peptides when hydrolysed with the protease alcalase. The green soybean seed protein hydrolysates prepared with alcalase might be utilised for physiologically functional foods with antihypertensive activity.

Keywords: Green soybean seed, proteases, angiotensin converting enzyme, IC50, degree of hydrolysis

.....

Enzyme Hydrolysates from Stichopushorrens as a New Source for Angiotensin Converting Enzyme Inhibitory Peptides

Category: Applied Research (B)

Prof. Dr. Nazamid Saari
Bita Forghani, Afshin Ebrahimpour, Jamilah Bakar and Azizah Abdullah Hamid
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Sea cucumber, known as the ginseng of the sea, has been long recognized in the folk medicine of Asian countries. This valuable source possesses unique medicinal properties such as nourishing blood, tonifying kidney, moistening dryness of the intestines, wound healing, treatment of stomach ulcers, asthma, hypertension, rheumatism and sinus. The

strong belief of health promoting effects leads to traditionally process sea cucumber through fermentation for up to one year before being used as a traditional medicine. Therefore, in perspectives of the medicinal attributes of sea cucumber, a large potential exists to produce and evaluate sea cucumber proteolysates as viable source of ACE inhibitory peptides for maintaining blood pressure in humans. The present study explored enzymatic proteolysis of sea cucumber (Stichopushorrens) to produce ACE inhibitory bioactive peptides. Among different proteolysates the alcalasehydrolysate exhibited the highest ACE inhibitory effect (0.4 mg/mL) with a unique pattern of molecular weight distribution lower than 20 kDa and 5 - 15 % of hydrophobicity.

Keywords: Enzymatic hydrolysis, sea cucumber hydrolysates, angiotensin converting enzyme, bioactive peptides; IC50, amino acids, HPLC

……..

A Glutamic Acid-Producing Lactic Acid Bacteria Isolated from Malaysian Fermented Foods

Category: Applied Research (B)

Prof. Dr. Nazamid Saari
Mohsen Zareian, Afshin Ebrahimpour, Fatimah Abu Bakar, Abdul Karim Sabo Mohamed, Bita Forghani and Mohd Safuan B. Ab-Kadir
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Glutamic acid is a multifunctional amino acid involved in taste perception, excitatory neurotransmission and intermediary metabolism. It plays an important role in gastric phase digestion with multiplicity effects in the gastrointestinal tract when consumed with nutrients by enhancing gastric exocrine secretion. Glutamic acid is a specific precursor for other amino acids i.e., arginine, proline, γ-amino butyric acid (GABA) and glutathione. Furthermore, a number of studies have shown the possible usefulness of glutamic acid in enhancing nourishment in the elderly and in patients with poor nutrition. Industrial production of glutamic acid is through microbial fermentation because the chemical method produces a racemic mixture of glutamic acid. Numerous studies have reported glutamic acid production by various microorganisms; however, most of them were not of food-grade. The key advantage of lactic acid bacterial production of glutamic acid is that the amino acid produced in this way is biologically active (L-glutamic acid) and the production process is considered safe and eco-friendly. LAB are commercially essential in the processing of food materials and they have extensively been applied in food industry. Employing LAB with the potential to produce glutamic acid can facilitate production of functional foods rich in bioactive compounds. Thus, research of this technological potential is of industrial furthest interest. The results of this study can be further applied

for developing functional foods containing glutamic acid and subsequently GABA as a bioactive compound.

Keywords: γ-amino butyric acid,Lactobacillus plantarum, 16S rRNA gene sequencing, polymerase chain reaction, phenotypic identification, sugar assimilation profile

……..

Inter-Varietal Variation in the Composition of Seeds and Seed Oils from Winter Melon [*Benincasa hispida* (Thunb.) Cogn.] Fruit

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Farooq Anwar , Nor Azizah Mohammad and Fatimah Othman
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Winter melon is a Cucurbitaceae family which produces large amount of seeds and usually, the seeds are not been utilized; considered as an agro-waste. Through this study, we discovered that winter melon seed oil contained high unsaturated fatty acids, whilst oleic acid and linoleic acid was the most abundant compound. As the demand of vegetable oils are increasing rapidly for both human food consumption and non-food consumption, winter melon seed shown potential as functional oil. It also can be suggested to widely been produce and to commercialize like almond oil, olive oil, safflower oil, grape seed oil and others. Thus, winter melon seed oil can be employed in foods, cosmetical and pharmaceutical preparations.

Keywords: Winter melon fruit, inter-varietal variation,seed oil

Production of Defatted Palm Kernel Cake Protein Hydrolysate as a Valuable Source of Natural Antioxidants

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Mohammad Zarei, Afshin Ebrahimpour, Azizah Abdul Hamid and Farooq Anwar
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Palm kernel cake (PKC) is the main by-product of the palm oil extraction process, which has a poor utility. Beside low price, its high protein content (15-19%) and abundantly available source has made the PKC an attractive and promising source of plant proteins in Malaysia. It is estimated that total production of PKC is around 2.2 million tons per year, which is equivalent to about 200,000 tons of protein. This can be a valuable source of raw materials for production of food ingredients including bioactive peptides. Recently, the demand for bioactive peptides as natural antioxidants in food is increasing due to the changing consumer's food intake towards healthier functional food ingredients. In this work, protein hydrolysate was generated from PKC for the production of bioactive peptides as a natural antioxidant. The results revealed a strong antioxidant activity of PKC protein hydrolysates generated by papain in scavenging the free radicals. This finding will open up a new avenue for capitalizing a natural source of protein for the production of functional food ingredients.

Keywords: Antioxidant, palm kernel cake, protein hydrolysates, bioactive peptide

……..

Purification and Characterization of Membrane-Bound Polyphenoloxidase (Mppo) from Snake Fruit [Salacca zalacca (Gaertn.) Voss

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Nurul Aqilah Mohd Zaini; Azizah Osman; Azizah Abd Hamid and Afshin Ebrahimpour
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Polyphenoloxidase, PPO, a widely known metallo-oxidative enzyme that responsible for the development of undesirable browning reaction in fruits and vegetables, especially during post-harvest and food processing stages, has become the major problem faces by the food manufacturer. In this study, membrane-bound PPO was isolated from Malaysian

exotic tropical fruit, Snake fruit [Salaccazalacca (Gaertn.) Voss] for the first time. The objectives was to determine the molecular properties and characteristics of mPPO such as molecular size, optimum pH, optimum temperature, substrate specificity and enzyme inhibitors; thus enable a proper procedure for enzyme inactivation to be develop. mPPO was isolated using mild non-ionic detergent (Triton-X114) to retain the nature of enzyme throughout the study. The isolated mPPO was subsequently fractionated by 40-80% ammonium sulfate and chromatographed on HiTrap Phenyl Sepharose High Performance and Superdex 200 HR 10/30 column, respectively.

Keywords: Snake fruit [Salaccazalacca (Gaertn.) Voss], membrane-bound polyphenoloxidase, Extraction, purification, characterization

.....

Bioactive Peptides from *Actinopyga lecanora* as Natural Antibacterial Agents

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Raheleh Ghanbari, Afshin Ebrahimpour, Azizah Abdul Hamid and Amin Ismail
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Bioactive peptides are exciting candidates as new antibacterial agents due to their broad antibicrobial spectra and non-toxicities. In addition it is difficult for bacteria to develop resistance to these peptides. Sea cucumber is a marine invertebrate of the phylum Echinoderm and the class Holothuroidea, which is found on the sea floor worldwide and has been used as traditional medicine to treat wound, eczema, arthritis, inflammation, cancer or hypertension in Asian countries for over centuries. Also, sea cucumbers are one of the marine animals which have been consumed as human food source, particularly in some parts of Asia. As far as, there is lack of information on the bioactive peptides from sea cucumber (Actinopygalecanora), therefore this study is an attempt to mainly provide some information on the antibacterial activity of bioactive peptides derived from (stone-fish) Actinopygalecanora. In this project sea cucumber proteolysis was employed to produce the bioactive peptides. Hydrolysates produced using bromelain and papain exhibited highest antibacterial activity against Escherichia coli, Pseudomonas aeruginosa, Pseudomonas sp. and Staphylococcus auras. Obtained results indicated that enzymatic proteolysis open a simple and cheap way to produce novel and safe antimicrobial peptides. Therefore, sea cucumber is considered as an effective and valuable source of natural antimicrobial peptides that could be used for preservatives in functional foods.

Keywords: Sea cucumber, bio-active peptides, anti-microbial activity, proteolytic

Enzyme Hydrolysates from *Stichopus* Horrens as a New Source for Angiotensin Converting Enzyme Inhibitory Peptides

Category: Applied Research (B)

Prof. Dr. Nazamid. Saari
Bita Forghani, Afshin Ebrahimpour, Jamilah Bakar and Azizah Abdullah Hamid
Faculty of Food Science and Technology
nazamid@putra.upm.edu.my
03-89468385

Golden sea cucumber (Stichopushorrens) flesh was explored as a potential source for generating peptides with angiotensin converting enzyme (ACE) inhibitory activity. Degree of hydrolysis (DH) and peptide profiling (SDS-PAGE) of Stichopushorrenshydrolysates (SHHs) also assessed. Overall, alcalasehydrolysate, exhibited the highest ACE inhibitory activity (IC50 0.41 mg/mL) followed by flavourzymehydrolysate (2.24 mg/mL), trypsin hydrolysate (2.28 mg/mL), papain hydrolysate (2.48 mg/mL), bromelainhydrolysate (4.21 mg/mL) and protamexhydrolysate (6.38 mg/mL). Alcalasehydrolysate showed the highst DH value of 39.8 % followed by flavourzymehydrolysate (32.7%). The SDS-PAGE result showed that alcalasehydrolysate had a unique pattern compared to others, which yielded potent ACE inhibitory peptides with molecular weight distribution lower than 20 kDa. A negative correlation was found between DH and IC50 values of alcalasehydrolysate. We concluded that the tested SHHs could be used as a potential source of functional ACE inhibitory peptides for physiological benefits.

Keywords: Enzymatic hydrolysis, sea cucumber hydrolysates, angiotensin converting enzyme, bioactive peptides, IC50, amino acids, HPLC

……..

Heat-Treatment Aqueous Two Phase System' for Purification of Serine Protease from Kesinai (*Streblus asper*) Leaves

Category: Fundamental (A)

Prof. Dr. Mohd Yazid Abd Manap
Mehrnoush Amid and Mustafa Shuhaimi
Faculty of Food Science and Technology
myazid@food.upm.edu.my
03-89468367

A 'Heat treatment aqueous two phase system' was employed for the first time to purify serine protease from kesinai (Streblusasper) leaves. In this study, introduction of heat treatment procedure in serine protease purification was investigated. In addition, the effects

of different molecular weights of polyethylene glycol (PEG 4000, 6000 and 8000) at concentrations of 8, 16 and 21% (w/w) as well as salts (Na-citrate, MgSO4 and K2HPO4) at concentrations of 12, 15, 18% (w/w) on serine protease partition behavior were studied. Optimum conditions for serine protease purification were achieved in the PEG-rich phase with composition of 16% PEG6000-15% MgSO4. Also, thermal treatment of kesinai leaves at 55°C for 15 min resulted in higher purity and recovery yield compared to the non-heat treatment sample. Furthermore, this study investigated the effects of various concentrations of NaCl addition (2, 4, 6 and 8% w/w) and different pH (4, 7 and 9) on the optimization of the system to obtain high yields of the enzyme. The recovery of serine protease was significantly enhanced in the presence of 4% (w/w) of NaCl at pH 7.0. Based on this system, the purification factor was increased 14.4 fold and achieved a high yield of 96.7%.

Keywords: Purification; heat treatment; aqueous two phase system; Kesinai; serine protease; yield

……..

An Antiviral Composition of Red Cabbage

Category: Fundamental (A)

Prof Dr. Fatimah Abu Bakar
Rand H. Hafidh, Abdulamir, A. S. and Muhammad Zukhruf Zaman
Faculty of Food Science and Technology
fatim@food.upm.edu.my
03-89468368

The present invention relates to a composition comprising an active ingredient having an effective amount of Brassica oleracea L extract containing at least one phytochemical as an antiviral agent. The antiviral agent having an antiviral activity against human respiratory syncytial virus (RSV strain A-2: ATCC VR-1540) and human herpes simplex virus type 1 (HSV-1 strain HF: ATCC VR-260) by using methanol crude extract of red cabbage (RC). The provision of the RC extract composition is advantageous as it had both prophylactic and viricidal action against RSV and also HSV-1.RC extract needed 1h time of incubation to give significant viricidal and protection actions against RSV infection on Vero cell line (IC50 = 13.9 and 16.09 mg/ml, respectively). It was found that RC extract was effective as both prophylactic and viricidal agent. However, RC extract was shown to be more effective as prophylactic agent, preventing RSV infection in Vero cells, than as a viricidal agent which directly inactivate RSV before infection. Comparing with the anti-RSV activity of a standard drug ribavirin, there was no significant difference ($P > 0.05$) between the prophylactic effect of RC extract (SI = 17.97) and that of ribavirin (SI = 21.95) which indicated that both had similar protective level on Vero cells against RSV while the viricidal effect of RC on RSV (SI = 15.25) was lower than that of ribavirin (SI = 23.39) ($P < 0.05$). The SI values of the viricidal activity for RC extract (34.52) were significantly higher than that of the prophylactic actions. There was also no significant difference in

the prophylactic effect of the drug acyclovir and RC extract against HSV-1 ($P > 0.05$), while there was significant difference between the viricidal effect of RC extract and that of acyclovir giving the RC extract the potency over acyclovir ($P < 0.05$).

Keywords: Antiviral composition, viricidal, prophylactic, red cabbage, RSV, HSV-1

……..

Detection and Identification of Lactobacillus Bacteria Found in the Honey Stomach of the Giant Honeybee *Apis dorsata*

Category: Fundamental (A)

Prof. Dr. Mohd Yazid Abd Manap
Naser Tajabadi, Makhdzir Mardan, Mustafa Shuhaimi, Amir Meiman Dipour and Leila Nateghi
Faculty of Food Science and Technology
myazid@food.upm.edu.my
03-89468367

This is the first assay that describes the isolation and identification of strains and species of Lactobacillus from the honey stomach of the Asiatic giant honeybee, Apisdorsata. Samples of honeybees were collected from A. dorsata colonies in different bee trees, and Lactobacillus was isolated from honey stomachs using selective media. The isolates were Gram-stained and tested for catalase reaction. The 16S rRNA genes from extracted DNA of bacterial colonies were amplified with polymerase chain reaction using lactobacilli genus primers (27F and 1492R). All bacterial 16S rRNA genes were sequenced and deposited in GenBank. The 34 isolated strains yielded three distinct rRNA sequences of 15 different strains. Lactobacillus sequences isolated from the bees' honey stomachs were comprised of Lactobacillus kunkeei related-sequences (56%) with other abundant sequences being related to other Lactobacillus sp. (38%) and Lactobacillus vermiform (6%).These strains can be good candidates for potential application as probiotics in honeybees and also as natural food preservatives, which, in turn, may be useful in the food industry..

Keywords: *Apisdorsata*, honey stomach, *Lactobacillus bacteria*, probiotics

Headspace Solid-phase Microextraction Analysis of the Volatile Flavour Compounds of Roasted Chickpea (*Cicer arietinum* L.)

Category: Fundamental (A)

Assoc. Prof. Dr. Lasekan Olusegun Olaniyi
Nurul Hanisah Juhari and Parveen Devi Pattiram
Faculty of Food Science and Technology
lasekan@food.upm.edu.my
03-89468535

Headspace-solid phase microextraction coupled with gas chromatography-mass spectrometry analysis were used to provide the volatile profile of roasted chickpea as a means of unravelling and elucidating roasted chickpea as a prerequisite in developing chickpea snack item for the health and functional food sectors. The results of the HS-SPME and optimization analysis using response surface methodology showed that DVB/CAR/PDMS was the most effective fibre and further results revealed the extraction temperature to be the dominant factor. A total of 61 volatile compounds were identified in the roasted chickpea. The best response within the range studied was established at 60C extraction temperature, 30 min of equilibrium time and 15 min of extraction time. The volatile compounds identified comprised of aldehydes (25%), hydrocarbons (25%), terpenoids (20%), esters (8%), ketone (8%), alcohols (8%) and heterocyclic (8%). The results further indicated that the final model was significantly ($P<0.05$) fitted for the response variable (total flavour peak area) studied with a relatively high R2 (0.9658).

Keywords: HS-SPME, chickpea, roasted, volatiles, RSM

Optimization of Hot-air Drying Conditions on the Physicochemical Characteristics of Torch Ginger (*Etlingeraelation*)

Category: Fundamental (A)

Assoc. Prof. Dr. Lasekan Olusegun Olaniyi
Nurul Hanisah Juhari, Sharifah Kharidah Syed Muhammad
and Muhammad Shahrim Ab Karim
Faculty of Food Science and Technology
lasekan@food.upm.edu.my
03-89468535

Authors have conducted extensive experimental works in this study. The findings are important for scientific interest of drying spices, herbs and similar product.

Keywords: Torch ginger, hot-air drying, physicochemical properties, Etlingeraelatior, Response Surface Methodology, optimization, herbs and spices, drying, Central Composite Design, ginger flower

……..

Purification of Serine Protease from Mango (*Mangifera indica* Cv. Chokanan) Peel Using an Alcohol/Salt Aqueous Two Phase System

Category: Fundamental (A)

Prof. Dr. Mohd Yazid Abd Manap
Mehrnoush Amid and Mustafa Shuhaimi
Faculty of Food Science and Technology
myazid@food.upm.edu.my
03-89468367

An alcohol/salt-based aqueous two-phase (ATPS) system, as a novel method of purification, was employed to purify serine proteases from mango (MangiferaIndicaCv. Chokanan) peel. The effectiveness of different parameters, such as type and concentration of alcohol (1-propanol, 2-propanol, and ethanol),type of salt (sodium citrate, potassium phosphate, and ammonium sulphate), pH, and NaCl, on the purification and selective separation of serine protease was investigated. Desirable conditions of partitioncoefficient (K), selectivity (S), purification factor (P), and yield (Y%) of serine protease, using ATPS, weredetermined. The highest partition coefficient (64.5) and selectivity (343.2) for serine protease purificationvalue were achieved in an ATPS of 16% (w/w) 2-propanaol, 19% (w/w) potassium phosphate, and 5% (w/v)NaCl at pH 7.5. It was demonstrated that serine protease could be recovered with a yield of 96.7% and a purification factor of 11.6.

Keywords: Purification, alcohol/salt system, serine protease, mango peel, purification factor, yield

Headspace Solid-phase Microextraction Gas Chromatography-Mass Spectrometry (HS-SPME-GC-MS) Determination of Volatile Compounds in Roasted Plantains (*French sombre* and *DwafKalapua*)

Category: Fundamental (A)

Assoc. Prof. Dr. Lasekan Olusegun Olaniyi
Faculty of Food Science and Technology
lasekan@food.upm.edu.my
03-89468535

Volatile compounds from roasted plantains (French sombre, AAB) and (Dwafkalapua, ABB) at different stages of ripening were evaluated by a gas chromatography-mass spectrometry (GC-MS) with headspace solid-phase microextraction (HS-SPME). A total of 42 volatile compounds were identified in the roasted plantain cultivars. Some of the volatile compounds with high concentration were 2,3-dimethylpyrazine, 2-ethyl-3,5-dimethylpyrazine, (E)-2-hexenal, 2,5-dimethylpyrazine and 2,3-dihydro-5-hydroxyl-6-methyl-(4H)-pyran-4-on respectively. Principal component analysis (PCA) based on the relationships between ripening/quality of volatiles showed that 2-methyl propanol, furfural, 2,5-dimethyl pyrazine, 2,3-butanedione, guaiacol, 2-ethyl-3-methyl pyrazine, 5-, ethyl acetate, 2-pentanol, 3-isobutyl-2-methoxy pyrazine and 7,8-dihydro-B-ionol were considered to contribute significantly to the overall aroma quality of fairly riped (stages 4 & 5) and roasted plantains.

Keywords: Roasted plantains (French sombre), AAB and Dwarf kalapua, ABB), volatile components, ripening stages, principal component analysis (PCA)

.....

Extraction of Oil from Tiger Nut (Cyperus esculentus L.) with Supercritical Carbon Dioxide (SC-CO2)

Category: Fundamental (A)

Assoc. Prof. Dr. Lasekan Olusegun Olaniyi
Sabo M. Abdulkarim
Faculty of Food Science and Technology
lasekan@food.upm.edu.my
03-89468535

Supercritical carbon dioxide (SC-CO2) was used to extract oil from tiger nuts and the physicochemical properties and the impact of extraction conditions [i.e., temperature (40C-80C), pressure (20-40 MPa) and time (60-360 min) on the yield were studied. The response surface analysis results revealed that the oil yield was significantly ($p<0.05$)

influenced by the main effect of the extraction pressure, extraction time and their quadratic effects respectively. However, the interaction between the extraction temperature and time had no significant (P>0.05) effect on the yield. The highest oil yield was 26.28 g/100 g sample after 210 min of extraction time at 30.25 Mpa and 60C respectively. The fatty acid composition of oils obtained by SC-CO2 and Soxhlet showed marked variation. Also, the fatty acid composition varied depending on the operating conditions. The viscosity of the oil decreased with the increase in temperature.

Keywords: Tiger nut oil, supercritical CO2 extraction, response surface methodology, fatty acid composition, viscosity

……..

A Cost-effective Screening Method for Bacteria Implicated Biogenic Amines Food Poisoning

Category: Product / Innovation (C)

Prof. Dr. Hasanah Mohd. Ghazali
Husniza Hussain, Vimala RMT Balasubramaniam, Mohd. Fuat Abd. Razak,
Wan Nazaimoon Wan Mohamud and Jamilah Bakar
Faculty of Food Science and Technology
hasanah@putra.upm.edu.my
03-89468345

Many microbiological tests had been developed in microtitre plates because they are usually more rapid and less labor-intensive as compared to the conventional method. In our study, we developed a method for screening of amino acid decarboxylase-producing microorganisms in 96-well microtitre plates using the Moeller Decarboxylase Base Broth (MDBB). The microorganisms convert amino acids into biogenic amines which can induce toxicological risks and health problems, are precursors of carcinogenic nitrosamines and act as indicators of food spoilage. MDBB contains a chromogen which reacts with biogenic amines causing a colour change that can be visualized and measured spectrophotometrically. Results obtained were based on mathematical and statistical analyses. The study shows that positive decarboxylase activities were detected with E. coli and K. pneumoniae, in agreement with previously reported studies. The advantages of this method were early capture of amino acid decarboxylase activity (within 7.5 hours), shortened incubation time, usage of less growth media and test substrates (amino acids), and application of up to 96 tests per run. Usage of the mathematical formulae ruled out the possible contamination and sample turbidity contribution and statistical analysis provide accuracy in determining the colour change.

Keywords: Biogenic amines, amino acid decarboxylases, Moeller base broth, food poisoning

Development of an Enzyme-Aided Pre-Treatment Process for Production of Pumpkin (*Cucurbitamoschata* L.) Powder

Category: Product / Innovation (C)

Prof. Dr. Hasanah Mohd. Ghazali
Shavakhi Forough, Osman Azizah Osman, Boo Huey Chern and Chang Lee Sin
Faculty of Food Science and Technology
hasanah@putra.upm.edu.my
03-89468345

The application of enzymes is beneficial to food industry because it is proven to increase juice extraction yield, improve clarification of juices, improve fruit and vegetable maceration, lower product viscosity and reduce waste products. Pumpkin (Cucurbitamoschata L.) powder is one of the main products which is conveniently used in processed food. To produce powder, the fruit must be converted into puree. As pumpkin fruit is texturally hard and heating to soften the fruit will cause structural and functional changes, this study explored using enzyme to macerate raw pumpkin into puree. Fresh pumpkins were mechanically ground to produce coarse pulp suitable for enzyme action. The pulp was then treated with different concentrations of several commercial enzymes, namely Pectinex® Ultra SP-L (Pectinex), Cellulast® 1.5 L (Cellulast), Fungamyl® 800 L (Fungamyl, an amylase preparation), and Termamyl® 120L, Type L (Termamyl, an amylase preparation) (Novozymes, Denmark) at their optimum temperature and the enzyme best macerated the fruit into puree was selected as spray drying feed. Changes in several physicochemical properties (color, viscosity, sugar content, and aroma) were monitored with raw pumpkin (control). Results showed that as the concentrations of Pectinex used increased, the incubation time needed for complete maceration of pumpkin decreased. No significant difference ($p < 0.05$) in the color, viscosity, sugar content, and aroma between the macerated pumpkin at each concentration of Pectinex with fresh pumpkin. Then, Cellulast and Fungamyl had lower maceration effect as the pumpkin remain relatively hard after incubation while Termamyl yielded product that dark in color. The effect of combination of enzymes was studied and Pectinex with Cellulast able to liquefied pumpkin while Pectinex with Fungamyl produced viscous product. Based on results, 2.5 % v/w Pectinex incubated at 50°C for 1 hour is the best enzyme to produce pumpkin puree as spray drying feed.

Keywords: *Cucurbitamoschata* L., enzymes, maceration pumpkin puree, properties

PRPi 2012

UPM's Research & Innovation

FACULTY OF HUMAN ECOLOGY

Relaxation in Piano Playing: Theory from Chinese Science

Applied Research (B)

Dr. Loo Fung Chiat
Faculty of Human Ecology
fungchiat@hotmail.com
03-89467132

Past literature in piano pedagogy reveals debate in the query in relaxation and has yet to come up with a solution or 'measurement' to the technique of relaxation. This research address the lacuna by investigating the technique of relaxation from a Chinese Science perspectives. Theories derives from the concept of Taijiquan was studied and applied to piano playing. As relaxation forms a fundamental technique in piano playing, this study examines the balance of Yin and Yang of Taijiquan, leading to how this concept could be applied in piano pedagogy. Views about relaxation from both subjects are discussed. The study is action based and reflect the practitioners finding.

Keywords: Relaxation, music, taijiquan

……..

Acceptance of Kuala Lumpur Malay's Residents Towards Rukyah (Incantation)

Applied Research (B)

Assoc. Prof. Dr. Nurdeng Deuraseh
Siti Nor Azhani Mohd Tohar
Faculty of Human Ecology
nurdeng@putra.upm.edu.my
03-89467137

Rukyah is an Arabic word referred to the incantations using the verses of Quran and hadith (the words of prophet Muhammad SAW). The aim of this study was to describe the acceptance of Kuala Lumpur Malay residents towards: i) treatment through rukyah (incantation), ii) traditional Malay healer (bomoh), and iii) learning of rukyah (incantation). For this purpose, 343 respondents from various backgrounds were identified using a convenient sampling technique Taman Segambut SPPK and PPR Kg. Baru, Air Panas were randomly selected as research locations. Data were collected using a questionnaire and analyzed as a descriptive statistic. Findings indicated that the level of acceptance towards the treatment through rukyah (incantation) and the Malay traditional healer (bomoh) was moderate. Meanwhile, the level of acceptance towards learnings of rukyah (incantation) was low. In conclusion, the respondents were found to accept treatments done through rukyah (incantation) and the Malay traditional healer (bomoh) moderately, but they were

less acceptance towards the learning of rukyah (incantation). These bring the implications that the respondents living in the city still accept treatments through rukyah (incantation) and the traditional Malay healer (bomoh) but they are not interested in the learning of rukyah (incantation). Thus, based the findings of the study, it is recommended that efforts which give prestige to the rukyah (incantation) be supported by all parties to maintain the practice of the Islamic medicine.

Keywords: Islamic medicine, Malay community, Malay medicine, rukyah (incantation).

……..

Gender Differences in Financial well-being: Assessment of Financial Management, Financial Socialization, Financial Attitude, and Financial Knowledge

Applied Research (B)

Prof. Dr. Laily Paim
Leila Falahati and Jariah Masud
Faculty of Human Ecology
laily@putra.upm.edu.my
03-89467102

Financial well-being and its impact on the quality of life have received considerable attention over the last decade. Satisfaction with personal financial affairs is an important factor that contributes to life satisfaction (Campbell et al. 1976). As compared to men, women are less knowledgeable financially (Goldsmith and Goldsmith, 2006), late age financially socialized (Shim et al., 2010) and have negative attitudes towards money (Dowling et al., 2009), which will likely result in significant differences in their financial management and, consequently, the different levels of perceived financial well-being. The aim of this study is to investigate gender differences in financial well-being, financial knowledge, financial socialization, financial management and financial attitude among college students. Using the stratified sampling method, 2500 college students from six public and five private colleges across Malaysia were studied. Of the 2,500 students who responded to the survey, 40.4% were male and 59.6% were female students. The ethnic composition was Malay (71.4%), Chinese (21.7%), Indian (5.0%) and others (.8%). The mean age of the respondents was 20.9 years. The t-test results indicated that male students have higher level of financial knowledge, earlier financial socialization, and more negative attitude towards money, however female have lower level of financial knowledge, later socialization in financial matters and more positive attitude towards money. In addition, there were no differences in influence of primary and socialization agents and the level of experienced financial problem between male and female students. Female students revealed better financial management and higher level of financial well-being as well. It is recommended that a special education program that covers financial knowledge and

managerial skills be set up by policymakers. There is also a need to enhance family understanding of how to involve children in the family's financial decision-making

Keywords: Gender,financial well-being,financial management, financial socialization, financial attitude, financial knowledge

……..

Pathway to Money Attitude: An Empirical Study of the Mediation Effect of Financial Skills

Applied Research (B)

Prof. Dr. Laily Paim
Leila Falahati and Mohamad Fazli Sabri
Faculty of Human Ecology
laily@putra.upm.edu.my
03-89467102

Attitude to money play an important role in determining a person's financial management and level of financial well-being (Joo & Grable, 2004; Porter & Garman, 1993; Shim, Xiao, Barber, & Lyons, 2009). Review the literature revealed the significant effect of personal and family factors and peer influence on differences in money attitude (Tsai, 2008). Shim et al., (2009) indicated that parental socialization and formal education, particularly with respect to money, exert a positive influence on a child's efforts to acquire financial knowledge, skills, and attitudes. This study developed a model to predict money attitude among young adolescents. The study sample comprised of 400 students from six public and five private universities across Malaysia The mean age of the respondents was 21 years, 43% were male and 56% were female students. Money attitude in this study was measured by adopting six dimensions of Furnham's Money Beliefs and Behavior Scale (MBBS) adapted to the Malaysian context. The mediation approach of Baron and Kenny (1986) was adopted to identify the mediating effect of financial skills on the relationship between financial socialization and primary and secondary socialization agents with money attitude. The findings of this study indicate that financial socialization and socialization agents as an environmental factor have an essential role in money attitude formation among young adults. The results also confirmed the mediate effect of financial skills. From this finding, the implications for family economics and financial educators seem even more apparent, given the important role of parents in socializing their children in financial issues and the effect of media and the Internet. In respect of the mediating effect of financial skills the findings support the importance of financial practices and knowledge that children learn within the family sphere. Policy makers may pay more attention to providing more education opportunities for students.

Keywords: Attitudes towards money, university students, financial skills, financial socialization.

Determinants of Financial Well-Being among Public and Private Employees in Malaysia

Applied Research (B)

Dr. Mohamad Fazli Sabri
Leila Falahati, Laily Paim and Jariah Masud
Faculty of Human Ecology
fazli@putra.upm.edu.my
03-89467094

The purpose of this study is to examine factors affecting financial well-being among public and private employees in Malaysia. The results of this study can be used for better understanding on the relationships between and among determinants of financial well-being by highlighting the relationships among demographic characteristics, financial literacy, financial behaviors, financial stress, financial problems and financial well-being. Samples were selected using multi-stage sampling technique among employees in public and private sectors. A total of 2,000 completed questionnaires were analyzed using path analysis to identify direct and indirect effects on financial well-being. Age, education, and income significantly affect the financial well-being of public sectors and income the only significant demographic characteristic affect financial well-being of private sectors. The findings identified that financial literacy, financial behaviors, financial stress level and financial problems had either a direct or indirect effect on financial well-being among employees at both sectors. Findings from this study have important implication with respect to the need of workplace financial education.

Keywords: Financial literacy, financial behaviors, financial stress, financial problems, financial well-being

Penglibatan dan Pemilihan Pemimpin Politik dalam Kalangan Belia Minoriti di Semenanjung Malaysia

Applied Research (B)

Dr Sarjit Singh Darshan Singh
Ahmad Tarmizi Talib, Nobaya Ahmad, Ma'rof Redzuan, Haslinda Abdullah,
Mohd Razali Harun and Mohd Roslan Rosnon
Faculty of Human Ecology
sarjit@putra.upm.edu.my
03-89467062

Lanskap politik Malaysia sekarang telah berubah pasca Pilihanraya Umum Ke 12 (PRU 12) pada 8 Mac 2008 yang lalu. Pada PRU 12 pencapaian Barisan Nasional (BN) agak merosot dengan kehilangan majoriti dua pertiga di Dewan Rakyat termasuk tewas di beberapa buah negeri kepada Pakatan Rakyat (PR). Senario itu sering dikaitkan dengan kuasa belia dalam mencatur lanskap politik di Malaysia. Oleh itu, makalah ini membincang secara khusus pola pemilihan parti dan pemimpin politik dalam kalangan belia minoriti di Semenanjung Malaysia. Wacana berkaitan politik belia minoriti masih baharu dan penting kerana belia minoriti juga merupakan kelompok yang sering mencetus perubahan dan perkembangan politik tanah air ke arah pembentukan budaya politik yang sihat dan positif. Tambahan pula, senario semasa menunjukkan bahawa perbahasan politik hanya berputar dalam ruang lingkup belia majoriti semata-mata. Oleh itu, hasil kajian ini akan merungkai beberapa persoalan yang berlegar dalam perbahasan isu politik semasa. Adakah belia minoriti terlibat dalam politik kepartian? Bagaimana corak pemilihan parti politik dan pemimpin dalam kalangan belia komuniti minoriti selepas Tsunami Politik 2008? Apakah ciri-ciri dan latar belakang calon pilihanraya yang menjadi pilihan belia minoriti? Justeru, hasil kajian ini boleh dijadikan ukuran dan panduan terutama menjelang Pilihanraya Umum Ke 13 (PRU 13) kelak.

Keywords: Penglibatan politik, pemilihan parti, pemimpin politik, belia minoriti

A Model for Womens Participation in Breast Cancer Prevention: The Impact of Health Seeking Behaviour on Community Participation

Applied Research (B)

Prof. Dr. Asnarulkhadi Abu Samah
Maryam Ahmadian and Asnarulkhadi Abu Samah
Faculty of Human Ecology
marydian50@yahoo.com
03-89467966

Although significant consideration has been dedicated to women's participation in breast cancer prevention, our knowledge about a link between breast health-seeking behaviours and community participation in breast cancer prevention remains incomplete. This study attempts to understand individual health-seeking behaviour as a tool for explaining how individuals engage with health services. To come up with the model, an assessment framework was developed based on three theories namely the health belief model, the theory of reasoned action and the social cognitive theory with the purpose of identifying the significant psycho-social factors influencing breast health behaviour among women. This model focused on a typology of community participation approaches in health, as well as five levels of participation in health programs proposed by Rifkin (1985 & 1991). The model explains the practical aspect of community participation for breast cancer prevention in developing and less developed countries. Community participation mostly exhibit at a health benefit and program activity levels. Using socio-psychological theories, the behavioral aspects of breast screening can be adjusted among women. The individual's psycho-social factors influence the levels of participation in health programs or services. Thus, community participation can take place with or without the presence of health professionals if the women decide to seek preventive breast cancer screening such as mammography. Drawing attention to the continuing need for breast health-seeking behaviour prior to community participation in breast cancer prevention will help to reduce delayed diagnosis of breast cancer among women, to improve treatment, and to develop health promotion strategies in a variety of context. More effort should be in placed to increase women's awareness, psychosocial needs, and their willingness to cooperate with health professionals for breast cancer screening. This initiative is about improving health status among women and it is part of community development endeavor.

Keywords: ' participation models; community participation levels; breast cancer; health seeking behaviour; psycho-social factors.

Pengurusan Institusi Wakaf dalam Pembangunan Ummah: Kajian di Selangor dan Wilayah Persekutuan Kuala Lumpur

Fundamental (A)

Dr. Amaludin Ab. Rahman
Zaid Ahmad, Nurdeng Deuraseh, Asnarulkhadi Abu Samah,
Nik Mohd Saiful W Mohd Sidik and Nurul Azra Ab. Malik
Faculty of Human Ecology
amal@putra.upm.edu.my
03-89467449

Aplikasi GIS (Geographical Information System) di dalam pengurusan institusi wakaf.

Keywords: Aplikasi GIS, Pengurusan Tanah Wakaf, institusi wakaf, wakaf am, wakaf khas

……..

Modelling the Factors Affecting Transport Energy-Saving Measures in Response to Climate Change.

Fundamental (A)

Assoc. Prof. Dr. Aini Mat Said
Syuhaily Osman and Chan Shiau Cin
Faculty of Human Ecology
ainims@putra.upm.edu.my
03-89467095

Concern about climate change has become a central issue in transport policy decision -making as it emits the highest amount of CO2 emissions as compared to other sectors. This study therefore aimed to model the factors affecting acceptability of transport energy saving measures in response to climate change. Quality of public transport as an external factor while attitude, knowledge, personal norm and efficacy representing internal factors were examined. A survey was conducted among 201 employees of Kuala Lumpur City Hall using self administered questionnaire. Findings indicate that the usage of public transport to work is rather low and train as a more preferred mode as compared to the bus. Results indicated that there were significant differences in acceptability to technical adoption measures between gender, level of education, income and all the internal factors. However differences in acceptability to behavioural change measures were only influenced by income, attitude and efficacy. Gender, knowledge of causes of climate change, personal norm and perceived efficacy were predictors for acceptability of technical measures while efficacy was the only factor that influenced acceptability of behavioural change measures.

The results indicated that distinctions ought to be made between technology adoption and behaviour modifications that require lifestyle changes when assessing pro-environmental intent behaviour. Implications for theory and practice are discussed.

Keywords: Energy, transport, environment, behaviour, climate change

……..

Normative Beliefs about Aggression as a Mediator of Narcissistic Exploitativeness and Cyberbullying

Fundamental (A)

Assoc. Prof. Dr. Mansor Abu Talib
Rebecca Ang and Tan Kit Aun
Faculty of Human Ecology
mansorat@putra.upm.edu.my
03-89467273

This study investigated beliefs about aggression as a mediator between narcissistic exploitativeness and cyber bullying. Participants included 336 young people from Singapore and 374 from Malaysia, average age 14-15 years. Findings revealed that narcissistic exploitativeness was significantly and positively associated with cyber bullying and normative beliefs about aggression and normative beliefs about aggression were significantly and positively associated with cyber bullying. Normative beliefs about aggression were a significant mediator in both samples; these beliefs about aggression served as one possible mechanism of action by which narcissistic exploitativeness could exert its influence on cyber bullying. Findings extended previous empirical research by showing that such beliefs can be the mechanism of action in online contexts. The authors concluded that prevention and intervention efforts should include modification of beliefs about aggression acceptability of cyber bullying.

Keywords: Cyberbullying,narcissistic exploitativeness,normative beliefs about aggression

Estimating a Model of Financial Satisfaction: Examining the Mediate Effect of Financial Behavior

Fundamental (A)

Dr. Mohamad Fazli Sabri
Leila Falahati, Laily Paim and Jariah Masud
Faculty of Human Ecology
fazli@putra.upm.edu.my
03-89467094

Satisfaction with one's financial status can enhance personal satisfaction, and more broadly, life satisfaction, and in contrast financial difficulties and dissatisfaction with one's financial status can lead to stress and depression. Research related to financial satisfaction revealed financial behavior has a major contribution to satisfaction or dissatisfaction with financial situation. More importantly it is documented that financial behavior is affected by other factors such as the level of financial literacy, financial attitude, childhood consumer experiences, influence of primary and secondary socialization agents as well. The purpose of this study is to assess factors predict financial satisfaction and furthermore examining the mediate effect of financial behavior on the relationship between financial literacy, financial attitude, childhood consumer experiences, influence of primary and secondary socialization agents and financial satisfaction. A sample of 700 university students from 11 universities (six public and five private) were selected using stratified sampling method. Data was collected by self-administered questionnaire. The research estimated model was tested using Structural Equation Modeling (SEM) through AMOS, and the mediation approach of Baron and Kenny (1986) using Amos was applied to assess the mediating effect of financial behavior. Results indicated that financial attitude, childhood consumer socialization, socialization agents, financial literacy, financial behavior and financial strain contribute to predict financial satisfaction. Furthermore the mediation effect of financial behavior was examined.

Keywords: Financial satisfaction, Financial strain, Financial behavior, Financial literacy, Financial attitude, Childhood consumer experiences, Primary socialization agents, Secondary socialization agents

PRPI 2012

UPM's Research & Innovation

FACULTY OF MODERN LANGUAGES AND COMMUNICATION

MyIntegrity - Instrumen Penilaian Kendiri Integriti Penjawat Awam

Applied Research (B)

Assoc. Prof. Dr. Ezhar Tamam
Hanina H. Hamsan, Azimi Hamzah and Amini Amir Abdullah
Faculty of Modern Languages and Communication
ezhar@fbmk.upm.edu.my
03-89468663

Instrumen MyIntegrity ini dibina berasaskan kepentingan menanda aras serta memantau tahap nilai integriti penjawat awam secara sistematik. Penilaian tahap integriti secara berkala dapat memberikan gambaran tentang tren dan jurang dalam tahap nilai integriti yang boleh digunakan untuk melaksanakan program intervensi pemantapan nilai integriti. Instrumen MyIntegrity ini merupakan instrumen yang reliable dalam mengukur tiga domain nilai integriti (Amanah, Bijaksana, dan Hemah). Instrumen ini telah diguna pakai oleh Kementerian Pengajian Tinggi sebagai audit nilai integriti staf secara berkala sejak 2007. Nilai Amanah merujuk kepada 'kesungguhan penjawat awam dalam memenuhi kewajiban dan tanggungjawab yang diamanahkan'. Terdapat 31 item yang mengukur domain amanah yang mana item-item dikelompokkan untuk mengukur lima sub-domain Amanah iaitu berdisiplin, bertanggungjawab, jujur, kebal rasuah, dan kebal salah guna kuasa. Nilai alpha cronbach bagi domain Amanah ialah .96. Nilai Bijaksana merujuk kepada 'kekuatan daya pemikiran penjawat awam dalam mengurus diri dan organisasi'. Domain ini mengandungi 18 item yang dikelompokkan kepada tiga sub-domain iaitu rasional, inovatif, dan optimis. Nilai alpha cronbach bagi domain Bijaksana ialah .93. Nilai Hemah bermaksud 'Tertib dan menunjukkan kesopanan ketika melaksanakan tugas yang diamanahkan'. Terdapat 13 item yang mengukur domain Hemah dan ia dibahagikan kepada dua sub-domain iaitu santun, dan prihatin. Nilai alpha cronbach bagi domain Hemah ialah .91. Instrumen MyIntegrity turut mengandungi item Social Desirebality Scale. Semua item diukur berdasarkan skala likert 5-mata -- 1 (tidak tepat dengan diri saya) hingga 5 (sangat tepat dengan diri saya). Indeks Integriti dihasilkan dengan mewujudkan satu skor purata dengan menggabungkan skor purata ketiga-tiga domain dalam instrumen MyIntegrity. Skor Indeks Integriti dikategorikan kepada empat band tahap integriti - tahap cemerlang, tahap baik, tahap biasa dan tahap lemah. Responden akan diberikan maklum balas setelah lengkap menjawab dengan diberikan tafsiran tentang markah yang mereka peroleh dalam penilaian MyIntegrity dan respon kepada item Social Desirability.

Keywords: Integriti, instrumen, penjawat awam

Advancing Aesthetic Literary Experience Through A Multimedia Project

Applied Research (B)

Ms. Zainor Izat Zainal
Wan Roselezam Wan Yahya
Faculty of Modern Languages and Communication
zainor@fbmk.upm.edu.my
03-89468694

The remarkable advances in the field of ICT have led to the appearance of interesting innovations in literature classrooms, one of which is multimedia. Multimedia has been proven to be a powerful learning tool as it is able to provide extensive learning opportunities, thus breaking away from the traditional and restrictive 'chalk and talk' type of teaching. This study examined the incorporation of an after-reading assignment called 'The Multimedia Project' in a literature classroom. It involved ninety-six students taking English literature courses at the Faculty of Modern Languages and Communication, Universiti Putra Malaysia. Multimedia can be defined in a variety of ways, but for this project multimedia refers to a literary text presentation, primarily made using sound and images. Through this project, the students had the opportunities to explore and develop their knowledge and critically analyzed the literary texts covered in class. This study relied on two types of analysis: an evaluation of the students' multimedia presentations and a survey of the students' opinions regarding the project. The findings indicated that the multimedia project proved to be effective in advancing students' literary experience and critical appreciation. The students' opinions also confirmed the viability of multimedia as a practical application tool in teaching literature as well as in promoting visual literacy.

Keywords: Multimedia, english literature, aesthetic experience,

……..

Lexical Access in Production of Idioms

Fundamental (A)

Dr. Yap Ngee Thai
Masoomeh Yeganehjoo
Faculty of Modern Languages and Communication
yap@fbmk.upm.edu.my
03-89468673

Earlier studies have worked on the hybrid account of idiom representation in the mental lexicon and the need for the superlemma level in the staged process of idiom production. However, lack of attempt has been undertaken to explore how idioms are represented in and accessed from the mental lexicon of second language (L2) during speech production.

This project used a cross-modal priming experiment to explore how idioms are represented in the L2 mental lexicon during language production. Thirty-two Iranian English instructors were asked to memorize a list of English expressions (common idiomatic and literal phrases) and to produce them when presented with both the grammatical subject of the sentence and the prime words (related or unrelated). The results of this study showed a positive effect of priming for both idiomatic and literal phrases implying that every constituent of an idiom could be accessed individually. With related primes, the production of idiomatic expressions was significantly faster than the production of literal phrases, supporting the unitary representation of the idiomatic expressions in the L2 mental lexicon during speech production.

Keywords: Lexical access, idiom production, cross-modal priming, mental representation of idioms, L2 mental lexicon, second language acquisition

……..

Statecraft as Practiced by a Malay Kingdom: The Terengganu State Legal Text of 1911

Fundamental (A)

Prof. Dr. Hashim Musa
Adi Yasran Abdul Aziz, Salmah Jan Noor Muhammad and Rozita Che Rodi
Faculty of Modern Languages and Communication
hasyim@fbmk.upm.edu.my
03-89468937

The Terengganu state legal document (Itqân al-mulûk bi ta'dîl alsulûk): Undang-Undang bagi Diri Kerajaan Terengganu is a printed text ordered to be written by the then ruler of Terengganu Sultan Zainal `Abdin the Third dated 11th Zulqa`idah 1329 (H) or 2nd November, 1911. It comprises one Introduction, 53 Articles and one Conclusion. The contents clearly show strong Islamic influence in the formulation of legal text pertaining to statecraft, while still maintaining some forms of Malay state tradition in several features. It also indicates clearly that this law was ordered to be written by the Sultan to resist the encroaching influence of the European colonial powers in the Malay world particularly in the state of Terengganu at the end of 19th Century and early 20th Century. This research will not seek to discuss the details of the contents of the legal text but will only focus on two aspects namely 1) the extend of Islamic influence in the legal text, and 2) the particular clauses that gave full authority and legal right to the present Sultan vis-a-vis the Constitution of Malaysia to appoint or reject any candidate to the office of the Menteri Besar or the Chief Minister. The research methodology applied is the content analysis of the text.

Keywords: Legal text, statecraft, constitution, federation, unitary government, terengganu state

NeoLexic: Membaca dan Menulis untuk Kanak-kanak Disleksia Visual

Product / Innovation (C)

Assoc. Prof. Dr. S. Vijayaletchumy
Wan Muna Ruzanna Wan Mohammad
Faculty of Modern Languages and Communication
letchumy@fbmk.upm.edu.my
03-89468769

Bermula tahun 2004, Kementerian Pelajaran Malaysia telah memulakan "Program Rintis Bermasalah Pembelajaran Spesifik Disleksia". Kini terdapat 51 buah Sekolah Program Rintis Bermasalah Pembelajaran Spesifik Disleksia di Malaysia. Murid-murid disleksia mempunyai masalah mengeja, membaca, dan menulis yang menghalang mereka daripada belajar setanding dengan pelajar-pelajar normal. Program NeoLexic ini memperkenalkan kaedah multisensori yang diubahsuai melalui kaedah Orton- Gillingham dan diadaptasi mengikut kaedah pembelajaran Bahasa Melayu di Malaysia. Enam langkah kaedah membaca dan mengeja ini sangat penting sebagai asas proses pembelajaran murid-murid disleksia. Perisian ini memfokuskan kepada memperkenalkan huruf konsonan dan vokal (KV), mengeja dan membaca suku kata (KV), membaca dan membunyikan dua suku kata terbuka dan tertutup, membaca gabungan huruf, membaca perkataan sukar gabungan (KVKK), dan membaca petikan mudah. Perisian ini adalah sebagai terapi Bahasa Melayu dan alat bantuan pengajaran untuk murid-murid disleksia

Keywords: Neolexic, membaca, menulis, kanak-kanak disleksia visual

……..

Establishing the Applicability of the Wiki Technology in Improving Writing in English

Fundamental (A)

Assoc. Prof. Dr. Tan Bee Hoon
Faculty of Modern Languages and Communication
tanbh@fbmk.upm.edu.my
03-89468911

Students today are growing up with the Internet, and this has impacted on how they live and learn. Therefore, teachers can no longer rely solely on traditional pedagogy and tools in English language instruction. They must learn more engaging techniques to motivate learning. In English-as-Second-Language (ESL) contexts, students are often reluctant to write in English. Their reluctance can be attributed to: the lack of a real or compelling reason to write, the absence of complementary support besides the teacher-fronted classroom,

and the ignorance of interesting writing tools. Yet writing in English is an essential skill for students to succeed in their academic endeavours and later in their career. Against this backdrop, the research study was initiated to investigate the applicability of wiki for the teaching and learning of English, focusing especially on writing. This study explored the application of a Writing With Wiki (WWW) approach in both secondary school and tertiary contexts where students were trained to use a Wiki tool to collaboratively write subject-related materials. The task motivated the students to write as they appreciated the authentic purpose of their writing. It also boosted students' confidence that they could be website or textbook writers, besides learning to be critical thinkers in evaluating and integrating related content in the materials they developed. Through collaboratively writing the materials, students acquired the course content while learning the craft of writing. The dual purposes of writing helped them gain confidence and competence as English language users.

Keywords: Wiki, technology, English, writing, approach, collaboration

……..

Pikat - Sound of Nature

Product / Innovation (C)

Dr. Megat Al Imran Yasin
Faculty of Modern Languages and Communication
megat@putra.upm.edu.my
03-89468777

The presentation provides an inside look at the extraordinary ability of indigenous people in Malaysia to call upon wild life such as the mousedeer and other animals. Creating beat through tapping leaves, these people compel the mouse deer to dance and come closer to them. This phenomenon is unique since the beat is foreign to the mousedeer and yet they become excited to tap and dance along to it. This beat has effects not only on the mousedeer but also on the other animals such deer and birds. The beat resemble the sound of tapping by wood pecker such as mentioned in the Tales of King Solomon in the book written by John D Seymour (2003) pg 30 & 31. In the tales of King Solomon "the Wood pecker sounded the war gong and the mousedeer was the chief of the war dance and at the sound of gong he commenced to dance". This tale is not a myth. A group of researcher from Universiti Putra Malaysia and the Wildlife and National Park Department of Malaysia conducted a study on this unique beat and use it as a method to call the animals especially mousedeer, deer and other animals to come closer to them. This beat has a potential to be used in the animal and wildlife conservation and management. The researchers used video camera and produced an interesting wildlife documentary with a duration of 45 minutes to prove that the beat produced by tapping as practiced by the indigenous people in Malaysia can lure the animals such as mousedeer, deer and other animals to come closer to human

being. In the presentation, the researcher intends to show part of the documentary that shows the mousedeer dance following the beat.

Keywords: Documentary, wildlife, mouse deer, sound of nature

PRPI 2012

UPM's Research & Innovation

FACULTY OF DESIGN AND ARCHITECTURE

Decorative Tiles Design based on Tropical Plant Images

Product / Innovation (C)

Dr. Zulkifli Muslim
Megat Muzhafar Megat Nizar
Faculty of Design and Architecture
zulmuslim@yahoo.com
03-89464066

The most important aspect of choosing tile is the pattern design. Therefore the importance of focusing the production process in design has become crucial. However, the review of the literature on the production process reveals that there is a lack of focus on the production processes in design compared to the evaluation made on the end or final product. Therefore, the objectives of this research are to determine the significance of systematic design process and ideas transformation in the development of graphic symbol. This study explores the relationship between tiles production and its pattern within an activity theory framework, focusing on data collected using questionnaires survey from selected universities in Peninsular Malaysia and interviews at Design Department of selected manufacture in Peninsular Malaysia. At the conclusion of this paper, a design criteria and analysis of system will be developed before production process of decorative tiles design from tropical plants images.

Keywords: Design process, design criteria, graphic symbol, tiles design production, tropical plant images.

.....

Rack for Professional Display

Product / Innovation (C)

Dr. Raja Ahmad Azmeer Raja Ahmad Effendi
Indastri Saion and Muhammad Asmuni
Faculty of Design and Architecture
rajaazmeer@yahoo.com
03-89464096

A display case is usually a box-shaped piece of furniture used to provide information on products collected for an exhibit. This may be linked with die-cast car collectors who utilize display cases as a place to exhibit the visual aesthetic characteristics of the miniature automobile. Hence, a properly designed display case with suitable materials is essential to match with the product appearance. The existing display cases show inappropriateness in terms of its appearance and material usage. Research had been carried out in understanding

this issue. This was done by using the qualitative research method in order to provide data and information on the collectors' experiences towards their hobby. Based on the research findings, a sculptural look display case was designed with reference to the corporate identity of the national car manufacturer, Proton. Besides locating it at a Proton showroom, the display case is also suitable for use during other exhibitions or for any similar event such as the KL International Motor Show. Moreover, the recycled use of waste material on the product is a great advantage as it also saves cost.

Keywords: Die-cast car, visual aesthetic, miniature automobile

……..

Boxxf: Motorcyclist Safety Compartment

Product / Innovation (C)

Dr. Raja Ahmad Azmeer Raja Ahmad Effendi
Dr. Zulkifli Muslim, Dr Mohammad Yazah Mat Racshid and Hoo Jun Hui
Faculty of Design and Architecture
rajaazmeer@yahoo.com
03-89464096

In Malaysia, there is a rapid increase of snatch issues among the public from year to year in urban areas especially among motorcyclists. In their normal modus operandi, snatch thieves often try to take something away from the victim by grabbing valuable things in the motorcycle compartment through violent and quick movements. Eventually, the incident has made the victims suffer in terms of physical as well as psychological. But, in worst case scenarios, it often leads to death.A qualitative and quantitative research method has been carried out in solving this issue. The findings show that a locking system for the motorcycle's compartment is an absolute necessity to prevent snatch incidents from occurring. Due to this, a new design of motorcycle compartment was produced. Besides having impressive styling and closing compartment with reliable locking system, multifunctional features have been added such as plastic bag hanger, wireless box, cellular phone charger and side release adjustable buckle strap to hold folded rain cloth.

Keywords: Motorcyclists, snatch thieves, compartment, multifunctional

Alfa Silage Compressor

Product / Innovation (C)

Mrs. Khairul Manami Kamarudin
Muhammad Faizal Che Leh, Kamariah Dola and Alisia Falies Jeffery
Faculty of Design and Architecture
manami@putra.upm.edu.my
03-89464096

Silage is one of the livestock feeds. In western countries, silage has been commercialized but not in Malaysia. This study is to investigate why silage is not preferred by the livestock farmers and development of design process in designing an affordable silage compressor for small holders. The result showed that Malaysian farmers prefer more on pellets as livestock feed due to the difficulties in silage production and they are not exposed to the advantages or benefits of silage. In general, this product emphasizes on the usage of silage as the livestock feed among Malaysian farmers. Most of the analyses conducted have focused on the processes of making silage, especially for the farmers who cannot afford their own machines. The product also will help them improve the silage production process in the aspect of times-consuming and quality of the silage. In addition, the product will contribute to the healthier ecosystem besides managing the agriculture waste wisely. Good waste management will lead to the healthier ecosystem and it also supports "Green Environments".

Keywords: Silage making, compressor machine, agriculture waste, farmers

.....

First Aid Kit Capsule for Homes

Product / Innovation (C)

Mrs. Khairul Manami Kamarudin
Khairul Manami Kamarudin, Muhammad Faizal Che Leh, Ruhaizin Sulaiman
and Nurul Izzati Kamarudin
Faculty of Design and Architecture
manami@putra.upm.edu.my
03-89464096

A first-aid kit is a collection of medical supplies and equipment suitable for use in giving first-aid. It is essential to have this kit in every home as home is one of accident-prone place. One of main problems that are identified with first-aid kit is that existing first-aid kit has no indication of the expiry date of each medication inside. Identifying expiry date on medical items is very important as to prevent users from using bad medicine and cause more infections in injuries. When experiencing emergencies, expired medicine and first-

aid items is a great disadvantages and a bad condition even worsen the situation. Every medicine has their expiry date including bandages with adhesives. By not paying attention to this matter, a first-aid kit which is supposed to be beneficial, may turn to hazard to one's health. Hectic and busy lifestyle made indications of expired medical items inside first-aid kit being highly ignored. Therefore, a suitable prevention mechanism for the expired medications inside first-aid kit has to be acknowledging by considering new revolutionized first-aid kit design. The proposed new design is not just giving new features of medical storage and their date-of-usage indication but also excite users and helps promote people to have it in every home. The new first-aid kit named "First-aid Kit Capsule" is not just introducing new breath of its styling but also rich with green approach, with sustainable packaging and material that are eco-friendly.

Keywords: First aid, home use, date indicator, aesthetic

.....

VOCIO (Child Rocker)

Product / Innovation (C)

Mrs. Siti Mastura Md Ishak
Azrol Kassim, Ruhaizin Sulaiman and Ahmad Qadri Basri @ Boseri
Faculty of Design and Architecture
toramir711@yahoo.com
03-89464096

OCIO is baby swing that practical and well-use for the use of infants and the parents' as well. This new design of baby rocking swing will consider more practicality aspect and well-use in the purpose of creating a design that can be very friendly user. There are many types of swing design can be find. Some of them use the rocking system as the technology has been developed. This study is to resolve the issue that arises on current baby swing products such as comfort, safety and personal taste. The disadvantages of existing baby swings are such as the awkwardness of styles with overhead bars or mobiles and the unpractical of some of product assembly during usage. Lastly, personal taste in using a practical product that equipped with justified technology without harming the baby itself was also taken as critical design criteria. Thus, this effort will ensure that the quality of the new design product is better than the older design by considering the best solutions based on the user needs. In general, the proposed product titled VOCIO emphasizes on the 3 factors of design considerations (comfort, safety and personal taste as mention above). Most of the analyses conducted have focused on the safe practical usage without abandoning the aesthetic criteria. The concept of new era of design considering each criterion is important due to the demands of personal taste and tendency of the society nowadays. This will help the user/ consumer to accept the design instead of accepting the new technology applied on the design.

Keywords: Baby rocker, comfortableness, safety, personal taste

Sustainable and Environmental Design of Kiosk for Tourism Malaysia (TDC)

Product / Innovation (C)

Dr. Ahmad Rizal Abdul Rahman
Ruhaizin Sulaiman and Sarah Rusmin
Faculty of Design and Architecture
rizalrahman17@gmail.com
03-89464096

Sustainable and nature have been among the key players of concepts in shaping out design for this project. Products offer in current market influences by many factors. 'Green' product design, is also known as design for environment, design for eco-efficiency or sustainable product design. Green design uses methods and products that minimize the ecological impact of design and construction on the earth. This design project adapted the elements of nature and local 'green' environment to sustain the local material use and minimize the impact one product could give to the Mother Nature. Despite adapting most of natural material including local timber and texture, this product still allow basic technology to ease its function and provide user friendly interface for users (especially tourists). The study begun by observing and collecting data about the ways tourists managed their products. These involved experts and individuals interviews. The Design process had been done parallel with the social inquiry as many changes in design had been implemented through the input from the interviews. This technique integrated users' involvement during the design process as applied in most of 'User Centred' Design Approach.

Keywords: Culture, kiosk design

.....

Public BENCH with the Element of Malay Traditional Features

Product / Innovation (C)

Dr. Ahmad Rizal Abdul Rahman
Ruhaizin Sulaiman andMohd Lukman Yacob
Faculty of Design and Architecture
rizalrahman17@gmail.com
03-89464096

Culture represents identity, way of life and also element of transmission that inspired and last through generations. This project has been delivered to develop public furniture that can represent or promote traditional elements of the Malay. The idea was to sustain local elements in modern lifestyle, as well as developing a new practical form without losing

the values from the past. This project of designing a modern public bench using traditional elements has been developed through 2 different stages. The first stage involved with design research where the designer has conducted several interviews with traditional and culture experts as well as studying cultural icons and trademarks. While the second part, involved with experimenting works of designing and fabricating a cultural character public bench. The fabrications process involved precise cuttings and jointing processes using Computer Aided Industrial Design as the element of culture need to be carefully trims and fabricate to precisely design during the assembly stages. It also involved the study of design and shape balance to join different parts of the components during assembly stages. These careful study and fabrication process has led to the production of full scale working prototype of the product.

Keywords: Furniture design, culture

……..

A Study on the Suitability and the Effectiveness of Benches Design in Public Park Areas: A Case Study in Kuala Lumpur

Product / Innovation (C)

Dr. Ahmad Rizal Abdul Rahman
Ruhaizin Sulaiman andFatin Hamidah Mahidin
Faculty of Design and Architecture
rizalrahman17@gmail.com
03-89464096

There are users who come to use a bench in a public park as a place to congregate or chatting. There is existing bench that does not meet to compatibility and comfort required by the user. Some homeless beggar sleep on benches as beds, because they do not have anywhere else to go. Hence, some of the local authority considers that comfortable aspect were not the first priority in the bench design. Depending on the material used and the design style of the bench that creates the comfort to the users. Some benches design with unsuitable material for the certain weather of the country. There are types of weather in general for all the countries, which is sunny, cloudy, hot, cold, dry, wet and windy. To face this situation, design and the effectiveness bench arrangement allows them to congregate and chat without any limits or barriers. In addition, suitable material for the benches is important to inviting users to sit on, it form a comfort and enjoyable to the users while they sit and do some activities. A case study was conducted in Public Park at Kuala Lumpur. This study was conducted with three methods, which are collecting information from questionnaire, doing observation and census upon bench design in public park areas. Two aspects stressed in this study are the characteristics of bench design and the characteristic of material used for existing bench. An appropriate bench design will be classified, as the suitability and the effective design when the analysis results based on the three methods.

Finally, one design outcome has been made, which is suitable and effective if located in Taman TasikPerdana, Kuala Lumpur.

Keywords: Furniture design, park design

.....

O-Fit: Exercise Equipment for Elderly People

Product / Innovation (C)

Dr. Zulkifli Muslim
Raja Ahmad Azmeer Raja Ahmad Effendi, Ruhaizin Sulaiman and Ngau Siok Jiun
Faculty of Design and Architecture
zulmuslim@yahoo.com
03-89464066

The purpose of this paper is to identify the problems faced by elderly people while living. To find information, research and data collection has been done by using quantitative and qualitative research methodology concept. These methods can give a lot of information about elderly people health needs and problems regarding elderly people easy fall. Besides quantitative and qualitative method to find information, journals and article readings also provided data for the research. From the research, many elderly people not have too much instrument for exercise and living in an unhappy mind. Furthermore, not many nursing homes in Malaysia plan for do the activity for health. This is caused by a number of factors among them the fall are increase and weakness. The findings from this research should create a new product idea related to health needs that fulfills the needs of elderly people.

Keywords: Exercise, instrument, health

G-Curture - Miniature Plant Hanger

Product / Innovation (C)

Mrs. Khairul Manami Kamarudin
Azrol Kassim, Nor Atiah Ismail andSyaza Mohamad Salleh
Faculty of Design and Architecture
manami@putra.upm.edu.my
03-89464096

Almost every people would love to be able to grow a garden, but they have limitation in terms of space. Small houses, apartments and townhouses do not often provide that much area to have a garden or small landscape. Some rental house may have large yards, but also have restrictions on tilling up the ground or building raised beds for planting. Using pots for gardening is the best way to create thriving gardens in limited space. However, using pots still cause limitation for small space gardening. Other way of utilizing these small spaces is by using hanging pot plant. This research extends the alternative way of small space gardening. With modularity concept, it is one of ways to have more plants for gardening yet utilize minimum space, focusing on vertical gardening. "G-Curture - Miniature Plant Hanger" is a modular product and uses natural material, uses welded wire as inner parts and Jute twine, a vegetable fibre (wrapping) suitable for hanging plants. Modular design of this hanging "pot", flat and attractive shape will increase customers' interest in having vertical garden and at the same time increase aesthetic values. It is also user friendly and easy to use.

Keywords: Vertical planting, modular, hanging plants, aesthetic

HEMOR (Sustainable Herbal-Lamp Mosquito Repellent)

Product / Innovation (C)

Mr. Ruhaizin Sulaiman
Tee Kai Xin
Faculty of Design and Architecture
ruhaizin@putra.upm.edu.my
03-89464034

This product consists of structure, bulb and heater plate. It has three relative functions. First is as a mosquito repellent which works by heating dried orange peel/skin or wormwood or citronella to produce smell. This odour is able to expel mosquitoeseffectively. Once the product is on, the bulb inside it will lit the area and at the same time produce heat that will slowly burnt the repelling materials. This product is also functioned as a decorative product to enhance the interior of a house or space.

Keywords: Sustainable, mosquito, repelling, fragrance, brightness, decorative item

.....

HEMOR (Sustainable Herbal-Lamp Mosquito Repellent)

Product / Innovation (C)

Mr. Ruhaizin Sulaiman
Tee Kai Xin
Faculty of Design and Architecture
ruhaizin@putra.upm.edu.my
03-89464034

This product consists of structure, bulb and heater plate. It has three relative functions. First is as a mosquito repellent which works by heating dried orange peel/skin or wormwood or citronella to produce smell. This odour is able to expel mosquitoes effectively. Once the product is on, the bulb inside it will lit the area and at the same time produce heat that will slowly burnt the repelling materials. This product is also functioned as a decorative product to enhance the interior of a house or space.

Keywords: Sustainable, mosquito, repelling, fragrance, brightness, decorative item

PRPI 2012

UPM's Research & Innovation

FACULTY OF MEDICINE AND HEALTH SCIENCES

Methanol Extract of *Bauhinia purpurea* Leaf Possesses Anti-Ulcer Activity

Category: Applied Research (B)

Assoc. Prof. Dr. Zainul Amiruddin
Zakaria Mohammad Fauzi Fahmi Kamarolzaman and Farhana Yahya
Faculty of Medicine and Health Sciences
dr-zaz@yahoo.com
03-89472654

The aim of the present study was to determine the anti-ulcer activity of a methanol extract of Bauhinia purpurea leaf (MEBP). MEBP was administered at doses of 100, 500 and 1,000 mg/kg and its effects on acute toxicity, absolute ethanol- and indomethacin induced gastric ulceration, and pyloric ligation tests in rats were investigated. At a dose of 5,000 mg/kg, MEBP did not cause any signs of toxicity in rats when given orally. Oral administration of MEBP exerted anti-ulcer activity ($p < 0.05$) in all models tested. However, a dose-dependent protection was observed only in the indomethacin-induced gastric ulceration model. Histological studies supported the observed anti-ulcer activity of MEBP. In the pyloric ligation assay, MEBP significantly increased gastric wall mucus secretion ($p < 0.05$), but did not affect the acidity of the gastric contents. MEBP exhibited anti-ulcer activity, which could be due to the presence of flavonoids, saponins or other polyphenols, thereby validating the traditional use of B. purpurea in the treatment of ulcers.

Keywords: *Bauhinia purpur*ea, Methanol extract, anti-ulcer activity, flavonoids, saponins, polyphenols

……..

Suppression of DMBA/Croton Oil-induced Mouse Skin Tumor Promotion by *Ardisia crispa* Root Hexane Extract

Category: Applied Research (B)

Dr Roslida Abdul Hamid
Yeong Looi Ting and Fezah Othman
Faculty of Medicine and Health Sciences
roslida@medic.upm.edu.my
03-89472341

Ardisia crispa root or locally known as 'mata itek' or 'mata ayam' has been used traditionally in folkloric medicine to treat various inflammatory diseases including skin disorder. Hexane extract, fractionated from its ethanolic crude extract has exerted a suppression on mouse skin tumorigenesis, induced by DMBA and further promoted by croton oil for 10 weeks. It

has also delayed the tumor growth when compared to the carcinogen control group. Ardisia crispa hexane extract showed an advantage as a chemopreventive agent in skin cancer development. Further investigation in determining its pathway as well as identifying the mediators involved are in progress. It can be marketed as a topical cream which can be commercialized like other cream with natural products based. Target consumers will be amongst patients with skin diseases/disorder or teenagers with skin problem such as acnes.

Keywords: Chemopreventive, skin tumorigenesis, Ardisia crispa, anti-tumor

……..

Antinociceptive and Anti-ulcerogenic Activities of the Ethanolic Extract of Annona Muricata Leaf

Category: Applied Research (B)

Dr Roslida Abdul Hamid
Chan Pit Foong and Mohd Khairi Husain
Faculty of Medicine and Health Sciences
roslida@medic.upm.edu.my
03-89472341

The crude exthanolic extract, was extracted from the leaves of Annona muricata or locally known as soursop or durian belanda. The extract has shown to exert anti-nociceptive and anti-ulcerogenic properties in various animal models. Thus, it may have potential to be marketed as a topical cream to relieve pain. Furthermore, as the experiments done on animals were administered via oral route, it may also have potential to be marketed as tea sachet for beverages purpose. The toxicity test done on the mice has also shown its LD50 at higher dose. Potential customers for this product may involve those who are in need of pain relievers for reducing pain caused by arthritis and others. The cost of the product will not be expensive as its source can be found anywhere in Malaysia. Besides, the cultivations of soursop in Malaysia are for their fruits, not their leaves. Therefore, the leaves will not be wasted anymore as we have found an alternative way to commercialize the leaves which act as pain killer.

Keywords: Annona muricata, soursop, anti-nociceptive, anti-ulcer, Formalin test

A Geranyl Acetophenone Targeting Cysteinyl Leukotriene Synthesis Prevents Allergic Airway Inflammation in Ovalbumin-Sensitized Mice

Category: Applied Research (B)

Assoc. Prof. Dr. Daud Israf
Norazren Ismail, Khozirah Shaari, Mohd Roslan Sulaiman and Tham Chau Ling
Faculty of Medicine and Health Sciences
daud.israf@gmail.com
03-89472337

Asthma is associated with increased pulmonary inflammation and airway hyperresponsiveness. The current use of corticosteroids in the management of asthma has recently raised issues regarding safety and lack of responsiveness in 5-10% of asthmatic individuals. The aim of the present study was to investigate the therapeutic effect of a non-steroidal small molecule that has cysteinyl leukotriene (cysLT) inhibitory activity, upon attenuation of allergic lung inflammation in an acute murine model. Mice were first sensitized with ovalbumin (OVA) and then treated with several intraperitoneal doses (100, 20, 2 and 0.2 mg/kg) of 2, 4, 6,-trihydroxy-3-geranylacetophenone (tHGA), a synthetic compound synthesized from a traditional plant, tenggek burung. Bronchoalveolar lavage was performed, lung samples were obtained and respiratory function of the mice was measured. OVA sensitization increased the pulmonary inflammation and it was significantly reduced at doses of 100, 20 and 2 mg/kg with no effect at the lowest dose of 0.2 mg/kg. The beneficial effects in the lung were associated with reduced eosinophilic infiltration and reduced secretion of Th2 cytokines and cysLTs. Treatment with tHGA significantly attenuated altered airway hyperresponsiveness as measured by the enhanced pause (Penh) response to incremental doses of methacholine. These data demonstrate that tHGA, a synthetic non-steroidal small molecule, can prevent acute allergic inflammation. This proof of concept opens further avenues of research and development of tHGA as an additional option to the current armamentarium of anti-asthma therapeutics.

Keywords: Asthma; acetophenone; AHR; cysteinyl leukotriene; cytokine; histopathology

Detection of 10 Medically Important Candida Species by Seminested Polymerase Chain Reaction

Category: Applied Research (B)

Dr. Leslie Than Thian Lung
Chong Pei Pei, Ng Kee Peng and Seow Heng Fong
Faculty of Medicine and Health Sciences
leslie@medic.upm.edu.my
03-89472373

The invention aims to achieve sensitive and specific detection of medically important Candida species. It uses seminested PCR method that has advantages in amplifying traces amount of Candida species DNA.The method utilised is inexpensive in comparison to many established detection methods such as enzyme-linked immunosorbent assay (ELISA). In addition, the sensitivity and specificity aspects of the detection are not compromised. As the trend of immunocompromised and immunosuppressed individuals is on the rise, the number of people who are susceptible to fungal infections caused by the opportunistic Candida species will also be proportionately showing an uptrend. The increasing number of cancer patients receiving chemotherapy, organ transplantation, elderly and the high prevalence of people living with HIV are some of the susceptible groups that may find the invention to be of benefits to them.

Keywords: Seminested PCR, Candida, specific, sensitive

.....

Microrna Expression Profiling and Potential Role Of Mir-181a in Head and Neck Cancers

Category: Fundamental (A)

Assoc. Prof. Dr. Cheah Yoke Kqueen
Nurul Syakima Ab Mutalib, Shiran Mohd Sidik, Sabariah Abdul Rahman,
Lee Learn Han and Avatar Singh Mohan Singh
Faculty of Medicine and Health Sciences
ykcheah@medic.upm.edu.my
03-89472343

MicroRNAs (miRNAs) represent a class of small non-coding RNAs that regulate gene expression by either inducing mRNA degradation or repressing mRNA translation. The involvements of miRNAs in various human cancer-related processes have been studied in recent years. Global miRNA profiling was performed on from various head and neck cancers by using the microarray approach followed by real time RT-PCR validation. The

microarray analyses identified 10 miRNAs that were able to distinguish malignant from normal tissues whereby seven miRNAs showed upregulation while three miRNAs showed down-regulation. Therefore, these miRNAs may aid in simple profiling strategies to identify individuals at higher risk of developing head and neck cancers, as well as elucidate the molecular mechanisms involved in head and neck cancers pathogenesis. Putative targets of miRNAs differentially expressed in head and neck cancers and the pathways involved, which was achieved through in silico analysis aided by online databases, whereby several cancer-associated genes and pathways were found to be targeted by miR-181a. The role of miR-181a in head and neck carcinogenesis was subsequently determined through functional analyses was found to regulates the proliferation, migration, invasion and colony-forming ability of head and neck cancer cell. Visualizing miR-181a expression and localization in head and neck tissues were performed via Locked Nucleic Acid in situ hybridization.

Keywords: MiRNA, microarray, head and neck cancers

.....

Immunomodulatory Activity of Polyphenols Derived from *Cassia auriculata* Flowers in Aged Rats

Category: Fundamental (A)

Dr. Rajesh Ramasamy
Cini Mathew John and Aishah Adam
Faculty of Medicine and Health Sciences
r.rajesh@medic.upm.edu.my
03-89472377

The immunomodulatory activity of Cassia auriculata (CA)-derived polyphenols was tested on aged rats. Rats (24-26 months old) were given CA polyphenols supplementation at doses of 25, 50, and 100 mg/kg for 28 days. Flow cytometry analysis of CA polyphenols-treated aged rats showed increased T and B cells percentage along with enhanced proliferation of splenocytes in both resting and LPS-stimulated cells. Increased percentage of pan T cells is further supported by an elevation of CD4+, CD8+, and CD4+CD25+ regulatory cells. In terms of innate immune cell activity, CA polyphenol supplementation reduced the oxidative burst activity of neutrophils in response to PMA and Escherichia coli activation. Our results collectively show that polyphenols derived from CA boost T cell immunity by increasing the number of T cells and its sensitivity towards stimulants and decreasing ROS production by neutrophils that could potentially harm multiple biological systems in aged individuals Cassia

Keywords: Auriculata, immune response, regulatory t cells

Screening for Thalassaemia in Discarded Red Blood Cells: A Novel Diagnostic Approach in Cord Blood Banking

Category: Applied Research (B)

Prof. Dr. Elizabeth George
Mei I Lai, Lai Kuan Teh, Rajesh Ramasamy, Ern Huei Goh, Kamalam Asokan, Maithili Vasudevan and Mary Anne Tan Jin I
Faculty of Medicine and Health Sciences
elizg@medic.upm.edu.my
03-89412381

Thalassaemia is public health problem in Malaysia. Cord blood is source of haemopoietic stem cells that can be used to treat a range of diseases. There have been no reports of screening for thalassaemia in cord blood banking in Malaysia. Couples who are carriers of thalassaemia are asymptomatic and may not be aware of their status and result in the storage of stem cells with intermediate to severe forms of thalassaemia. In cord blood banking, the cord blood is processed to separate blood cells and collect stem cells. These stem cells are frozen and stored at minus 196 degrees Celsius. Red cells separated out in the process are discarded. Hb subtypes were quantified in 3.5ml of discarded red blood cells using the BioRad Variant II Hb analyzer with the ?-thalassaemia short program. The instrument accurately measures HbA, HbF, HbA2 and Hb Variants. Hb Barts and HbH appear as prerun peaks in the chromatogram (C-gram) with retention time (RT) values 0.2 and 0.5 respectively. Informative C-gram patterns were obtained for normal cord blood sample, beta-thalassaemia major, Hb Barts hydrops foetalis, HbH disease and HbE beta-thalassaemia. The assay was possible at a cost of RM28 per sample and a turnover time of 10 samples per hour without technical difficulties. This novel diagnostic approach is feasible and effective for thalassaemia screening in red blood cells which would otherwise be discarded during cord blood processing to screen for thalassaemia. Cord blood with severe and intermediate forms of thalassaemia can be preselected and not stored.

Keywords: Cord blood banking, discarded red blood cells, thalassaemia screening

PRPI 2012

UPM's Research & Innovation

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

A Case Study with Nokia E5-00 Mobile Phone

Category: Applied Research (B)

Dr. Ali Dehghantanha
Mohsen Damshenas
Faculty of Computer Science and Information Technology
alid@fsktm.upm.edu.my
03-89471655

In the past few years, there has been an exponential increase in the number of smartphone users. By its very nature, smartphone saves and manages vast amount of information pertaining to its owner. As a result, this ubiquitous device is being regarded as a valuable evidence item in forensic investigations. Nevertheless owing to disparity in smartphone models, retrieving whole data from all models using predefined instructions and tools is not always possible. This paper studies demo or trial versions of four widely used mobile forensics tools namely, Oxygen Forensic Suite, Paraben's Device Seizure, Mobile Internal Acquisition Tool, and MOBILedit! Forensic Lite in extracting data from a Nokia E5-00 smartphone. The result of this paper presents that existing toolkits are deficient to gather volatile data as well as deleted information.

Keywords: Mobile forensics; smartphone; data acquisition

.....

External Device Recognition System

Category: Applied Research (B)

Dr. Ali Dehghantanha
Farid Daryabar and Nur Izura Udzir
Faculty of Computer Science and Information Technology
alid@fsktm.upm.edu.my
03-89471655

A system for educating security and hacking skills.

Keywords: Security, forensics

3D Heart Anatomy

Category: Applied Research (B)

Assoc. Prof. Dr. Rahmita Wirza
Anas Alabousy, Mohd. Zamrin Dimon, Suhaini Kadiman, M. Iqbal Saripan
and Lili Nurliyana
Faculty of Computer Science and Information Technology
rahmita@fsktm.upm.edu.my
03-89471704

Measuring the right ventricle (RV) stroke volume, which is different from the end diastolic volume (EDV) and the end systolic volume (ESV) in a cardiac cycle of a full volume Real-Time Three-Dimensional Echocardiography (RT3DE) with a minimum of interaction, is still a challenge even though there are several methods available to measure the RV stroke volume (in-vivo, in-vitro or clinically). Using Magnetic Resonance Imaging (MRI), Cardiac Computed Tomography (CCT) or RT3DE, in this study we measured the RV stroke volume by measuring the end systolic volume and RV end diastolic. The current Advanced-QLAB software only covers the assessment of the left ventricle (LV) and the mitral valve. Goal: The objective of this study is to measure the RV stroke volume with greater accuracy than currently available, and with a minimum of manual manipulation and correction. The algorithm has four stages where the data extraction part assumes that the direction and number of cutting disks will affect the measurement result. The second stage is measuring the image resolution. In the third stage we automatically determine the end systolic (ES) and end diastolic (ED) volume of the RV. Finally, the algorithm measures the stroke volume. Results: The RV stroke volume has been compared with the LV stroke volume and a robust relation has been found between them. Results showed that the measurement is accurate, but is still affected by acquiring quality.

Keywords: Right ventricle stroke volume, region growing method, left ventricle volume

A Distributed Energy-Aware Clustering Algorithm for Life Time Enhancement of Wireless Sensor Network

Category: Applied Research (B)

Assoc. Prof. Dr. Zuriati Ahmad Zukarnain
Javad Memariani, Azizol Abdullah and Zurina Mohd. Hanapi
Faculty of Computer Science and Information Technology
zuriati@fsktm.upm.edu.my
03-89471710

In distributed sensor networks, a large number of small sensors are deployed to create a network which cooperates together to set up a sensing network. The main duty of sensors is to prepare access to environmental information anytime, anywhere by collecting, processing, analyzing and transmitting data. To design applications and protocols for sensor networks, the maximum network lifetime and minimum energy depletion should be considered as important parameters. In sensor networks, clustering has been proven to be cost effective (He, Yoon, & Kim, 2006) because the data routing and transmitting only be mastered by cluster heads. Besides, cluster heads can process, filter and aggregate data sent by cluster members, thus reducing network load and alleviating the bandwidth. In this paper, we propose a distributed, energy-efficient clustering algorithm that extends the network lifetime by using some parameters such as energy, centrality, density, in addition distances between nodes and the sink. The proposed algorithm, in the worse case, has an algorithmic complexity of O (N) at each sensor node.

Keywords: energy-efficient clustering algorithm that extends the network lifetime by using some parameters such as energy, centrality, density, in addition distances between nodes and the sink

……..

M2i2tswtcm: A New Efficient Optimization Marker Algorithm to Improve Fairness Bandwidth in Diffserv Networks

Category: Applied Research (B)

Prof. Dr. Mohamed Othman
Ameen Mohammed Alkharasani
Faculty of Computer Science and Information Technology
mothman@fsktm.upm.edu.my
03-89466535

The Quality of Service (QoS) requirement Differentiated Services (DiffServ) typically having three main categories of performance metrics- bandwidth, latency and jitter. Although the DiffServ routers provide Per Hop Behaviours (PHBs) to aggregate traffic

for different levels of service through the Assured Forwarding (AF) by provides service differentiation to aggregates, an unfairness problem still occurs in DiffServ networks. In order to improve bandwidth fairness along with efficient optimization to alleviate this problem, this article proposes Double Modified Double Improved time sliding window Three Colour Marker (M2I2tswTCM) algorithm, which makes a new value of ? that depends on the logarithm peak information rate (PIR) and which is added to the adaptive factor that exists in the previous algorithm. Through extensive simulation implementation using the NS-2 under DiffServ network, we compare the fairness of the proposed algorithm with previous algorithms. The results show that the M2I2tswTCM algorithm performed better than the seven marker algorithms in terms of fair bandwidth distribution for different network provision levels.

Keywords: Quality of service, DiffServ networks, Traffic maker, TswTCM, Fairness, Provision level, Excess bandwidth

……..

On-Demand Channelr Eservation Scheme for Common Traffic in Wireless Mesh Networks

Category: Applied Research (B)

Prof. Dr. Mohamed Othman
Hassen A. Mogaibel and Mohamed Othman
Faculty of Computer Science and Information Technology
mothman@fsktm.upm.edu.my
03-89466535

Wireless Mesh Networks (WMNs) have recently gained momentum as a new broadband internet access technology to provide internet traffic. These networks have unique characteristics that make them different from ad hoc networks. These differences are as follows. First, WMNs are composed of static mesh routers that are equipped with multiple radio interfaces and turn each interface into a non-overlapping channel. These additional interfaces can create multiple concurrent links between adjacent nodes. Second, most of the traffic in WMNs is directed toward the gateway. Third, both local traffic and internet traffic are relayed by the mesh router to indeed destination. The Multi-Radio Ad hoc On-Demand Distance Vector (AODV-MR) developed to support multi-radio and does not take into account above mentioned WMNs characteristics. In this paper, we propose an on-demand channel reservation scheme to reserve some of mesh router radio interfaces to support the gateway traffic while the remaining interfaces can be used to support the local traffic. Our scheme establishes high throughput paths for the traffic destined at the gateway, reduces the intra-flow and inter-flow interferences as well as to support full duplex node transmission. The scheme allows the gateway to assign a list of channels for each received gateway routing discovery message. Simulation results show that our

proposed scheme significantly improves the performance of multi-radio multi-channel wireless mesh networks.

Keywords: Wireless mesh network; Multi-radio; On-demand routing; Multi-channel; Multi-link

.....

An Adaptive Delayed Acknowledgment Strategy to Improve TCP Performance in Multi-Hop Wireless Networks

Category: Applied Research (B)

Prof. Dr. Mohamed Othman
Ammar Mohammed Al-Jubari, Borhanuddin Mohd Ali and Nor AsilahWati Abdul Hamid
Faculty of Computer Science and Information Technology
mothman@fsktm.upm.edu.my
03-89466535

In multi-hop wireless networks, transmission control protocol (TCP) suffers from performance deterioration due to poor wireless channel characteristics. Earlier studies have shown that the small TCP acknowledgments consume as much wireless resources as the long TCP data packets. Moreover, generating an acknowledgment (ACK) for each incoming data packet reduces the performance of TCP. The main factor affecting TCP performance in multi-hop wireless networks is the contention and collision between ACK and data packets that share the same path. Thus, lowering the number of ACKs using the delayed acknowledgment option defined in IETF RFC 1122 will improve TCP performance. However, large cumulative ACKs will induce packet loss due to retransmission time-out at the sender side of TCP.Motivated by this understanding, we propose a new TCP receiver with an adaptive delayedACK strategy to improve TCP performance inmulti-hop wireless networks. Extensive simulations have been done to prove and evaluate our strategy over different topologies. The simulation results demonstrate that our strategy can improve TCP performance significantly.

Keywords: TCP Â· Multi-hop wireless network Â· Delayed ACK

Lightweight, Fast And Efficient Distributed Hierarchical Graph Neuron-Based Pattern Classifier

Category: Applied Research (B)

Mrs. YM Raja Azlina Raja Mahmood
Zurina Mohd. Hanapi, Sazlinah Hasan and Noridayu Manshor
Faculty of Computer Science and Information Technology
azlina@fsktm.upm.edu.my
03-89471768

A lightweight, fast and efficient pattern classifier based on Distributed Hierarchical Graph Neuron (DHGN) is proposed and implemented. A classifier with such features is essential for the emerging networks such as wireless sensor networks and mobile ad hoc networks, where resources such as bandwidth and energy are limited. The proposed classifier adopts an in-network processing algorithm and has a one cycle learning capability. DHGN network is a new form of neural networks which consist of a hierarchical graph-based representation of input patterns. We have made comparison study between the proposed solution with the well known Self-Organizing Map (SOM) classifier, in relation to accuracy and computational complexity. The results show that our solution offers lower computational complexity than SOM while guaranteeing satisfactory accuracy.

Keywords: Lightweight Classifier, Distributed Hierarchical Graph Neuron (DHGN), Computational Complexity.

……..

Laptop Tracking System

Category: Applied Research (B)

Mrs. YM Raja Azlina Raja Mahmood
Yee Chee Yeong
Faculty of Computer Science and Information Technology
azlina@fsktm.upm.edu.my
03-89471768

Laptop theft has been on the rise in recent years and yet with low recovery rate. One approach to track the stolen laptop is through the MAC/IP address detection. The limitation of this approach is that the laptop needs to be connected to the Internet, so that the IP address of the associated MAC address can be determined. In doing so, one has to work closely with the respective Internet Service Provider (ISP). However, there is no guarantee that the exact geographical location of the stolen laptop can be obtained. We developed a real time laptop tracking system, known as a Lappy Tracker System that

does not require Internet connection and the ISP involvement. Inspired by the Automatic Vehicle Location System for tracking vehicle location, we employed similar approach for tracking laptop location. In the proposed system, the geographic location of a stolen laptop is determined in real time by a Global Positioning System (GPS). A General Packet Radio Service/Global System for Mobile Communications (GPRS/GSM) modem is then used to send the location information to the legitimate owner.

Keywords: laptop tracking, laptop theft, GPS, GPRS/GSM, geographic location

……..

Point-To-Point Communication on Gigabit Ethernet and Infiniband Networks

Category: Applied Research (B)

Prof. Dr. Mohamed Othman
Roswan Ismail, Nor Asilah Wati Abdul Hamid and Rohaya Latip
Faculty of Computer Science and Information Technology
mothman@fsktm.upm.edu.my
03-89466556

This paper presents the measurements of the MPI point-to-point communication performances on Razi and Haitham clusters by using SKaMPI, IMB and MPBench benchmark programs. These measurements were done on clusters with identical configurations in order to compare and analyze the MPI communication performance over different interconnect technology; Gigabit Ethernet and InfiniBand. The comparison and analysis of the results from all benchmark programs used were then provided. It revealed that different MPI benchmark programs rendered different results for different interconnect. The results for both technologies were then compared to the experiment's results that were done on cluster with Opteron quad-core processor. The comparison concluded that besides type of interconnect, the architecture of the clusters itself might also affected the results.

Keywords: MPI benchmarks, parallel computer, IBM Blade HS21 Server, multi-core processors, SKaMPI, IMB, MPBench, Gigabit Ethernet, Infiniband.

Performance Evaluation of Routing with Load-Balancing in Multi-Radio Wireless Mesh Networks

Category: Applied Research (B)

Assoc. Prof. Dr. Zuriati Ahmad Zukarnain
Nori Mohammed AL-Kharasani
Faculty of Computer Science and Information Technology
zuriati@fsktm.upm.edu.my
03-89471710

Wireless mesh networks (WMNs) face several challenges such as architectural design and network protocol design issues. The capacity of WMNs is very limited, such as the result in an available singlechannel bandwidth system compared to a multi-channel system. Two problems affect the capacity of mesh networks; i.e. load balancing and interference. To support the mesh network infrastructure, it is necessary to balance the traffic load and reduce the interference. One important direction for improving the capacity of WMNs is to use multiple radio interfaces and multiple channels simultaneously. The proposed load balancing routing algorithm method provides the load balance for multi-radio mesh networks by using a good routing metric,which captures the differences in transmission rates, packet loss ratio, traffic load and intra/inter flow interferences. The simulation results of this study, which used the network simulation NS-2, showed the capacity improvement that helps distributing the traffic load for efficient resource utilization

Keywords: Wireless Mesh networks, routing metric, multi radio, load balancing

……..

An Agent-Based Paradigm Representation for Object-Oriented Programming Semantics

Category: Applied Research (B)

Dr. Teh Noranis Mohd Aris
Faculty of Computer Science and Information Technology
nuranis@fsktm.upm.edu.my
03-89471712

Comprehending Object-Oriented Programming (OOP) is not an easy task especially by novice students. The problem occurs during the transition from learning fundamental programming language concept to OOP concept. It is very important to handle this problem from the beginning before novices learn more advanced OOP concepts like encapsulation, inheritance, and polymorphism. Learning programming from source code examples is a common behavior among novices. Novices tend to refer to source codes examples and adapt the source codes to the problem given in their assignments. To cater the problems

faced by these novices, a novel agent-based model have been designed to assist them in comprehending OOP concepts through source codes examples. The instructor needs to provide two related source codes that are similar but in different domain. Generally, these source codes go through the preprocessing, comparison, extraction, generate program semantics and classification processes. A formal algorithm that can be applied to any two related Java-based source codes examples is invented to generate the semantics of these source codes. The algorithm requires source codes comparison based on keyword similarity to extract the words that exist in the two related source codes. Three agents namely SemanticAgentGUI, semanticAgent and noviceAgent are designed in the proposed model. The running system illustrates an OOP semantic knowledge representation by intelligent agents. The proposed model is tested with two related source codes and proved to produce accurate results. It is expected that this invention can assist novices in enhancing their programming skills. In addition, a plan to produce a copyright of this model is suggested.

Keywords: Object-Oriented Programming Semantics, Source Codes Comparison, Keyword Similarity, Extraction, Classification

……..

QTCP: An Optimized and Improved Congestion Control Algorithm of High-Speed TCP Networks

Category: Applied Research (B)

Prof. Dr. Mohamed Othman
Barkatullah Qureshi
Faculty of Computer Science and Information Technology
mothman@fsktm.upm.edu.my
03-89466556

TCP researchers evaluated the performance and fairness of different TCP on the basis of new algorithms. The new High-Speed Transport Control Protocols (HS-TCP) were developed but there are still many problems regarding to bandwidth utilization, throughput and packet loss rate. To overcome these problems Quick Transport Control Protocol (QTCP) algorithm based on optimizations of HS-TCP slow start algorithm and Additive Increase and Multiplicative Decrease (AIMD) algorithm have been proposed. A modified algorithm has been developed by using an additive increase approach to grow window with normal speed and to increase scalability by putting constant value of stability of timeline in congestion avoidance phase. This constant timeline gives long stability time; it provides many benefits as compared to other high-speed TCP protocols. The improved algorithm increased throughput and decreased packet loss rate and fairly share link utilization. In this regards several experiment of simulations were observed the fairness. The results show best bandwidth utilization, improved throughput and less packet loss rate as compared to other high speed TCP variants.

Keywords: Fairness, QTCP, AIMD, Congestion Avoidance, Throughput

Improving Named Entity Recognition Accuracy for Gene and Protein in Biomedical Text Literature

Category: Applied Research (B)

Assoc. Prof. Dr. Hamidah Ibrahim
Hossein Tohidi and Assoc. Prof. Dr. Masrah Azrifah Azmi Murad
Faculty of Computer Science and Information Technology
hamidah@fsktm.upm.edu.my
03-89471713

The task of recognizing biomedical named entities in natural language documents called Biomedical Named Entity Recognition (NER) is the focus of many researchers due to complex nature of such texts. This complexity includes the issues of character-level, word-level, and word order variations. In this study an approach for recognizing gene and protein names that handles the above issues is proposed. Similar to the previous related works, our approach is based on the assumption that a named entity occurs within a noun group. The strength of our proposed approach lies on a Statistical Character-Based Syntax Similarity (SCSS) algorithm which measures similarity between the extracted candidates and the well-known biomedical named entities from the GENIA V3.0 corpus. The proposed approach is evaluated and results are satisfied. For both gene and protein names recognitions, we achieved 97.2% for precision (P), 95.2% for recall (R), and 96.1 for F-measure. While for protein names recognition we gained 98.1% for P, 97.5% for R, and 97.7 for F-measure.

Keywords: Natural language processing, information extraction, named entity recognition, biomedical.

.....

A Dynamic Compressed Accessibility Map for Secure XML Querying and Updating

Category: Applied Research (B)

Assoc. Prof. Dr. Hamidah Ibrahim
Meghdad Mirabi, Assoc. Prof. Dr. Nur Izura Udzir and Assoc. Prof. Dr. Ali Mamat
Faculty of Computer Science and Information Technology
hamidah@fsktm.upm.edu.my
03-89471713

By specifying a fine-grained access control on the XML data, an accessibility map is required to determine the accessibility of XML nodes for a specific subject (e.g. user or role) under a specific action (e.g. read or write). In recent years, several research works have been done to reduce the overall storage cost of accessibility map with rapid determination of accessibility of XML nodes at runtime but there is no effort to

implement the accessibility map in a compact format for dynamic environment where the accessibility of XML nodes can be updated frequently. In this research, we propose a Dynamic Compressed Accessibility Map (DCAM) to implement the accessibility map in a compact format which can be used in dynamic environment. In order to determine the accessibility of XML nodes at runtime, we propose an efficient lookup method by labeling the authorization nodes in the DCAM with the dynamic XML labeling scheme. We also propose an efficient method to accelerate the process of checking the access authorizations for a set of XML nodes retrieved from the XML query processor when the access locality among the XML nodes in the XML tree is high. The experimental results demonstrate that the DCAM is more efficient in both the space and time requirements for secure XML querying and updating.

Keywords: Access control, encoding and labeling scheme, privacy, XML querying, XML updating.

……..

Collaborative Caching Priority for Serving Continuous Query in Mobile Database

Category: Applied Research (B)

Assoc. Prof. Dr. Hamidah Ibrahim
Mohamed Ahmed Elfaki, Assoc. Prof. Dr. Ali Mamat and Prof. Dr. Mohamed Othman
Faculty of Computer Science and Information Technology
hamidah@fsktm.upm.edu.my
03-89471713

The mobile ad hoc network (MANET) computing technology needs efficient services as the number of mobile users is increasing. Several approaches have been proposed and mostly adopted the collaborative caching strategies to enable mobile nodes to cache and share data items in their local caches. However, serving queries based on their priority has not been utilized to further reduce the cache discovery overhead and improve the data access performance and availability. This research proposes a new collaborative caching approach called Collaborative Caching Priority (CCP) which attempt to reduce the delay by serving the query based on its type. Prioritization was given to the queries based on the demand needs of the requested node. After the queries are classified, the queries are directed and served in the local cache if the required data item is fully available. Otherwise the query is forwarded to the neighbor nodes, cluster header or database server depending on the type of the query and the output is sent to the requested node. The experimental results significantly show that the proposed approach outperforms the cooperative and adaptive system (COACS), with a decrement 30.42% in terms of average delay and an increment of 21.26% for hit ratio.

Keywords: Mobile database, query processing, collaborative caching, Mobile Ad hoc Network (MANET)

An Encoding Scheme Based on Fractional Number for Querying and Updating XML Data

Category: Applied Research (B)

Assoc. Prof. Dr. Hamidah Ibrahim
Meghdad Mirabi, Assoc. Prof. Dr. Nur Izura Udzir and Assoc. Prof. Dr. Ali Mamat
Faculty of Computer Science and Information Technology
hamidah@fsktm.upm.edu.my
03-89471713

In order to facilitate the XML query processing, several labeling schemes have been proposed to directly determine the structural relationships between two arbitrary XML nodes without accessing the original XML documents. However, the existing XML labeling schemes have to re-label the pre-existing nodes or re-calculate the label values when a new node is inserted into the XML document during an update process. In this research, we devise a novel encoding scheme based on fractional number to encode the labels of the XML nodes. Moreover, we propose a mapping method to convert our proposed fractional number based encoding scheme to bit string based encoding scheme with the intention to minimize the label size and save the storage space. By applying our proposed bit string encoding scheme to the range-based labeling scheme and the prefix labeling scheme, the process of re-labeling the pre-existing nodes can be avoided when nodes are inserted as leaf nodes and sibling nodes without affecting the order of XML nodes. In addition, we propose an algorithm to control the increment of label size when new nodes are inserted frequently at a fix place of an XML tree. Experimental results show that our proposed bit string encoding scheme provides efficient support to the process of XML updating without sacrificing the query performance when it is applied to the range-based labeling schemes.

Keywords: Bit string, dynamic labeling scheme, fractional number, skewed insertion, XML query processing, XML updating.

……..

Investigating Phishing Attacks

Category: Fundamental (A)

Dr. Ali Dehghantanha
Farhood Norouzizadeh Dezfouli and Nur Izura Udzir
Faculty of Computer Science and Information Technology
alid@fsktm.upm.edu.my
03-89471655

This paper presents a summary of recent research on phishing investigation technique by using phoneypot and web bugs. Nowadays, phishing has become rampant issue to the

society and considers as a major threat to society's privacy which costs millions of dollar annually. Today the fighting phishing technique normally involve the approach that only minimize the damage rather than tracking down the phisher. This paper proposes a forensic framework for tracing the phishing agent using phoneypot. It provides the fake information (indistinguishable from real ones) with fingerprint credentials and injected the web bugs to collect the information from phishing agent once it detects phishing agent.

Keywords: Digital forensics, phishing, phishing tracing.

.....

Investigation of Malware Defence and Detection Techniques

Category: Fundamental (A)

Dr. Ali Dehghantanha
Farid Daryaban and Nur Izura Udzir
Faculty of Computer Science and Information Technology
alid@fsktm.upm.edu.my
03-89471655

Malwares are considered as a major threat vector which can be potentially caused huge damage to both network infrastructure as well as network applications. In this paper, different techniques such as repacking, reverse engineering and hex editing for bypassing host-based Anti Virus (AV) signatures are illustrated, and the description and comparison of different channels and methods when malware might reach the host from outside the networks are demonstrated. After that, bypassing HTTP/SSL and SMTP malware defences as channels are discussed. Finally, a new malware detection technique base on honeynet systems is discussed and its strengths and weaknesses were highlighted.

Keywords: Malware defences, bypassing malware, honeynet, anti viruses, penetration testing.

A Framework for Forensic Investigation of Symbian Mobile O.S

Category: Product / Innovation (C)

Dr. Nur Izura Udzir
Ali Dehghantanha, Ramlan Mahmod and Farid Daryabar
Faculty of Computer Science and Information Technology
izura@fsktm.upm.edu.my
03-89471708

We developed a toolkit called Live Symbian Forensic Analyzer which gathers data that cannot be retrieved by forensic tools. Providing the fastest and at the same time the safest way to recover the required items from Symbian OS phones i.e. Nokia E5-00, this toolkit involves minimum interactions with the investigator. Furthermore, provided that the toolkit is signed by Symbian, it is capable to be run on tremendous mobile phone models.

Keywords: Forensic toolkit, Symbian OS, mobile, smartphones

.....

CyberRegs: A Usage Control Model for Academies

Category: Product / Innovation (C)

Dr. Nur Izura Udzir
Ali Dehghantanha, Ramlan Mahmod and Farid Daryabar
Faculty of Computer Science and Information Technology
izura@fsktm.upm.edu.my
03-89471708

We developed a monitoring system called CyberRegs to protect digital intellectual property. This system control the access to academic materials provided at any learning institute and their usage based on user types, individual users, and group users, as well as the time and duration of access.

Keywords: Usage control, intellectual property protection.

STMAD:Semi-automated Tracking of Mitral Annular Displacement

Category: Product / Innovation (C)

Assoc. Prof. Dr. Rahmita Wirza O.K. Rahmat
Faten Abed Ali Dawood,Suhaini Kadiman, Lili Nurliyana Abdullah
and Mohd Zamrin Dimon
Faculty of Computer Science and Information Technology
rahmita@fsktm.upm.edu.my
03-89471704

Mitral annular displacement (MAD) in echocardiography has been described as a variation in the mitral annulus position between the end-diastolic and the end-systolic in a complete cardiac cycle. It can be used as an index of the left ventricle (LV) systolic function. The maximum displacement occurs during a complete cardiac cycle measured in millimetres for each side individually. This invention is based on automatic boundary detection of the LV wall motion. The border detection covers three main steps: first, speckle-noise reduction and image contrast enhancement. Second, extract the region of interest ROI (i.e. the LV myocardial wall) by using a global thresholding technique. Two morphological operators named 'erosion' followed by 'dilation' were used to increase the border detection accuracy. In the third step, Robert's edge detector was used to detect the ROI boundaries. Based on the detected border, the MAD was measured by computing the movement distance in two-consecutive images using the 'Euclidian distance' method. A semi-automatic tracking method was applied to 178 original 4-chamber views of 2D echocardiography images from seven different patients. The experimental results for this invention were compared with results that was obtained by using a tissue motion quantification (TMQ) Advanced plug-in technique using QLAB software (Philips Medical Systems). A qualitative assessment was done by visual observation by two experts in the field and the comparison scores showed that this invention method was 78 % and 85 % more acceptable in terms of representation and reliability respectively. A quantitative assessment was done using the Mann-Whitney test which found no significant difference between the two methods.

Keywords: LV systolic, motion tracking, averaging filter, echocardiography imaging, morphological operators, border detection.

Smart Travel Package Recommendation System

Category: Product / Innovation (C)

Assoc. Prof. Dr. Hamidah Ibrahim
Kwok Siang Kwee, Nurul Husna Mohd Saad, Ali Amer Alwan and Teo Poh Kuang.
Faculty of Computer Science and Information Technology
hamidah@fsktm.upm.edu.my
03-89471713

Smart Travel Package Recommendation System is a web-based application, which is a safe platform design to allow users/tourists to search for travel packages that are under promotion. This system also allows travel agencies to promote their current latest packages promotion. Besides, users/tourists are able to search, view, and give feedbacks on the travel agents'page. The uniqueness of this product compared to other existing systems is that the injection of the Preference Evaluation techniques into this product's searching method (Top-K, Skyline, Top-K Dominating, K-Dominance, and K-Frequency). Each of these techniques has their own specialty in sorting the final results that are based on user preferences. Existing products that utilized traditional searching/recommendation method would be delayed in terms of the processing time in providing the information needed and users in today's fast-paced world would find this aspect unattractive and this would lead to frustration in users using the search engines. In addition, most of the existing search engines/ information recommendation systems would recommend information that is not personally relevant since their searching/recommendation method is based on keywords or indexing methods instead of the preferences and needs of users. Furthermore, the information extracted during searching/recommendation is typically ranked inappropriately, and no data analysis is performed on the information thus misleading users in making the final decision. Meanwhile, from the perspective of the data owners, this is such a hindrance to their business too since the traditional searching method would rank the search result based on the hit counter of a web page. This would mean that web pages that have low hit counter would be listed at the bottom (or worse, not listed at all) of the search results page, even if the web page might have a chance of being what the user actually wanted.

Keywords: Information recommendation system, preference evaluation techniques, data management, travel packages.

A System Dynamics Approach to Assess Impacts of Personnel Factors on Delayed Software Projects

Category: Product / Innovation (C)

Dr. Yusmadi Yah Jusoh
Mostafa Farshchi
Faculty of Computer Science and Information Technology
yusmadi@fsktm.upm.edu.my
03-89471760

Delay in a software project may result in the loss of a market opportunity or the postponement of a dependent project. Therefore, software project managers take various steps to ensure that their project is completed on time, such as adding new members to the project team. However, adding new manpower to a delayed project may cause a negative impact on the team's productivity due to assimilation time, training overhead and communication overhead. Consequently, project managers have difficulty in making the decision on whether or not to add new members to the team. Thus, this research aims to examine whether a significant schedule improvement can be achieved with consideration of the new manpower's capabilities, skills and experience. A System Dynamics Model is proposed to simulate the behaviour of a project's progress when new members are added. The proposed model was evaluated through experiments using two types of case studies. The results of the experiments indicate that a significant schedule improvement of a late project can be achieved if people with certain levels of personnel factors are added to the project.

Keywords: Software project management, personnel factors, system dynamics, schedule delay.

PRPI 2012

UPM's Research & Innovation

FACULTY OF BIOTECHNOLOGY AND BIOMOLECULAR SCIENCES

In Vitro and *In Vivo* Antioxidant Activity of Spray Dried Vernonia Amygdalina Water Extract

Category: Applied Research (B)

Assoc. Prof. Dr. Noorjahan Banu Mohamed Alitheen
Yeap Swee Keong , Ho Wan Yong , Liang Woon San, Beh Boon Kee,
Kristeen Teo Ye Wen and Nurul Elyani Mohamad
Faculty of Biotechnology and Biomolecular Sciences
noorjahan@biotech.upm.edu.my
03-89467471

Vernonia amygdalina. Del has been widely consumed as an herb to treat various diseases including hyperglycemia and cancers. The plant is widely available and can be easily cultivated. Hence, the cost for obtaining extract from the plant is relatively low. In this study, we prepared the *V. amygdalina* extract through water extraction followed by spray-drying, which is an approach widely used in commercial herbal preparation. Then, the *in vitro* and *in vivo* antioxidant activity of the spray dried water extract were quantified using DPPH radical scavenging assay, superoxide dismutase (SOD) assay, malondialdehyde (MDA) measurement and total antioxidant capacity (TAOC) assay. DPPH assay showed that *V. amygdalina* spray dried water extract was a moderate antioxidant agent in comparison to vitamin C. In the in vivo tests, increased SOD and TAOC amount and reduced MDA levels were observed in the organs and blood of the animals treated with the extract. It was concluded that V. amygdalina spray dried water extract is a potential antioxidant agent that can protect cells in the organ from oxidation stress. Nevertheless, apart from playing a role in the defense against diseases related to oxidative stress such as cancers, cardiovascular and neurodegenerative diseases, antioxidants also take part in promoting anti-aging effect. At such, this herbal extract could be commercialized as a health supplement not only for enhancing one's health against diseases, but could be also benefited for delaying the aging process.

Keywords: Antioxidant, *in vivo*, *Vernonia amygdalina*

Newcastle Disease Virus Activated Human Peripheral Blood Mononuclear Cells-A Potential Immunoregulatory Agent For Human Breast Cancer Therapy

Category: Applied Research (B)

Assoc. Prof. Dr. Noorjahan Banu Mohamed Alitheen
Lam Han Yuen , Yeap Swee Keong , Khatijah Yusoff, Suraini Abdul Aziz,
Abdul Rahman Omar, Beh Boon Kee and Tamilselvan Subramani
Faculty of Biotechnology and Biomolecular Sciences
noorjahan@biotech.upm.edu.my
03-89467471

Newcastle disease virus (NDV) has been discovered for its oncolytic activity on human tumor cells. The aim of this study is to examine the in vitro immunomodulatory effects of NDV strain AF2240 on human peripheral blood mononuclear cells (PBMC) proliferation, cytokines production and cytolytic effect on tumor cells. In this study, low titers of NDV (8 and 2 HAU) were observed to stimulate the proliferation of human peripheral blood mononuclear cells. Furthermore, NDV was also found to enhance the expression of intracellular cytolytic mediator proteins (including perforin and granzyme B) and anticancer cytokines such as interferon-gamma, interleukin-2 and interleukin-12. The results from 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyl tetrazolium bromide assay clearly demonstrated that the activated human PBMC exerted efficient cytolytic activity towards human breast tumor cell line MCF-7. Based on the findings that human PBMCs could be immunologically activated upon exposure to NDV; and that these activated cells display enhanced cytolysis effect towards tumor cells, a patent has been filed on the immunoregulatory effect of NDV on human lymphocytes and its potential to target breast tumor cell death. Thus, we concluded that NDV is a potential immunotherapeutic agent against human breast tumor cells. In future, this virus can be potently incorporated into the development and commercialization of immunotherapeutic biologics as a new option for cancer treatment.

Keywords: Newcastle disease virus (NDV), AF2240, immunoregulation, PBMC, human breast cancer cell line

A Novel Construct of T1 Lipase For Effective Purification

Category: Applied Research (B)

Prof. Dr. Raja Noor Zaliha Raja Abd. Rahman
Che Haznie Ayu Che Hussian, Abu Bakar Salleh, Adam Leow Thean Chor,
Mohd Shukuri Mohamad Ali, Mahiran Basri
Faculty of Biotechnology and Biomolecular Sciences
rnzaliha@biotech.upm.edu.my
03-89460708

The present invention relates to method to substitute second step affinity chromatography with ion exchange chromatography by site-directed mutagenesis at downstream region of GST sequences (H215R and G213R). This is to enable to differentiate the isoelectric point (pI) value of GST from the pI value of matured T1 lipase. Also, by obtaining a new construct, new T1 lipase from the above methods, the new construct and T1 lipase was purified using two chromatography steps affinity and ion exchange chromatography. Thus, as mentioned above, the said method provides an advantage to limit or eliminate the second affinity chromatography step. Previous purification strategy of T1 lipase has been greatly established using two steps of affinity chromatographies. The first affinity chromatography was performed to capture GST fusion lipase present in the crude extract, while the second affinity chromatography was performed to separate cleaved GST and matured T1 lipase. The second affinity chromatography was performed because GST and matured T1 lipase cannot be separated through ion exchange chromatography due to their close pI values. Therefore, the idea is to substitute the second affinity chromatography with an ion exchange chromatography was obtained. To do this, the pI value of GST tag is changed by molecular modification. When pI value of matured T1 lipase and GST are different, they can be separated through ion exchange chromatography. The present invention has created opportunity to produce T1 lipase with lower cost and shorten the time

Keywords: *E.coli*, lipase, isoelectric point (pI), site-directed mutagenesis, purification

Establishment of a Chromatographic Finger Printing as a Rapid and Sensitive Method to Trace the Monacolins in Monascus Purpureus Fermented Product

Category: Fundamental (A)

Prof. Dr. Arbakariya Ariff
Zahra Ajdari, Musaalbakri Abdul Manan, Afshin Ebrahimpour, Rosfarizan Mohamad and Muhajir Hamid
Faculty of Biotechnology and Biomolecular Sciences
arbarif@biotech.upm.edu.my
03-89471048

Red fermented rice (RFR) is unique Chinese traditional fermented cooked rice with Monascus spp. With no doubts Monascus spp. is one of the rare fungi with extraordinary ability to produce comprehensive range of secondary metabolites those are mostly useful in human life. However, RFR has been reputed as hypocholesterolemic supplement due to its monacolins production. RFR consumption has been grown nearly 80% from 2005 to 2008 in the United States, with sales of $20 million in 2008. Since the red fermented rice has not been approved as medicament by the Food and Drug Administration (FAD), the physicians have limitation to suggest this product and guide the patients to use it. In this regards, the proper information about the natural supplements that is given by producers is very important. Therefore, quality and quantity control for standardization of these supplements would be done much more simple, rapid and more acquiret, by improving of analyzing instrument. Chromatographic profiling could provide the images of chemical components including not only marker compounds but also other actives or potentially bioactive, even toxic constituents according to individual properties of each compound. In this study, we introduced a new established rapid and sensitive method to identify and quantify monacolins based on its individual properties by liquid chromatography and mass spectrometry. Results of this study have demonstrated that Monacolins lactonization was found to be the important property of monacolins that can be used to solve the problem of false-positive results in monacolin identification and quantification using LC/PDA/MS.

Keywords: Chromatographic finger printing, Lactonization, LC/PDA/MS, Monascus purpureus, monacolins, red yeast rice

Immunogenicity of a Truncated Enterovirus 71 VP1 Protein Fused to a Newcastle Disease Virus Nucleocapsid Protein Fragment in Mice

Category: Fundamental (A)

Assoc. Prof. Dr. Norazizah Shafee
Wei-Choong Ch'ng and Khatijah Yusoff
Faculty of Biotechnology and Biomolecular Sciences
nshafee@biotech.upm.edu.my
03-89466719

Enterovirus 71 (EV71) is one of the viruses that cause hand, foot and mouth disease. Its viral capsid protein 1 (VP1), which contains many neutralization epitopes, is an ideal target for vaccine development. Recently, we reported the induction of a strong immune response in rabbits to a truncated VP1 fragment (Nt-VP1t) displayed on a recombinant Newcastle disease virus (NDV) capsid protein. Protective efficacy of this vaccine, however, can only be tested in mice, since all EV71 animal models thus far were developed in mouse systems. In this study, we evaluated the type of immune responses against the protein developed by adult BALB/c mice. Nt-VP1t protein induced high levels of VP1 IgG antibody production in mice. Purified VP1 antigen stimulated activation, proliferation and differentiation of splenocytes harvested from these mice. They also produced significant levels of IFN-?, a Th1-related cytokine. Taken together, Nt-VP1t protein is a potent immunogen in adult mice and our findings provide the data needed for testing of its protective efficacy in mouse models of EV71 infections.

Keywords: Enterovirus 71, recombinant VP1 protein, immunogenicity

PRPI 2012

UPM's Research & Innovation

FACULTY OF ENVIRONMENTAL STUDIES

The Economic Impact of Climate Change on the Rice Production in Malaysia

Applied Research (B)

Prof. Mad Nasir Shamsudin
Negin Vaghefi, Ahmad Makmom and Milad Bagheri
Faculty of Environmental Studies
mns@putra.upm.edu.my
03-89474801

This study attempts to estimate the potential impact of climate change on the rice production in Malaysia. The crop model ORYZA 2000 was used to simulate rice yield of MR 219 variety in eight granary areas of Malaysia from 1999-2007. The model predicted a reduction in rice yield of 0.36 tonne per hectare under the scenario of an increase in temperature by 2°C and at the current CO_2 level of 383 ppm. With the reduction in rice yield, the economic loss to the Malaysian rice industry was estimated at RM162.531 million per year. Under the scenario of increase of CO_2 concentration from 383 to 574 ppm and with 2°C rise in temperature, the reduction in yield will be 0.69 tonne per hectare. Consequently the economic loss will be at RM299.145 million per year for the rice industry. With the above potential impacts, some adaptation and mitigation strategies to overcome the adverse effects of climate change on rice production were recommended.

Keywords: Economic impacts, climate change, carbon dioxide, temperature, rice production

……..

Forest Soil Response to Anthropogenic Nitrogen Deposition at Ayer Hitam Forest Reserve, Puchong, Malaysia

Fundamental (A)

Prof. Dr. Mohamad Pauzi Zakaria
Negin Vaghefi, Ahmad Makmom and Milad Bagheri
Faculty of Environmental Studies
mpauzi@env.upm.edu.my
03-89466764

Forest decline resulting from long term elevated nitrogen deposition has been investigated extensively for the past decades in Europe and China (in Asia). In Malaysia, such investigations are not well documented. The level of emissions together with the climatic conditions (hot and humid) in the country renders forest ecosystems susceptible to the adverse effects of anthropogenic nitrogen deposition. This research uses the soil response

to nitrogen deposition through soil solution chemistry to determine the impact of nitrogen deposition at the Ayer Hitam Forest Reserve in Puchong. Soil samples collected at a depth of 20 cm at different compartments were analyzed for NO_3-N, NH_4-N, Al, Ca, Mg, K and pH. The result showed that all the soil samples are acidic (pH = 3.61 - 4.89) and there is enhanced levels in free Al in the soil resulting from the acidic nature of the soil. These levels of free Al are within the range that can be toxic to the plants (> 200 mmol/m^3). Furthermore, the level of nitrogen (as nitrate) in the soil is below limits that can be critical to forest productivity (< 100 mmol/m^3). Also, the result shows that the forest is not saturated with respect to nitrogen and that nitrogen contributes to a relatively limited extent to soil acidity. This research can provide baseline information for future studies to produce a definitive conclusion as the status of the forest with regard to the potential threat that may result from nutrient imbalance in the soil.

Keywords: Elevated nitrogen deposition, forest ecosystem, soil response, free aluminium, nutrient imbalance

……..

Land use Suitability Analysis Using Multi Criteria Decision Analysis Method for Coastal Management and Planning: A Case Study of Malaysia

Applied Research (B)

Assoc. Prof. Dr. Wan Nor Azmin Sulaiman
Milad Baghei Ghadikolaei and Negin Vaghefi
Faculty of Environmental Studies
milad.bagheri.gh@gmail.com
03-89466751

There is an urgent need to evaluate the land use suitability in coastal area because of increasing population; providing place for naturally protective coastal ecosystem; and improving cumulative impacts. This paper presents an application of Multi Criteria Decision Analysis Technique as an approach to deal with regional coastal management and planning. Analytical Hierarchy process (AHP) technique has been used to obtain preference weights of land use suitability criteria in a study area located in Marang region in Malaysia. AHP technique is a useful tool to deal with the problem to design the alternatives which optimize the objectives. Furthermore, this technique can be used by researchers to make a precise decision and acceptable personal judgements together with expert knowledge.

Keywords: Multi Criteria Decision Analysis (MCDA), Analytical Hierarchy Process (AHP), land-use suitability analysis, coastal planning

Applications of Cation Exchange Capacity and Loss on Ignition as an Indicator of Potential Metal Accumulation in Sediment

Fundamental (A)

Dr. Ahmad Zaharin Aris
Nur Aliaa Shafie and Nadzhratul Husna Ahmad Puad
Faculty of Environmental Studies
zaharin@env.upm.edu.my
03-89467455

An exploratory study was carried out at 22 sampling stations along the Langat River, Selangor in attempt to identify the leading factors that influence the level of heavy metals accumulation in the sediment (0-5cm). Total metals (Pb, Cd, Cu, Zn), pH, Eh, salinity, electrical conductivity, LOI and CEC were determined. The characteristic of the sediment shows that pH (3.09 - 7.46), salinity (0.02 - 10.71 ppt), EC (3.39- 517 µS/cm), Eh (-16.20 - 253.10 mV), CEC (2.71 - 67.82 meq/100g) and LOI (0.62 - 17.90 %) were substantially high in variation. Meanwhile the total metals recorded LA 1, LA 8, LA 10, LA 11 and LA 12 as being highly accumulated by Cd, Zn and Pb. This study revealed that LOI unveiled strong significant correlation with Ca, Mg, K and Na at $p < 0.01$ where the Ca and Mg were ideally controlled by organic matter contents whereas exchangeable Na and K were substantially influenced by salinity. Unfortunately, CEC and LOI does not apprehend strong significant correlation with all the metals whilst only Cd exhibited weak correlation with both CEC and LOI where $r=0.375$, $r=0.430$ at $p<0.01$. Therefore, understanding the characteristics and features of sediment and heavy metals is crucial in order to scrutinize the factors that significantly influence the heavy metal binding which soon relates to the sources and pollution magnitude in the sediment.

Keywords: Sediment, heavy metals, cation exchange capacity, loss on ignition

Ionic Ratios in Delineating the Hydrogeochemistry Mechanisms

Fundamental (A)

Dr. Ahmad Zaharin Aris
Noorain Mohd Isa and Ahmad Zaharin Aris
Faculty of Environmental Studies
zaharin@env.upm.edu.my
03-89467455

Kapas Island in Terengganu, Malaysia, is characterized as a small, unique island where depends on groundwater as their primary freshwater resources. Hydrochemical studies were carried out in the island with the objective of identifying the influence of seawater on the chemical composition of groundwater in Kapas Island via ionic ratios. From the calculated ionic ratios, the Na/Cl ratios ranged from 0.5-2.86, implying that the fresh groundwater in Kapas Island was affected by the mixing processes. Values close to seawater ratio indicate a recent mixing of seawater into the aquifer. In addition, the groundwater composition changed from Ca-rich to Na-rich are explained mostly by mixing and cation exchange processes. The chemical processes above indicate interference detected in the aquifer system but so far not related to seawater intrusion. The findings showed that even though the Kapas Island aquifer is surrounded by seawater and is vulnerable to seawater intrusion attributed to its physical characteristics, it is also affected by human activity related to groundwater abstraction. The preliminary database of this paper gives advantages to future researches and statutory body as a preface database to designate and overcomes problems related to fresh groundwater consumption in small islands.

Keywords: Aquifer, groundwater, hydrochemical, Kapas Island, major ions

PRPI 2012

UPM's Research & Innovation

FACULTY OF AGRICULTURE AND FOOD SCIENCES

Indigenous Paecilomyces Lilacinus with Antagonistic Activity against Meloidogyne Incognita

Category: Applied Research (B)

Dr. Wong Sing King
Pau Chen Guan, Leong Chan Teck and Osumanu Haruna Ahmed
Faculty of Agriculture and Food Sciences
wongsk@btu.upm.edu.my
08-6855225

Black pepper is one of the most important commercial crops in Sarawak. However, the industry is threatened by the infestation of root-knot nematodes (RKN) which are widely spread in the soil. This study aimed to identify the potential biological control agent against RKN. Ten indigenous isolates of Paecilomyces lilacinus (PL), were isolated from two black pepper farms in Sarawak heavily infested with RKN as an initiative to control RKN problem. All isolates showed varying degree in colonizing female nematodes. In the female nematode bioassay on water agar, both indigenous strains of PL namely PLA, PLB, and a commercial strain as positive control demonstrated highly significant colonization (>90%, P 0.01) on female. In egg parasitism test, spore suspension (1 x 10^5 spore/mL) of the strains PLA, PLB and PLM exhibited 78.8%, 66.0% and 73.4% parasitism on eggs, respectively. Meanwhile, hatching of nematode eggs incubated in spore suspension of PLA, PLB and PLM for seven days were significantly reduced; 88-89% of eggs were hatch-inhibited as compared to control (26%). This illustrated both local isolates, PLA and PLB are comparable with the commercial strain as biological control agents for managing RKN infestation on black pepper vines.

Keywords: Black pepper; Meloidogyne incognita; Paecilomyces lilacinus; Biocontrol; Antagonistic; Root-knot nematodes

Diversity of Seaweed from Bintulu Coastal Water

Category: Fundamental (A)

Dr. Mohd Hanafi Idris
Mohd Hafizbillah, Wong Sing King and Abu Hena Mustafa Kamal
Faculty of Agriculture and Food Sciences
mhanafi@btu.upm.edu.my
08-6855209

Seaweeds are the renewable natural resources and potentially have been used in food production, pharmaceutical and application in industrial recently. A study of seaweed on coastal area was carried out around Pantai Tanjung Batu, Pantai Telekom, Golden Beach, Kuala Similajau, Kuala Nyalau and Batu mandi at Bintulu area during the low tide. A species diversity and composition was recorded based on the NAGISA Protocols. A total 54 species were recorded from study areas belonging to Rhodophyta (22 species) followed by Pheophyta (17 species) and Chlorophyta (15 species). Dominant species were Chaetomorpha sp., Enteromorpha compressa, Padina minor, Padina australis, Gracilaria salicornia, Hydropuntia edulis, Hypnea cervicornis, Hypnea spicifera, Acanthopora spicifera, Laurencia sp., Laurencia papillosa and Laurencia similis. Rocky shore area highly with biological diversity for seaweed growth and inhibit where solid rock predominant suitable for attachment as substrate for seaweed in their ecology and sunlight for photosynthesis process. These nature sources highly potential for industrial and recently been culture in both outdoor and indoor culture systems regarding to sustainable of seaweed sources for maintain the ecology and diversity in marine biology.

Keywords: Seaweeds, rocky shore, ecology, potential, sustainable

.....

Effects of Deforestation on Soil Major Macro-Nutrient and Other Selected Chemical Properties of Secondary Tropical Peat Swamp Forest

Category: Fundamental (A)

Assoc. Prof. Dr. Seca Gandaseca
Muhamad Ismawi Salimin, Osumanu Haruna Ahmed and Nik Muhamad Ab Majid
Faculty of Agriculture and Food Sciences
seca@btu.upm.edu.my
08-6855473

Development of agriculture and economic sector has become a subject to the current deforestation of tropical wetland region. The aim of the present study was to investigate the effect of deforestation on secondary tropical peat swamp forest (TPSF) by comparing macro-nutrients and others selected peat soil chemical properties of secondary TPSF and

deforested secondary TPSF site. Peat soil samples were collected from two different plots at Batang Igan, Sibu, Sarawak, Malaysia. The plots were secondary TPSF where this area has been logged, but has not been cleared, while the other plot was clearing area where the forest has been cleared for agriculture. Sixteen soil samples were taken in each plot at a depth of 0 to 15 cm. All samples were taken randomly using peat auger. The samples were air dried and ground to pass through a 2 mm sieve. Soil pH was determined in water and potassium chloride (KCl) at ratio 1:2.5 using a pH meter. The loss on ignition method was used to determine soil organic matter and total carbon. Soil cation-exchange capacity (CEC) was determined by the leaching method. Total nitrogen was determined by the Kjeldahl method. The total phosphorus (TP) and total potassium (TK) were extracted by the aqua regia method followed by the blue method to determine TP, and TK was measured using atomic absorption spectrophotometer. pHwater, soil CEC, soil organic matter, total C, total P, total K and C/N ratio were significantly higher in secondary TPSF when compared with deforested secondary TPSF, while the pHKCl and C/P ratio content was statistically higher for deforested secondary TPSF. Deforestation of secondary TPSF significantly decreased soil pHwater, CEC, SOM, total C, total N, total P, total K and C/N ratio, but significantly increased soil pHKCl and C/P ratio.

Keywords: Peat swamp forest, soil acidity, soil organic matter, total carbon, total nitrogen, total phosphorus,total potassium, C/N and C/P ratio.

……..

Aboveground Biomass Production of Rhizophora apiculata Blume in Sarawak Mangrove Forest

Category: Fundamental (A)

Assoc. Prof. Dr. Seca Gandaseca
Chandra Iman Arianto and Abu Hena Mustafa Kamal
Faculty of Agriculture and Food Sciences
seca@btu.upm.edu.my
08-6855473

Mangrove forests are found in tropical and subtropical coastal tidal regions. Rhizophora apiculata Blume is one of the most important species in mangrove forest. It is also one of the commercial mangrove timber species in Asia-Pacific region which dominates large areas of mangrove in this region. In order to understand forest ecosystem characteristics and to establish the proper management system, a precise estimation of biomass is necessary. The objective of this study is to quantify the aboveground biomass production and stem volume of R. apiculata in Awat-Awat mangrove forest, Sarawak. Approach: Seven representative trees were used in this study for sampling from February 2011 to March 2011. Allometric relationships were examined using either independent variable Diameter (D) or combination of quadratic of D and Height (D2H). Results: The best fit

of allometric equations were developed from the combination of quadratic of D and H (y = 0.055Â´0.948, R2 = 0.98) which is more recommended to estimate biomass and stem volume of R. apiculata in Awat-Awat mangrove forest, Sarawak. Total aboveground biomass and stem volume of R. apiculata were 116.79 t h-1 and 65.55 m3 h-1, respectively. Conclusion: Aboveground biomass and stem volume is closely related with tree diameter and height which indicates that aboveground biomass and stem volume will increase with increasing diameter and height of R. apiculata.

Keywords: Aboveground biomass, allometric equation, Rhizophora apiculata, mangrove forest, commercial mangrove, timber species, expensive since, forest ecosystem, aboveground biomass

……..

Natural Food Availability and Food Selection Preference of Tiger Shrimp *Penaeus monodon* in Aquaculture Pond

Category: Fundamental (A)

Dr. Abu Hena Mustafa Kamal
Hishamuddin Omar and Misir Kusnan
Faculty of Agriculture and Food Sciences
hena@btu.upm.edu.my
03-89474891

The investigation of food and food selection preferred by different sizes (PL15 to adult) of black tiger shrimp, Penaeus monodon Fabricius 1798, was carried out in tropical aquaculture ponds. Post larvae (15.2 ± 3.5 mm) and juveniles (65.2 ± 5.9 mm) foregut contains detritus (unidentified materials) followed by diatoms (Pleurosigma sp., Navicula sp., Nitzchia sp. and Cosinodiscus sp.), crustacea and insecta. The subadult (86.4 ± 8.9 mm) and adult (132.0 ± 12.8 mm) shrimp feed on detritus, crustacea, mollusca, annelida, rotifera, insecta and phytoplankton. However, it was found that the food selection preference of P. monodon is dependent on the availability of food items in the pond bottom. The tendency to prefer natural food by shrimps was observed when the food was available. The benthic organisms declined at the end of the culture period indicating that the culture species, that is, shrimps preyed on them as living or dead food along with artificial diets and detritus. Shrimps are detritivorous when benthic organisms are scarce. This fact shows that benthic detritus is considered a good food supplement for shrimps since it consists of cellulose, lignin, protein, starch, fats waxes and oils.

Keywords: Aquaculture, natural food, *Penaeus monodon*, Malaysia

PRPI 2012

UPM's Research & Innovation

INSTITUTE OF BIOSCIENCE

Mitigation of Ruminant Methane Production by Condensed Tannins of Leucaena

Category: Applied Research (B)

Prof. Dr. Ho Yin Wan
Tan Hui Yin, Sieo Chin Chin, Norhani Abdullah and Liang Juan Boo
Institute of Bioscience
ywho@ibs.upm.edu.my
03-89472161

Methane is the second most important greenhouse gas that contributes to global warming and climate change. It has a heat trapping potential 23 times that of carbon dioxide. Methane production from livestock, predominantly ruminants, accounts to about one-third of global anthropogenic methane production. Methane production during ruminal fermentation also contributes to a loss of feed energy of up to 12%. Thus, mitigation of methane production by ruminants not only reduces greenhouse gas emission but also improves feed efficiency. In this study, we extracted a natural compound, consisting of condensed tannins, from young shoots and leaves of Leucaena leucocephala hybrid-Rendang, and investigated its effects on methane mitigation, rumen fermentation parameters such as pH, dry matter (DM) digestibility, nitrogen degradability and volatile fatty acid production, as well as molecular diversities and populations of methanogens and protozoa which are involved in methane production in the rumen. The in vitro gas production test was used in the investigation as it provides data on fermentation parameters of feed with a high correlation to its in vivo base. The results showed that the condensed tannin extract, at a relatively low level of 40 mg/g DM could reduce methane production by 57% without negatively affecting DM digestibility, nitrogen degradability and other rumen parameters. Total populations of methanogens and protozoa were also reduced by about 30 and 60 %, respectively, and molecular diversities of methanogens in the orders Methanomicrobiales and Methanobacteriales were reduced by 15 and 7%, respectively, while protozoa in the genera Ostracodinium and Anodiplodinium were reduced by 5 and 3%, respectively, and those in the genus Entodinium increased by 11%. The findings of the study indicated that condensed tannins at 40 mg/g DM has the potential to be used as a feed supplement to reduce methane production in ruminants, without adversely affecting rumen fermentation parameters.

Keywords: Methane mitigation, ruminal methane production, condensed tannins, Leucaena leucocephala hybrid

Defatted Kenaf Seed Meal (DKSM): Prospective Edible Flour from Agricultural Waste with High Nutritive Values and Antioxidant Activity

Category: Applied Research (B)

Mr. Chan Kim Wei
Nicholas Khong Mun Hoe, Shahid Iqbal and Maznah Ismail
Institute of Bioscience
chankw@ibs.upm.edu.my
03-89472145

Kenaf (Hibiscus cannabinus L.) seeds are primary by-product of kenaf plantation. Recently, kenaf seed oil has been proposed as a new source of functional edible oil with promising antioxidant activity and anticancer properties. As kenaf seed only contains approximately 20% oil, massive extraction of kenaf seed oil will eventually result in the production defatted kenaf seed meal (DKSM) in considerably large quantity. DKSM is potentially used as an alternative and new emerging source of functional food ingredient. Our studies show that DKSM is high in protein (26.19%) and carbohydrate (57.09%), accompanied with magnesium, potassium and phosphorus as the major dietary minerals (> 1%) within. On the aspect of nutraceutical values, DKSM exhibited appreciably higher total phenolic content (3399.37 ?g GAE/g defatted material), total flavonoid content (251.00 ?g RE/g defatted material) and antioxidant activity as compared to several tested commercial edible flours (wheat, rice and sweet potato). Gallic acid, (+)-catechin, 4-hydroxybenzoic acid, vanillic acid and syringic acid were found to be the predominant phenolics in DKSM. Acute toxicity study indicated that DKSM is safe for oral consumption and did not demonstrate any adverse toxic reactions to the rats at the dosage as high as 2000 mg/ kg body weight. On the basis of our studies, DKSM is prospectively commercialized as a safe, highly antioxidative and nutritive edible flour/ ingredient for value-added nutraceutical and functional food products, which could create health, wealth and reputation to the community and nation. Since DKSM is a low-cost secondary agricultural by-product, optimal utilization of DKSM as novel functional food ingredient could significantly reduce the costs for agricultural waste disposal and production of nutraceutical and functional food products.

Keywords: Defatted kenaf seed meal, Hibiscus cannabinus L.,phenolic compounds, antioxidant activity, nutritive edible flour,functional food ingredient, acute toxicity

Anti-Aggregation Effects of Thymoquinone against Alzheimer Beta-Amyloid Peptide

Category: Applied Research (B)

Ms. Norsharina Ismail
Maznah Ismail, Shahid Iqbal and Latiffah A. Latiff
Institute of Bioscience
norsharina@ibs.upm.edu.my
03-89472194

Anti-Aggregation Effects Of Thymoquinone Against Alzheimer's Beta-Amyloid Peptide Alzheimer's disease (AD) is ranked among the major causes of dementia among the elderly population. The main pathological hallmark of AD is senile plaques containing its major constituent, Aβ peptide with 39-43 amino acids, by-product of amyloid precursor protein in the neurons. Aβ peptide has been reported to be neurotoxic to neuronal primary culture and cell lines due to aggregation of Aβ in the forms of oligomers, protofibrils and fibrils, hence has been identified as one of the major causes of neurodegenerative processes in AD. Despite recent improvements in the symptomatic therapy of cholinergic drugs; development of an effective therapeutic approach, which may interfere directly with Aβ aggregation in the central nervous system, is desperately required. Thymoquinone (TQ) is a bioactive compound identified from Nigella sativa, which has been reported to possess various pharmacological attributes. But, no report describing the inhibition potential of TQ for Aβ fibril formation and aggregation has been presented so far. In view of the fact that increasing number of people, across the globe, are switching towards use of herbal medicines as supplements for treatment of different diseases, it would be of immense significance to explore the potential of a well documented plant based bioactive compound or herbal medicine as a neuroprotective agent. Our study found that TQ, co-incubated with Aβ1-40, reduced the numbers of fibrils in some degree with shorter fibrils and small amorphous aggregates. Furthermore, pretreated TQ protected cytotoxic effects of Aβ1-40 on primary cultured cerebellar granule neurons. Therefore, TQ might have a direct interaction with Aβ resulting in prevention of Aβ aggregation and mediating its neuroprotective effects; thus may have potential in future therapeutic development of AD.

Keywords: Anti-aggregation of beta amyloid,alzheimer's disease,thymoquinone,neurop rotective

In Vitro Antiproliferative Effect of the Inclusion Complex of Zerumbone with Hydroxylpropyl-β-Cyclodextrin on Liver Cancer Cell Line, Hepg2

Category: Applied Research (B)

Dr. Ahmad Bustamam Abdul
Nabilah Muhammad Nadzri, Eltayeb E. M.Eid, Siddig Ibrahim Abdelwahab, Mohd Aspollah Sukari, Theebaa Anasamy, Behnam Kamalidehghan, Syam Mohan, Suvitha Syam and Ng Kuan Beng
Institute of Bioscience
ahmadbstmm@yahoo.com
03-89472339

Zingiber zerumbet Smith locally known as 'lempoyang' wild ginger belongs to Zingiberaceae family. Scientific research towards Z. zerumbet proved that it contained a suppressive effect which was conducted by a bioactive compound, zerumbone (ZER), a crystalline sesquiterpene. The purpose of encapsulation of the ZER with hydroxylpropyl-?-cyclodextrin (HP?CD) is to enhance the solubility of ZER in water and make it highly tolerated by the human body. The objective of this study is to investigate the anti-tumor activities of the inclusion complex of ZER with HP?CD towards the HepG2 liver cancer cells. The MTT assay showed that the inclusion complex increased cytotoxicity in a time-dependent manner. The morphology tests using phase-contrast inverted microscope and AO/PI double staining showed the ultra-structural changes associated with apoptosis. HepG2 treated with the inclusion complex of ZER with HP?CD also resulted in increasing of apoptotic cells and the increment of G2 phase in 24 hours following with the decrement of G2 phase after 48 and 72 hours. Treatment with the inclusion complex also results in increased total nuclear intensity, increased cell permeability, loss of mitochondrial membrane potential and cytochrome c release as observed in high content screening assay. Increasing of Bax, Bid, caspase-3 and decreasing of Bcl-2 were shown in RayBioÂ® Human Apoptosis Antibody Array assay. These results proved that the highly soluble inclusion complex of ZER with HP?CD induce apoptosis programmed cell death in HepG2 and further investigations for this complex is needed to promote it for use as an anticancer drug against hepatocellular carcinoma.

Keywords: Anti liver cancer, Zerumbone, Zingiber zerumbet, Cytotoxicity

Circular RNA TFO as Antiviral Therapy Against Feline Infectious Peritonitis Virus

Category: Applied Research (B)

Dr. Abdul Rahman Omar
Bimo A. Tejo and Choong Oi Kuan
Institute of Bioscience
aro@ibs.upm.edu.my
03-89472111

Feline infectious peritonitis virus (FIPV) is a feline coronavirus (FCoV) which causes a fatal disease called feline infectious peritonitis (FIP) in cats. It is estimated that at least 50 % of cats in the world are infected with this fatal disease. Current antiviral therapies are not effective to control the fatal progression of the disease. Furthermore, various vaccines that have been developed are ineffective to control FIP in cats. RNA based molecular therapy such as siRNA, miRNA and RNA aptamers have been studied against various infectious diseases and cancers. Little is known on the potential of Triple Helix-Forming Oligonucleotide (TFO) RNA as anti-viral therapy. Hence, TFO based RNA therapy is chosen as a molecular therapy to inhibit FIPV replication. Five sets of FIPV specific circular RNA TFO (TFO1 to TFO5) targeting the selected regions of virulent FIPV were designed and tested in vitro. The antiviral effect of circular RNA TFOs was determined using cell culture and qRT-PCR assays. The results showed that all the circular RNA TFO, except for TFO2 RNA, significantly inhibit FIPV replication by reducing the viral RNA copy numbers up to 100,000 fold compared to control cells. In addition, the interaction of the circular RNA TFO with the targeted viral segment was confirmed using nanoITC analysis. Circular RNA TFO with antiviral activity showed strong binding kinetics with a Kd of ~ 0.1?M. Also, the antiviral effect of the circular RNA TFO therapy was found to be far more superior compared to the recently developed siRNA therapy against FIPV replication. The specificity of the antiviral effects was also confirmed by qRT-PCR and nanoITC assays, where linear or unrelated circular RNA TFO failed to show any antiviral effects towards the virus. In conclusion, circular RNA TFO has huge potential as an antiviral agent against FIPV infection in cats.

Keywords: Feline infectious peritonitis virus, triple helix-forming oligonucleotide, circular RNA TFO

Formation and Physicochemical Characterization of Glyphosate-Laden Nanoemulsion for Herbicide Application

Category: Applied Research (B)

Prof. Dr. Mahiran Basri
Lim Chaw Jiang, Dzolkhifli Omar, Mohd. Basyaruddin Abdul Rahman, Abu Bakar Salleh and Raja Noor Zaliha Raja Abdul Rahman
Institute of Bioscience
mahiran@science.upm.edu.my
03-89467266

An environmentally friendly nano-emulsion system was developed for application of water-soluble herbicide active, glyphosate isopropylamine (IPA). A stable pre-formulation consisting of an emulsion system of fatty acid methyl esters (FAMEs)/alkylpolyglucosides (APG) and organosilicone/water was selected from isotropic region in the phase diagram. Upon dispersion of the pre-formulation with water dilution using low-energy stirring (200 rpm for 5 min), the nano-emulsion system was formed with the particles size of less than 200nm. Lower surface tension values of the nano-emulsion formulation (< 30mN/m) were obtained than commercial Roundup® (47.8mN/m). The nano-emulsion formulation showed lower effective dose of ED50 (0.40 kg a.e./ha) in controlling the weed goosegrass (Eleusine indica) than Roundup® (0.48 kg a.e./ha). The nano-emulsion particles were found to incorporate well with the glyphosate IPA thus inferring that it could ameliorate the bioactivity and bioavailability of the herbicide. This finding suggested that the use of nano-emulsion system could increase penetration and uptake of the glyphosate IPA. This nano-emulsion formulation was high kinetically stable, easy in application, enhanced bioefficacy and economically viable.

Keywords: Nano-emulsion, glyphosate isopropylamine, alkylpolyglucosides, pesticide formulation, low-energy emulsification

Palm-Based Esters Nanoemulsions System containing Ibuprofen for Topical Drug Delivery

Category: Applied Research (B)

Prof. Dr. Mahiran Basri
Norazlinaliza Salim, Mohd. Basyaruddin Abd. Rahman, Dzulkefly Kuang Abdullah, Hamidon Basri and Abu Bakar Salleh
Institute of Bioscience
mahiran@science.upm.edu.my
03-89467266

Ibuprofen, a non-steroidal anti-inflammatory drug (NSAID), is commonly administrated orally for the treatment of rheumatoid arthritis and osteoarthritis. It has anti-inflammatory, antipyretic, and analgesic properties. Prolonged oral administration often causes gastrointestinal ulcers and gastrointestinal bleeding, which also causes anaemia. Ibuprofen has been formulated into many topical preparations to reduce these adverse side effects and to avoid hepatic first-pass metabolism. Due to poor skin permeability, it is difficult to maintain an effective concentration of ibuprofen through topical delivery. In order to enhance the permeation of ibuprofen, palm-based esters nanoemulsion systems containing ibuprofen for topical delivery was developed. The phase behaviour of palm oil esters (POEs) and palm kernel oil esters (PKOEs) as the lipophilic phase with non-ionic surfactants and water were studied. Nanoemulsions of 20-200 nm offer many advantages such as a large interfacial area for ibuprofen absorption, low preparation cost (low energy method), high kinetic stability, solvent-free, and production feasibility. The in vitro release of ibuprofen from palm-based esters nanoemulsion system showed increased in the permeability of ibuprofen in comparison to the conventional formulation.

Keywords: Palm oil esters, Palm kernel oil esters, Topical delivery, Ibuprofen, NSAIDs

Anti-Influenza Activity of HESA-A a HerbaL-Marine Compound: an *In vitro* Study

Category: Fundamental (A)

Prof Dr Aini Ideris
Parvaneh Mehrbod, Abdul Rahman Omar and Mohd Hari-Bejo
Institute of Bioscience
Tnca@putra.upm.edu.my
03-89466024

HESA-A is an active natural biological compound from herbal-marine origin. Previous studies have reported that the therapeutic properties of HESA-A are able to treat psoriasis vulgaris and cancers. However, no antiviral properties have been reported. This study was designed to investigate the potential antiviral properties of HESA-A and its effects in modulating TNF-a and IL-6 cytokine levels. HESA-A was prepared in normal saline as a stock solution (0.8 mg/ml, pH = 7.4). Percentages of cell survival when exposed to different concentrations of HESA-A at different time intervals was determined by MTT assay. Based on the MTT method and hemagglutination assay (HA), HESA-A is capable of improving cell viability to 31% and decreasing HA titre to almost 99% in co-penetration exposures. In addition, based on quantitative realtime PCR and ELISA, it was found that HESA-A causes decrements in TNF-a and IL-6 cytokine expressions,In conclusion, HESA-A was effective against influenza infection through suppressing cytokine expression.

Keywords: HESA-A, H1N1, Influenza virus, Cytokine, TNF-?, IL-6

……..

Preparation and Physicochemical Evaluation of Biodegradable Magnetic K-Carrageenan Beads and Application for Chromium Ions Pre-Concentration

Category: Fundamental (A)

Prof. Dr. Mariana Nor Shamsudin
Muhammad Farhan Nazarudin and Ahmad Adlie Shamsuri
Institute of Bioscience
mariana@medic.upm.edu.my
03-89472138

Increase in environmental pollution due to industrial development is a challenge to be faced by the community. Heavy metals such as chromium, cadmium, lead, and copper are a result of discharge from various industries may cause serious environmental problems

and also health hazards. Nowadays, various methods have been introduced to overcome this problem, such as chemical precipitation, evaporation, ion-exchange, adsorption, cementation electrolysis, and reverse osmosis. One of the most effective methods is the use of carrageenan that resulted from magnetic carrier technology for magnetic separation methods, where the purification procedure can be performed in just a test tube or in a container and does not incur expensive costs. Application of this technique has been carried out in the field of molecular biology (in the separation of nucleic acids) and microbiology for the separation of cells. In this study, β-carrageenan magnetic gel-beads were obtained via interphase technique and hane been showed the abilities of magnetic carrageenan beads as adsorbent in solid phase extraction towards chromium ion from aqueous solution. Carrageenan (magnetic) are used in the process of separation (adsorption) for their low cost, their ability in reducing metal content in waste water (sewage), and they cause no toxic effects. The mechanism of metal cations involves formation of complex metal with metal ions and functional groups that are located on the surface or carrageenan pores.This studied showed the abilities of magnetic carrageenan beads as adsorbent in solid phase extraction towards chromium ion from aqueous solution.

Keywords: Magnetic β-carrageenan beads, interphase technique,solid phase extraction

……..

Catechins-rich Oil Palm Leaves Extract Enhances Bone Calcium Content of Estrogen-Deficient Rats

Category: Product / Innovation (C)

Prof. Dr. Suhaila Mohamed
Ahdab Bakhsh and Mohamed Mustapha Noordin
Institute of Bioscience
mohamed.suhaila@gmail.com
03-89472168

The present invention relates to an extract of palm leaf and a composition containing the same as an effective ingredient for synergistically increasing bone mineral density and arterial integrity and homeostasis in the prevention and treatment of osteoporosis. Postmenopausal estrogen deficiency often causes bone-density loss and osteoporosis. This study evaluated the effects of oral administration of oil palm leaves extract (OPL) on bone-calcium contents and structure, bone density, ash weights and serum total alkaline phosphatase (T-ALP) of estrogen-deficient ovariectomised (OVX) rats. Female Sprague Dawley rats were divided into five experimental groups namely: (1) intact (control N); (2) ovariectomized (OVX control); and OVX rats supplemented with either (3) 2% w/v green tea (OVX+GT); (4) 150 mg OPL/kg body weight (BW); or (5) 300 mg OPL /kg BW in the drinking water. After three months, the OVX control rats had significantly low femur and tibia masses (-5%; -3%), ash (-15%; -10%), calcium contents (-0.5%; -2.7%), bone density

and T-ALP concentrations (-40%) compared to intact rats. The catechins-rich OPL dose dependently increased OVX bone-density and structure, femur and tibia mass (by +8%; +12% respectively), ash (by +30%; +20% respectively), calcium (by +3% and +5%) and T-ALP concentrations (by +76%) compared to the OVX rats. The increases by OPL were higher than that in OVX-GT and control intact rats. The catechins-rich OPL enhanced bone mass in estrogen deficient rats by increasing osteoblast activities to higher levels than in normal rats and green tea. This is evidenced by the modulation of serumT-ALP levels, bone calcium content, total mineral content and bone histological structure. The OPL is a potential inexpensive ingredient for protection against osteoporosis and influences bone metabolism by directing towards bone formation.

Keywords: Bone calcium content; estrogen-deficiency; oil palm leaves; osteoporosis

……..

Use of a Composition Comprising of Acylated Steryl Glucoside in the Manufacture of an Antidiabetic, Antioxidant and Hypocholesterolemic Product

Category: Product / Innovation (C)

Prof. Dr. Maznah Ismail
Mustapha Umar Imam and Siti Nor Asma Musa
Institute of Bioscience
maznah@medic.upm.edu.my
03-89472115

The invention relates to glucose lowering-, hypocholesterolemic- and antioxidant properties of GBR and ASG, which is an innovation of brown rice that has been subjected to germination. It is particularly suited for diabetic subjects whose problems include sustained chronic hyperglycemia, abnormal cholesterol metabolism and oxidative stress damage. It is hoped that this invention will impact on the lives of diabetics and even those suffereing from other chronic diseases related to oxidative stress. We hope to develop functional foods and nutraceuticals from this innovation for diabetics as well as non-diabetics who are at risk of cardiovascular disease. Of particular importance is the fact these products will equally be useful in cases where oxidative stress is a problem like aging, Alzheimer's disease, cancers and other degenerative diseases.

Keywords: Diabetes, germinated brown rice, white rice, oxidative stress, cardiovascular diseases

Thymoquinone Loaded Nanostructured Lipid Carriers (TQ-NLC): A Drug Candidate for Treatment of Cervical Cancer

Category: Product / Innovation (C)

Dr. Latifah Saiful Yazan
Ng Wei Keat, Rasedee Abdullah and How Chee Wun
Institute of Bioscience
latifah@medic.upm.edu.my
03-89472308

Thymoquinone (TQ) was cytotoxic against several cancer cell lines such as human cervical adenocarcinoma (HeLa) cells and human squamous carcinoma cells (SiHa). Nevertheless, oral delivery of TQ is limited by the solubility-related poor oral bioavailability. Nanostructured lipid carrier (NLC) is one of the colloidal carrier systems that provide an alternative drug delivery system for lipophilic active compound such as TQ. TQ loaded NLC (TQ-NLC) was prepared by dispersing lipid matrices onto aqueous surfactant matrix. The mixture was homogenized by applying the hot high pressure homogenization technique. The mean particle size of TQ-NLC was 57.20 ± 0.1305 nm with a narrow polydispersity index (PDI) lower than 0.3. The zeta potential of TQ-NLC was greater than 30 mV. Polysorbate 80 helps to increase the stability TQ-NLC. Differential scanning calorimetry showed that TQ-NLC has a melting point of 56.73ºC, which is lower than that of the bulk material and higher than the melting point of TQ, indicating that TQ was encapsulated in NLC. The encapsulation efficiency of TQ in TQ-NLC was 80.52 ± 0.4776 % as determined by HPLC analysis. The development of TQ-NLC is worthwhile since nanoformulations are expected to increase the oral bioavailability.

Keywords: Thymoquinone loaded nanostructured lipid carriers, cervical cancer

PRPI 2012

UPM's Research & Innovation

INSTITUTE OF ADVANCED TECHNOLOGY

Nanostructured Manganese Substituted Nickel Cobaltite for Supercapacitor Application

Category: Applied Research (B)

Prof. Dr. Zulkarnain Zainal
Chang Sook Keng, Lee Kuang Tsin, Tan Kar Ban, Nor Azah Yusof,
Wan Mohamad Daud Wan Yusoff, Lee Jyh Fu and Wu Nae Lih
Institute of Advanced Technology
zulkar@science.upm.edu.my
03-89464209

As demand for power in ever increasing worldwide, it is foreseen that the development of efficient energy storage devices will be highly desired in the future. In this regard, supercapacitor which is also referred to as 'electrochemical capacitor (EC)', 'double-layer capacitor' or 'ultracapacitor', is an innovative electrochemical technology due to the combined batteries and capacitors properties. As one of the potential supercapacitive materials, cobaltite system with spinel structure has been the subject of intense research due to its established applications in electrochemistry. NiCo2O4 and NiMnxCo2?xO4?y (x ? 1.0) have been synthesized by co-precipitation method, and the effects of Mn substitution for Co on the microstructural and electrochemical properties pertaining to the supercapacitor applications have been studied. Co-precipitation method is proven to be the most promising method in preparing cobaltite spinels as it is simple, cost effective, of low temperature and yet capable of producing homogeneous nanoparticles with controllable composition. Moreover, the nanostructured materials prepared through this method are chemically stable over time. Spinel structure is retained when a quarter of Co of the spinel is substituted with Mn (i.e., x = 0.5), where the Mn ions predominantly occupy the octahedral sites of the spinel lattice. The presence of Mn significantly suppresses crystal growth upon thermal treatment. Electrodes of the materials exhibit nearly ideal electrochemical capacitor behaviour in neutral electrolyte solution (1.0 M KCl(aq)). Mn substitution greatly enhances the specific capacitance of the spinel, giving gravimetric and superficial specific capacitances of ca. 110 F g-1 and ca. 380 ?F cm-2, respectively for x = 0.5 powder. The capacitance enhancement is attributed to the facile charge-transfer characteristic of the Mn ions, which enables a greater amount of charge transferred between the oxide and the aqueous electrolyte species over the same potential window, as revealed by in situ X-ray absorption near-edge structure analysis.

Keywords: Nickel-cobalt oxide, Supercapacitor, Mn substitution, Co-precipitation, X-ray absorption near-edge structure

A Novel Data Driven Evidential Belief Function Model for Landslide Prediction in Malaysia

Category: Applied Research (B)

Assoc. Prof. Dr.-Ing. habil. Biswajeet Pradhan
Biswajeet Pradhan, Omar F. Althuwaynee and Ahmad Rodzi Mahmud
Institute of Advanced Technology
biswajeet24@gmail.com
03-89468466

A new and novel GIS based data driven Evidential Belief Function (EBF) model has been developed for landslide prediction mapping in Malaysia. A total 14 landslide conditioning factors were used with the newly developed EBF model to delineate the predicted landslide hazard areas. Each factor's weight was determined by four algorithms i.e. bel, dis, unc and plaus algorithms. Then the landslide hazard indices were calculated using the calculated weights, and the landslide prediction map was constructed in GIS. Landslide locations were used for validation of the results and assess the prediction accuracy of the model. GIS data was used to efficiently analyse the large volume of data, and the EBF proved to be an effective tool for landslide hazard prediction. The validation results showed sufficient agreement between the landslide prediction map and the existing data on landslide areas. The results of this study indicated that the EBF model can be effectively used in landslide prediction mapping and forecasting. This project has enormous potential to be patented as it has viable commercial impending for landuse planners, civil engineers. The model output will help the property developers, civil engineers to identify the future landslide occurring zones in an area. This way the future landslides can be prevented by taking necessary measures of slope stability and embankment. We have implemented a new computational code for EBF based GIS model for landslide prediction mapping.

Keywords: Landslide prediction, evidential belief function, GIS, remote sensing,

Photocatalytic Degradation of p,o,m-Cresol by Zinc Oxide Under UV Irradiation

Category: Applied Research (B)

Prof. Dr. Abdul Halim Abdollah
Y. Abdollahi, Z. Zainal and N. A. Yusof
Institute of Advanced Technology
yadollahabdolla@putra.upm.edu.my
03-89467547

Abstract: Photocatalytic degradation of p-cresol was carried out using ZnO under UV irradiation. The amount of photocatalyst, concentration of p-cresol and pH were studied as variables. The residual concentration and mineralization of p-cresol was monitored using a UV-visible spectrophotometer and total organic carbon (TOC) analyzer, respectively. The intermediates were detected by ultra high pressure liquid chromatography (UPLC). The highest photodegradation of p-cresol was observed at 2.5 g/L of ZnO and 100 ppm of p-cresol. P-cresol photocatalytic degradation was favorable in the pH range of 6-9. The detected intermediates were 4-hydroxy-benzaldehyde and 4-methyl-1,2-benzodiol. TOC studies show that 93% of total organic carbon was removed from solution during irradiation time. Reusability shows no significant reduction in photocatalytic performance in photodegrading p-cresol.

Keywords: Photocatalytic degradation; cresol; mineralization; ZnO; UV

……..

The Improvent of Optical Properties of Cadmium Sulphide Thin Film as Window Layer of Solar Cell

Category: Applied Research (B)

Prof. Dr. Azmi Zakaria
Atefeh Jafari
Institute of Advanced Technology
atefeh.j87@gmail.com
03-89466650

Cadmium Sulphide (CdS) thin film has attracted many attentions in the past few years because of its wide direct band gap energy, optical and electrical properties and stability as a window layer in solar cells. Various methods have been used for depositing of CdS films such as Chemical Vapour deposition, Sputtering and Spray Pyrolysis [4], Chemical bath deposition (CBD), Close Space Sublimation, and Successive Ionic Layer Adsorption and Reaction CBD also called Growth solution is known as a low cost and facile method to raise the performance of CdS window used in CdTe and CIGS solar cells. Deposition of CdS thin films by this technique is based on the controlled precipitation of the material

where the release of Cd2+ ions is controlled by adding a complex agent to Cd salt. Recently the CdS semiconductor film was improved by adding foreign metals to change the optical and or electrical properties, for example by Copper, Gallium, and Erbium dopings. Earlier Sn doped CdS films has been carried out by using tartaric acid as complex agent to study electrical properties but it was less transparent. As the transmittance of light is the major concern for window layer in a thin film structured solar cells a very high transparent CdS films by doping Sn need to be searched out.

Keywords: CdS thin film, window layer, optical properties

.....

Synthesis Mechanism of Low-Voltage Varistors Prepared Through Modified Citrate Gel Coating Technique

Category: Applied Research (B)

Prof. Dr. Azmi Bin Zakaria
Wan Rafizah Wan Abdullah, Mansor Hashim, Md Mahmudur Rahman and
Mohd Sabri Mohd Ghazali
Institute of Advanced Technology
azmizak@gmail.com
03-89466650

High demands on low-voltage electronics have increased the need for varistors with fast response, highly non-linear current-voltage characteristics and energy absorption capabilities at low breakdown voltage. However, trade-off between breakdown voltage and grain size poses a critical bottle-neck in the production of ZnO low-voltage varistors. The present study highlights the synthesis mechanism for obtaining praseodymium oxide (Pr_6O_{11}) based ZnO varistor ceramics having breakdown voltages of 2.8 to 13.3 V/mm through employment of modified citrate gel coating technique. The technique offers more direct and reproducible way of obtaining varistor ceramics at reduced preparation time and temperature compared to conventional solid state route. Precursor powder and its ceramics were examined by means of TG/DTG, FTIR, XRD and FESEM analyses. The electrical properties as a function of Pr_6O_{11} addition were analyzed on the basis of I-V characteristic measurement. The technique applied has enabled the production of varistor at reduced preparation time and temperature. The breakdown voltage could be adjusted from 0.01 to 0.06 V per grain boundary by controlling the amount of Pr_6O_{11} from 0.2 to 0.8 mol%, without alteration of the grain size. The non-linearity coefficient varied from 3.0 to 3.5 and the barrier height ranged from 0.56 to 0.64 eV. Breakdown voltage and non-linearity coefficient lowering with increasing Pr_6O_{11} content were associated to reduction in the barrier height caused by variation in O vacancies at grain boundary.

Keywords: Citrate gel; praseodymium oxide; low-voltage varistors; zinc oxide

A Method for Producing Polymer-Encapsulated Nanoparticles

Category: Applied Research (B)

Prof. Dr. Robiah Yunus
Mahshid Kalani
Institute of Advanced Technology
robiah@eng.upm.edu.my
03-89467533

Polymer-encapsulated particles are particles coated with a layer of a polymer. These particles have various applications depending on the compound and the choice of polymer used for encapsulation. In particular, these encapsulated particles are of great interest in the pharmaceutical industry. By encapsulating the drug compound with a polymer, it is possible to control the delivery and release of the drug, thus improve drug bioavailability, increase effectiveness and reduce risk of adverse side effects. However, it is also necessary to control the particle size and its distribution for efficient drug delivery. Smaller particles are preferred as they increase the total surface area, leading to better bioavailability. Small particles with narrower particle size distribution provide better flexibility of administration. The supercritical antisolvent (SAS) method is a common method for encapsulating compounds to produce polymer-encapsulated particles. In the prior researches, various studies have been done to optimize the supercritical antisolvent process to improve the characteristics of the resulting polymer-encapsulated particles. Most of the methods used are directed towards optimizing the parameters related to equipment, material crystallinity or composition. However, achieving the optimum result with manipulation of the mentioned parameters is very difficult or expensive. This present invention relates to a method for producing polymer-encapsulated particles, using supercritical antisolvent to produce polymer-encapsulated particles having fine and uniform morphology with smaller particle size. This invention has high potential commercial value as it provides ways for drug manufacturers to choose the correct polymer for producing nano encapsulated particles for controlled drug delivery

Keywords: Supercritical anti-solvent, encapsulation, supercritical fluid density, particle size

Composition Formulation of High Performance EMI Suppressors

Category: Applied Research (B)

Assoc. Prof. Dr. Mansor Hashim
Ismayadi Ismail and Fadzidah Mohd Idris
Institute of Advanced Technology
mansor@science.upm.edu.my
03-89467554

Electromagnetic interference in transmission, reception and processing of electronic intelligence is becoming increasingly acute with the increase of device operating frequencies well into the GHz region. Ferrites are still the best interference suppression material to deal with the above problem. Simply stated the problem to be solved is how to suppress harmonics higher than the working frequency band. At ITMA, we have developed two types of powerful interference absorbing/suppressing materials which are: (1) Composition-dependent NiZn ferrite for EM interference suppression/removal for frequencies around resonance and (2) Nanograin-microstructured NiZn ferrite for EM interference suppression/removal for frequencies in a very broad band without resonance. This type of EMI suppression is believed the first to be developed in the world by our team. The first type is capable of competing with the best EMI suppressors such as produced by Stewart and TDK. The second type has no commercial comparison yet but the suppression/loss characteristics have been sought after for many decades by industrial ferrite scientists and electronic circuit designers. At ITMA, we have discovered how to produce it. We foresee a fast-growing demand from the electronics industry all over the world once the product is commercialised.

Keywords: Electromagnetic interference suppression, ferrites

.....

Theoretical Prediction and Experimental Validation of the Tensile Response of Hierarchical CNT-CF/PP Composite

Category: Fundamental (A)

Prof. Madya Dr. Suraya Abdul Rashid
Shazed Md. Aziz and Mohamad Amran Mohd Salleh
Institute of Advanced Technology
suraya@eng.upm.edu.my
03-89466285

Hierarchically structured polymeric composites are ideal engineered materials to carry loads and stresses due to their high in-plane specific mechanical properties. Carbon

fibre (CF) reinforced polymeric composites have a wide range of unexplored potential applications in various technological areas such as aerospace, automobile, electronic and process industries due to their outstanding properties, such as high specific strength and stiffness, lower weight and flexible tailoring etc. Growing carbon nanotubes (CNTs) on the surface of high performance CF provides a means to tailor the mechanical properties of the fiber-resin interface of a composite. The growth of CNTs on CF was conducted via floating catalyst chemical vapor deposition (CVD). The mechanical properties of the resultant fibres, CNT density and alignment morphology were shown to depend on the CNT growth temperature, growth time, carrier gas flow rate, catalyst amount, and atmospheric conditions within the CVD chamber. Carbon nanotube coated carbon fiber reinforced polypropylene (CNT-CF/PP) composites were fabricated and characterized in order to explore their advantages as low cost, thermally stable and light-weight engineering materials. A combination of Halpin-Tsai equations, Voigt-Reuss model and rule of mixture was used in hierarchy to predict the mechanical properties of randomly oriented short fibre reinforced composite. An experimental program has been carried out in which the fibre orientation distribution has been analyzed on the composite fracture surfaces with Scanning Electron Microscope (SEM) and image processing software. Finally, the discrepancies between the predicted and experimental values are explained.

Keywords: Hierarchical composite, carbon nanotube, carbon fibre, chemical vapor deposition, numerical implementation, fibre orientation.

……..

Synthesis and Characterization of Manganese doped ZnO Nanoparticles

Category: Fundamental (A)

Prof. Dr. Abdul Halim Abdollah
Y. Abdollahi, Z. Zainal and N. A. Yusof
Institute of Advanced Technology
yadollahabdolla@putra.upm.edu.my
03-89467547

Various levels of manganese (Mn)-doped ZnO were synthesized by precipitation method. Characterization was carried out by XRD, TEM, SEM, EDX, BET and the band gap measured by UV-visible reflectance. In the XRD pattern of samples, there is no signature of impurity peaks, which could indicate Mn-related secondary phases. The EDX show the amount of Mn doped on ZnO is slightly lower than the theoretical value. The SEM of 1% Mn-doped ZnO illustrated that morphology is well ordered, has low aggregation, and homogeneous distribution of particle size. High aggregation is observed, however, in other percentages of Mn-doped ZnO. Results of TEM show that more than 50% of the particles for undoped and Mn-doped ZnO use between 15 and 35 nm, with 1% Mn doped ZnO having the highest percentage (77%). The BET shows that the surface area of

synthesized catalyst increases when the weight ratio of manganese increases up to 1% Mn, but decreases thereafter. The band gap of 1% Mn-doped ZnO is 2.2 eV which is smaller than the undoped ZnO band gap. The results of characterization show 1% Mn-doped ZnO has the highest surface area, the lowest particles size and the lowest agglomerate. Moreover the calculated band gap of 1% Mn-doped ZnO is lower than others except 0.5%Mn. Additionally, photodegradation of cresols under visible lightshowed that 1% Mn-doped ZnO had maximum adsorption and rate of photodegradation. In conclusion 1% Mn doped ZnO is suitable as the best photocatalyst to degrade cresols under visible light irradiation.

Keywords: ZnO; co-precipitation; manganesedoping; optical properties; nanoparticles

……..

Thick Film Paste for Electronic Devices

Category: Product / Innovation (C)

Assoc. Prof. Dr. Mohd Nizar Hamidon
Mohammad Hadi Nezhad Shahrokh Abadi, Rahman Wagiran, Abdul Halim Shaari, Norhafizah Abdullah, Juraina Md Yusof and Maryam Ehsani
Institute of Advanced Technology
mnh@eng.upm.edu.my
03-89467532

Thick film technology is currently used to fabricate electronic, mechanical/ chemical, energy, and display devices. Currently, screen printing technology in Malaysia is using thick film paste material imported from foreign countries. The dependency on external source resulted in a high cost and currency deficit to the government of Malaysia. It is reported in 2009 that Malaysia's electronic production and market was ranked at number 6 with 3.7% output. Meanwhile in the market analysis, Malaysia was placed at number 15 with a total of 1.5% market value from the world market. This shows that local demands is high and Malaysia shall produced it locally at a competitive price and open the possibility of exporting it to other lucrative market. The value of worldwide sales of thick film devices was estimated at $14.8 billion in 2003 and projected to rise at an average annual growth rate (AAGR) of 15.2% to $30.0 billion by 2008. This scenario shows that there are golden opportunities to venture in the thick film technology locally by introducing a new thick film paste with low cost, good shelf life, good viscosity and rheology.The thick film paste composition incorporates a newly composed organic binder from linseed stand oil, m-xylene and _-terpineol. Furthermore, the uses of linseed oil as an organic element in comparison with the inorganic binder such as binary metal, boride glass frit composition and titanium dioxide is an advantage for a better and healthy environment.

Keywords: Thick film paste, organic binder, electronic devices

Spatial Change Detector (SCD v1.0) "A Decision and Planning Support Tool"

Category: Product / Innovation (C)

Dr. Fazel Amiri
Abdul Rashid Mohamed Mohamed Shariff
Institute of Advanced Technology
famiri@putra.upm.edu.my
03-89467539

This product has the ability to project spatial change patterns of land use on the basis of Potential Change Index (PCI). PCI is a new index that allows for visualization of change, thus aiding change detection. This gives a better insight and a quantitative indicator of change that has occurred on the ground. Land use maps for two time periods are inputted to create the change detection scenario. These Time Series maps were implemented as a critical input of the Potential Change Index to facilitate the projection of land use change. The vector format used helps in the accurate computation of change. Spatial tools are developed in the ArcView software as a new extension; the Spatial Change Detector (SCD v1.0). This particular technique and the resulting map are simple, straightforward and easy to interpret. The Spatial Change Detector v1.0 helps in the assessment of land use change and is intended as a decision and planning support. Land use experts, with their specialized knowledge can help ensure that the Spatial Change Detector databases represent realistic, practicable and functional spatial systems. The Spatial Change Detector ensures that the results are interpreted correctly, within the relevant context, to maximize the contribution to land use planning and decision support. The Spatial Change Detector has the advantage of helping in planning of national map revisions. It has tremendous commercialization potential nationally and internationally. Potential customers include mapping, surveying, planning and land related agencies. Its' benefits far outweighs its cost and this tool will be of immense help in better utilization of land resources.

Keywords: Land use simulation, change detection, potential change index (PC index), GIS extension

Activity of Heterogenous Catalyst (Ca(OCH3)2) for Synthesis of Palm oil based Trimethylpropane Triesters

Category: Applied Research (B)

Prof. Dr. Robiah Yunus
Teck-Sin Chang, Hassan Masood, Umer Rashid, Thomas S.Y. Choong,
Dayang Radiah Awang Biak and Azhari
Institute of Advanced Technology
robiah@eng.upm.edu.my
03-89467533

Palm oil-based trimethylolpropane (TMP) esters are potential biodegradable base stock for lubricant production. Calcium methoxide was used as a catalyst for the synthesis of palm oil-based trimethylolpropane (TMP) esters through chemical transesterification of palm oil methyl esters (POME) with TMP. The effect of the main operating variables, i.e. temperature, pressure, molar ratio of TMP to POME and the catalyst amount on yield of TMP esters was studied and analyzed. The optimum conditions for the reaction were found to be 180 0C temperature; 50 mbar pressure; molar ratio of TMP: POME at 1:6, mass ratio of calcium methoxide 0.3% per weight of reaction mixture and 8 hr reaction time. Palm oil TMP ester containing 98% w/w triesters was successfully synthesized under these conditions.

Keywords: Trimethylolpropane, palm oil, lubricant, calcium methoxide, transesterification

PRPI 2012

UPM's Research & Innovation

INSTITUTE OF GERONTOLOGY

Real Time Monitoring on Elderly Alzheimer's Patient in Day Care Center

Applied Research (B)

Assoc. Prof. Dr. Abdul Rashid Mohamed Shariff
Mohd Fadhil Abuhan, Zaiton Ahmad and Ahmad Rodzi Mahmud
Institute of Gerontology
rashid@eng.upm.edu.my
03-89467543

Humans are sometimes affected by Alzheimer Disease (AD) when aging. AD has major implications on patient safety and care. The elderly Alzheimer's patient encounters risk of losing all of their memory capability and are unable to live a normal life accordingly. The short memory may let the patient to wander aimlessly and this may lead them to danger. Hence, the Alzheimer's patient needs close care to ensure their safety. Some Alzheimer's patient would be sent by their family to a day care center for day care. The caregivers in day care center have a tough job in monitoring closely the number of Alzheimer's patients at their day care center because of the limited number of caregivers available. A motivation of this research is to reduce the caregiver's burden. In this research, an assistive technology tools called Alzheimer's Real Time Location System (A-RTLS) is implemented on several Alzheimer's patients who are residents at the Taman Seputeh Alzheimer's day care center, Kuala Lumpur in early 2011. A-RTLS helps to strengthen day care center security, real time monitoring, enhance the caregiver care management quality on Alzheimer patients, alerts caregiver whereabouts of the patient in real time and help medical doctors to analyze resident's spatial movement sequence pattern for determining patient behaviour problems of wandering aimlessly. Commercialization potential would be high as the technology being used in this research is suitable for indoor tracking and reliable for health care industries in Malaysia. The potential consumers in Malaysia at this time, would involve 2 Alzheimer's day care center, 12 government old folks home, a growing number of private old folks home and thousand Alzheimer's patient homes. The potential is not only within Malaysia but also overseas. The cost of implementation is more affordable and reasonable for institutional implementation at RM 50,000.

Keywords: Alzheimer disease,care management quality,close care, day care center security,real time monitoring, patient safety,

Social Vulnerability in an At-risk Older Population in Peninsular Malaysia

Applied Research (B)

Dr. Rahinah Ibrahim
Siti Suhailah Abdullah, Yadollah Abolfathi Momtaz and Jariah Masud
Institute of Gerontology
imahibrahim@putra.upm.edu.my
03-89472754

The elderly are commonly regarded as at-risk population but being a heterogeneous group, some would be face higher social vulnerability from having less access to opportunities and being more vulnerable to certain socio-economic risks than others. The purpose of this study is to compare the types and likelihood of social vulnerability faced by different subgroups of at-risk older persons. Data for this study were obtained from a cross-sectional survey in 2008 comprising 1880 older persons aged 60 and over in Peninsular Malaysia. Social vulnerability was measured using six variables, namely, less than monthly contact and poor relationship with children, small social network, loneliness, and poor social support from family and friends. At-risk elderly comprised of 45.5% of older persons aged 70 and over, 52.6% women, 58.3% rural residents, 37.9% with no formal education, 9.7% living alone, 3.9% with no children, 39.8% widowed and 3.9% who never married, divorced or separated. Logistic regression analyses revealed that the six social vulnerability models, containing selected socio-demographic predictors, were all statistically significant and correctly classified from 61.1% to 97.6% of cases. Across the six models, it was found that older women were over three times more likely to have poor relationship quality with children. Being widowed was over two times more likely to have fewer than monthly contact with children. Older people who stayed in rural area were 1.32 times were more likely to have small social network and 1.15 times to experience loneliness. The findings have shown that even among the at-risk older population, each subgroup can still be differentiated in terms of the types and risk of social vulnerability. Therefore, there is a potential utility of this type of research to match social support to most at-risk group, particularly older women, widowed and rural dwellers.

Keywords: Elderly, disadvantaged, Peninsular Malaysia, population at-risk

The Prevalence of Hearing Impairment among Older Malaysians and its Estimated Cost

Applied Research (B)

Mrs. Siti Farra Zillah Abdullah
Jariah Masud, Rahimah Ibrahim and Norashidah Mohamed Nor
Institute of Gerontology
f4rra@yahoo.com
03-89472743

The growth of older persons is expected to cause a rise in age-related health problems such as dementia, musculoskeletal, visual-hearing and cardiovascular disease which entail significant health care expenditure for the nation. The purpose of this analysis is to estimate the risk and impute the cost of hearing impairment among older Malaysians. Data derived from a cross-sectional study in 2008, involving 1, 880 older persons aged 60 years and above. Hearing impairment was measured using a single question of self-reported hearing problems. A total of 6.2% respondents reported of having hearing impairment. Logistic regression was performed to determine the likelihood of respondents having hearing impairment. The model was found to be statistically significant (?2 = 70.382 (df=7, n = 1875)), $p < 0.001$, and correctly classified 93.8% of cases. Five of the independent variables made a unique statistically significant contribution to the model (age, sex, marital status, education level and employment status). The strongest predictor of reporting a hearing problem was age (OR = 2.122) which indicated that older respondents (70 years and above) were over 2 times more likely to report hearing problem. Based on the prevalence of hearing impairment from this study and current population of older Malaysians (2.2 million), the crude estimate of hearing loss in the country is at RM 464 million per annum. The cost estimation was made using the Australian cost of hearing loss at $3,314 per person annually for 3.55 million of Australians population with hearing loss in 2005. There is an urgent need for research in understanding this medical condition and underlying cost that may impinge on quality of life in old age. With the ageing of older population of Malaysia, the prevalence of hearing loss among the old-old cohort would increase.

Keywords: Hearing impairment, older malaysians, crude estimate

Ethnic Differences in Dementia: Mediating Effect of Depression and Educational Attainment

Applied Research (B)

Dr. Yadollah Abolfathi Momtaz
Institute of Gerontology
yabolfathi@gmail.com
03-8947273

Research shows marked difference in the prevalence of dementia among different ethnic groups in Malaysia, wherein elderly Malays had twice the risk for dementia compared to Chinese. However, there is a relative dearth of studies focusing on how ethnicity may influence dementia. The main aim of this study is to test potential mediating effects of depression and level of education on the association between ethnicity and dementia. The sample for this study consisted of 2796 community-dwelling elderly people aged 60 years and older was drawn from a cross-sectional national survey entitled "Mental Health and Quality of Life of Older Malaysians (MHQoLOM)". The Malaysian adapted version of the Geriatric Mental State-Automated Geriatric Examination for Computer Assisted Taxonomy (GMS-AGECAT) was used to assess dementia and depression. Mediational analysis, comprising logistic regression model, the product of coefficients test and the Sobel test was conducted to test mediating effect of depression and level of education. As expected, the result of the chi-square analysis revealed significant ethnic difference in the prevalence of dementia. The results from the mediational analyses revealed that depression and education significantly mediate the association between ethnicity and dementia. This suggests that disparities of depressive symptoms and education among different ethnic groups cause ethnic difference in the prevalence of dementia. The findings demonstrate significant mediating effects of depression and level of education on the association between ethnicity and dementia imply that ethnicity, per se, does not necessarily contribute directly to dementia. The significant effect of educational attainment, suggests that educational pursuits in early life can positively influence cognitive functioning in late life. Additionally, prevention and timely diagnosis with appropriate and effective treatment of depression may prevent and reduce the rate of cognitive impairment and dementia in old age.

Keywords: Aged; dementia; depression, education; ethnicity, mediational analysis

Contributing Factors to Road Accident among Older Malaysians Drivers

Fundamental (A)

Mr. Mohamad Fazdillah Bagat
Sharifah Norazizan Syed Abdul Rashid
Institute of Gerontology
fadilbagat@yahoo.com
03-89472742

The purpose of this analysis is to investigate the contributing factors to road accident among older Malaysian drivers. Data was obtained through face-to-face interview with 400 drivers aged 50 years and over in a cross-sectional study entitled "Perception of Needs and Barriers of Older Drivers in Malaysia" (2006-2008) conducted in the states of Perak and Selangor which have the highest accident rates involving older persons. The age of the respondents ranging from 50 to 86 years (M=60, SD=7). The respondents drive about eight times a week with an average distance of less than 50 km (56.8%). Most of them (92.8%) are confident with their driving ability and perceived themselves as in good health (89.3%). About 13.6% was involved in one or more accidents for the past two years. Logistic regression was performed to assess the impact of a number of factors on the likelihood that respondents would involve in accident. Seventeen independent variabels were entered into the model which was found to be statistically significant (?2 = 34.893, df= 17, N = 400, $p < 0.001$), indicating that the model was able to distinguish between respondents involve in accident for the last two years. Three variables (having chronic diseases, anger due to traffic situations and have traffic summons) made a unique statistically significant contribution to the model. The strongest predictor of being involved in accident was having chronic diseases, recording an odds ratio of 3.68. This indicates that respondents who had chronic diseases were over 3 times more likely to be involved in accident. Findings from the study show that health status and driving behaviour are among the crash risk factors for older drivers. Future research is needed to investigate further the extent to which these factors interact with one another to help reduce road accident cases among older drivers.

Keywords: Older drivers;road accident; contributing factors;Malaysian.

PRPI 2012

UPM's Research & Innovation

INSTITUTE FOR MATHEMATICAL RESEARCH

Extension of Jeffreys Prior Estimation for Weibull Censored Data

Category: Applied Research (B)

Prof. Dr. Noor Akma Ibrahim
Al Omari Mohammed Ahmed
Institute for Mathematical Research
nakma@putra.upm.edu.my
03-89466873

This research examines the performance of MLE and Bayesian estimator with Jeffreys and Extension of Jeffreys prior for the parameters, survival and hazard functions of survival data following Weibull distribution. Lindley's approximation is used in the Bayesian estimation. The perfomance of the frequentist approach compared to the Bayesian couterpart is based on rigourous simulation study.

Keywords: Extension of Jeffreys prior informatiob, Bayesian, Lindley's approximation, maximum likelihood

……..

Fast Helmholtz Solver

Category: Applied Research (B)

Prof. Dr. Mohamed Othman
Mohd Kamalrulzaman Md Akhir, Zanariah Abdul Majid, Jumat Sulaiman
and Mohamed Suleiman
Institute for Mathematical Research
mothman@fsktm.upm.edu.my
03-89466556

In this article, we consider the numerical solution of two-dimensional Helmholtz equation. The four point Explicit Decoupled Group (EDG) iterative method together with Gauss-Seidel (GS) is applied to solve a linear system generated from discretization of the finite difference scheme using the second order central difference. In addition, the formulation and implementation of the proposed method to solve the problem alsopresented. Numerical result and comparisons with other existing method are given to illustrate the efficiency of the proposed method.

Keywords: Helmholtz equation, Explicit Group Method, Explicit Decoupled Group Method, Gauss-Seidel Method, Finite Difference Scheme.

Direct Two-Point Block One-Step Method for Solving General Second-Order ODEs

Category: Applied Research (B)

Assoc. Prof. Dr. Zanariah Abdul Majid
Nur Zahidah Mokhtar and Mohamed Suleiman
Institute for Mathematical Research
zanariah@science.upm.edu.my
03-89467959

The mathematical problems in real world can be written in the form of higher order differential equations and arise in the fields of science and engineering. The purpose of this paper is to present a direct two point block one-step method for solving general second order ordinary differential equations (ODEs) directly using variable step size. This method will estimate the solutions at two points simultaneously. Numerical results shown the efficiency of the proposed method compared to the existing method.

Keywords: Block method, direct method, second order ODEs

……..

Novel Bivariate Closure Approximations in Stochastic Epidemics

Category: Applied Research (B)

Dr. Isthrinayagy S. Krishnarajah
Dr. Glenn Marion and Professor Dr. Gavin Gibson
Institute for Mathematical Research
isthri@science.upm.edu.my
03-89466827

Nonlinear stochastic models are typically intractable to analytic solutions and hence, moment-closure schemes are used to provide approximations to these models. Existing closure approximations are often unable to describe transient aspects caused by extinction behaviour in a stochastic process. Recent work has tackled this problem in the univariate case. In this study, we address this problem by introducing novel bivariate moment-closure methods based on mixture distributions. Novel closure approximations are developed, based on the beta-binomial, zero-modified distributions and the log-Normal, designed to capture the behaviour of the stochastic SIS model with varying population size, around the threshold between persistence and extinction of disease. The idea of conditional dependence between variables of interest underlies these mixture approximations. In the first approximation, we assume that the distribution of infectives (I) conditional on population size (N) is governed by the beta-binomial and for the second form, we assume

that I is governed by zero-modified beta-binomial distribution where in either case N follows a log-Normal distribution. We analyse the impact of coupling and inter-dependency between population variables on the behaviour of the approximations developed. Thus, the approximations are applied in two situations in the case of the SIS model where: (1) the death rate is independent of disease status; and (2) the death rate is disease-dependent. Comparison with simulation shows that these mixture approximations are able to predict disease extinction behaviour and describe transient aspects of the process.

Keywords: Log-normal; Beta-binomial; Mixture distribution; Zero-modified distribution; Moment-closure; Bivariate SIS; Markov process

……..

Numerical Solutions for a Nearly Circular Crack With Developing Cusps Under Shear Loading

Category: Fundamental (A)

Assoc. Prof. Dr. Nik Mohd Asri Nik Long
Zainidin K. Eshkuvatov and Koo Lee Feng
Institute for Mathematical Research
nmasri@science.upm.edu.my
03-89466863

We studied the behavior of the solution at the crack edges for a nearly circular crack with developing cusps subject to shear loading. The problem of finding the resulting force can be written in the form of a hypersingular integral equation. The equation is then transformed into a similar equation over a circular region using conformal mapping. The equation is solved numerically for the unknown coefficients, which will later be used in finding the stress intensity factors. The sliding and tearing mode stress intensity factors are evaluated for cracks and displayed graphically. Our results seem to agree with the existing asymptotic solution.

Keywords: Stress intensity factors, nearly circular crack, conformal mapping, hypersingular integral equation

Computation of Extreme-Value Parameters and Inference by Approximation Covariance Technique

Category: Fundamental (A)

Assoc. Prof. Dr. Mahendran Shitan
Provash Kumar Karmokar
Institute for Mathematical Research
mahen@putra.upm.edu.my
03-89466876

Ordinary least squares (OLS) and Linear (LIN) estimators are commonly used in estimating the parameters of location-scale family of distributions. Various works have been done to compare the efficiency between these two estimators for the two-parameter exponential distribution and the two-parameter Weibull distribution. Motivated by these works, it would be of interest to evaluate the performance of the LIN method for the extreme-value distribution. We found that the performance of LIN estimator is better than that of OLS estimator in the sense that it had smaller standard errors and better efficiency.

Keywords: Ordinary least squares, linear estimator, relative efficiency, location-scale family, generalized variance, approximation covariance.

.....

The Performance of Robust Variance Inflation Factor

Category: Fundamental (A)

Prof. Dr. Habshah Midi
Arezoo Bagheri
Institute for Mathematical Research
habshah@science.upm.edu.my
03-89466606

The detection of multicollinearity is important since it is responsible for causing major interpretative problems in regression analysis such as insignificant regression coefficients where in fact they are significant. It is now evident that high leverage points or outliers in X-direction may affect the collinearity pattern of a data set specifically in the presence of collinear explanatory variables in a regression model. These leverage points may decrease or increase multicollinearity problem of a collinear data matrix X. Since classical multicollinearity diagnostic methods such as the Classical Variance Inflation Factor (CVIF) are not resistant to the presence of high leverage points, applying classical methods are not reliable and produce misleading conclusions. In this paper, the performance of Robust Variance Inflation Factors (RVIF) on collinear data sets is investigated. The RVIF is developed by incorporating the newly proposed robust coefficient determination based on Generalized M-estimator embedded with DRGP, namely the GM (DRGP)-estimator.

The new RVIF is compared with another RVIF established by incorporating a robust coefficient determination based on MM-estimator. The results of real data and simulation study on a collinear data signify that the CVIF performs poorly in the presence of high leverage points. However, the RVIF based on GM (DRGP)-estimator followed by the RVIF based on MM-estimator successfully detect the collinearity pattern when high leverage points are present in the collinear data.

Keywords: High leverage points, multicollmearity, diagnostic methods, condition number, collinearity-influential measure

.....

Collinearity -Influential Observation Diagnostic Measure Based on a Group Deletion Approach

Category: Fundamental (A)

Prof. Dr. Habshah Midi
Arezoo Bagheri
Institute for Mathematical Research
habshahmidi@gmail.com
03-89466606

Collinearity-Influential observations are those observations that might induce or disrupt multicollinearity patterns in a data. Such observations are usually points with high leverage points, although all high leverage points are not collinearity-influential observations. Detection of collinearity-influential observation is very crucial due to their responsibility for misleading conclusion about the fitting of a regression model. Much work has been done on these problems, but in the presence of multiple high leverage collinearity-influential observations, most commonly used measures fail to identify them correctly. We propose a new measure based on a diagnostic robust group deletion approach. Some practical cutoff points for existing and developed diagnostics measures are also introduced. Numerical examples and simulation results show that the proposed measure provides significant improvement over the existing measures.

Keywords: High leverage points, Collinearity-influential measure, diagnostics robust generalized potentials

Unbiased Estimation of Structural Parameters in Credibility Models with Dependence Induced by Common Effects

Category: Fundamental (A)

Prof. Dr. Noor Akma Ibrahim
Mehdi Emrahimzadeh, Abdul Aziz Jemain and Adem Kilichman
Institute for Mathematical Research
nakma@putra.upm.edu.my
03-89466873

In these models, the estimation formulas are not complicated, in practice the calculations are simple. These models and its estimators are easily extendable to higher levels. In these models, we only need to estimate the variance of the structural parameters and we don't require to know the distribution of the common effects random variables."

Keywords: Credibility models, structural parameters, common effects

……..

High Order Explicit Hybrid Method for Solving Second-Order Ordinary Differential Equations

Category: Fundamental (A)

Assoc. Prof. Dr. Fudziah Ismail
Faieza Samat and Mohamed Suleiman
Institute for Mathematical Research
fudziah@science.upm.edu.my
03-89466811

In the development of numerical methods for solving special second order ordinary differential equation, it is crucial to take into account the algebraic order of the method as well as the error norm because this is the main factor for achieving high accuracy in the calculation. Generally the theoretical solution of the problem is also oscillating or periodic in nature, thus it is also essential to consider the phase-lag and dissipation of the method. These are two types of errors, where phase-lag is the angle between the analytical solution and the numerical solution while dissipation is the distance from the cyclic solution. In this paper, two explicit hybrid methods for the numerical integration of second-order ordinary differential equations are constructed. Based on the algebraic order, phase-lag and dissipative order, we obtained the first method which is of algebraic order seven, dispersive of order eight and dissipative order seven and has minimized error norm, while the second method is also of algebraic order seven, phase-lag of order eight

and dissipative of order nine. The methods are suitable for solving special second order ordinary differential equations which have oscillating solutions. The algebraic order of these methods is the highest in comparison with other explicit hybrid methods of the same class. Numerical results are tabulated and comparisons are made with the existing methods which clearly shown the advantage of the new methods.

Keywords: Explicit Hybrid methods, algebraic order, phase-lag, dissipation.

……..

Unsteady Boundary-Layer Flow and Heat Transfer of a Nanofluid Over a Permeable Stretching/Shrinking Sheet

Category: Fundamental (A)

Mrs. Norfifah Bachok
Anuar Ishak, Roslinda Nazar, Norazak Senu and Norihan Md. Arifin
Institute for Mathematical Research
norfifah78@yahoo.com
03-89466849

The unsteady boundary layer flow of a nanofluid over a permeable stretching/shrinking sheet is theoretically studied. The governing partial differential equations are transformed into ordinary ones using a similarity transformation, before being solved numerically. The results are obtained for the skin friction coefficient, the local Nusselt number and the local Sherwood number as well as the velocity, temperature and the nanoparticle fraction profiles for some values of the governing parameters, namely, the unsteadiness parameter, the mass suction parameter, the Brownian motion parameter, the thermophoresis parameter, Prandtl number, Lewis number and the stretching/shrinking parameter. It is found that dual solutions exist for both stretching and shrinking cases. The results also indicate that both unsteadiness and mass suction widen the range of the stretching/shrinking parameter for which the solution exists.

Keywords: Nanofluid, Stretching/shrinking sheet, Unsteady boundary layer, Dual solutions

Automatic Quadrature Scheme for Hypersingular Integrals

Category: Fundamental (A)

Assoc. Prof. Dr. Zainidin K. Eshkuvatov
Institute for Mathematical Research
ezaini@science.upm.edu.my
03-89466855

An automatic quadrature scheme (AQS) is presented for evaluating hypersingular integrals (HSI), of a given function f, which is required to have certain smoothness or continuity properties. The density function f(x) is approximated by the classical orthogonal Chebyshev polynomials which interpolates in Chebyshev zeros. The Fast Fourier Transform method (FFT) is used to determine the coefficients of Chebyshev polynomials. Numerical examples are clearly demonstrate the developed AQS provide efficient, accurate and reliable results. Comparison of the performances of the present method with others is given.

Keywords: Hypersingular integrals, Singular integrals, Chebyshev series, Interpolation, Indefinite integration, Automatic quadrature scheme

.....

Boundary Layer Flow Over a Moving Surface in a Nanofluid with Suction or Injection

Category: Fundamental (A)

Mrs. Norfifah Bachok
Anuar Ishak, Roslinda Nazar, Norazak Senu and Norihan Md. Arifin
Institute for Mathematical Research
norfifah78@yahoo.com
03-89466849

An analysis is performed to study the heat transfer characteristics of steady two-dimensional boundary layer flow past a moving permeable flat plate in a nanofluid. The effects of uniform suction and injection on the flow field and heat transfer characteristics are numerically studied by employing an implicit finite difference method. It is found that dual solutions exist when the plate and the free stream flow move in the opposite directions. The results indicate that suction delays the boundary layer separation, while injection accelerates it

Keywords: Nanofluid, Moving flat plate, Boundary layer, Suction/injection, Dual solutions

Unsteady Stagnation Point Flow and Heat Transfer Over a Stretching/ Shrinking Sheet With Suction or Injection

Category: Fundamental (A)

Assoc. Prof. Dr. Nik Mohd Asri Nik Long
Norihan Md. Arifin and Melini Suali
Institute for Mathematical Research
nmasri@science.upm.edu.my
03-89466863

The unsteady stagnation point flow and heat transfer over a stretching/shrinking sheet with suction/injection is studied. The governing partial differential equations are converted into nonlinear ordinary differential equations using a similarity transformation and solved numerically. Both stretching and shrinking cases are considered. Results for the skin friction coefficient, local Nusselt number, velocity and temperature profiles are presented for different values of the governing parameters. It is found that the dual solutions exist for the shrinking case, whereas the solution is unique for the stretching case. Numerical results show that the range of dual solutions increases with mass suction and decreases with mass injection.

Keywords: Stagnation point flow, stretching/shrinking sheet, heat transfer, dual solutions, suction or injection.

.....

Jensen-Shannon Divergence and Non-linear Quantum Dynamics

Category: Fundamental (A)

Assoc. Prof. Dr. Hishamuddin Zainuddin
Saeid Molladavoudi and Chan Kar Tim
Institute for Mathematical Research
hisham@putra.upm.edu.my
03-89466874

Using the statistical inference method, a non-relativistic, spinless, non-linear quantum dynamical equation is derived with the Fisher information metric substituted by the Jensen-Shannon distance information. Among all possible implications, it is shown that the non-linear SchrÃ¶dinger equation preserves the symplectic structure of the complex Hilbert space, hence a Hamiltonian dynamics. The canonically projected dynamics is obtained on the corresponding projective Hilbert space of pure state density operators.

Keywords: Measures of information theory, Non-linear quantum dynamics, Geometry of quantum mechanics

Evasion from Many Pursuers in Simple Motion Differential Game with Integral Constraints

Category: Fundamental (A)

Assoc. Prof. Dr. Gafurjan Ibragimov
Abdulla Azamov and Marzieh Khakestari
Institute for Mathematical Research
gafur@science.upm.edu.my
03-89466818

We consider a differential game of several pursuers and one evader with simple motions and integral constraints on control functions of players. We find a sufficient condition for the evader to escape from all pursuers. Assuming that the total resource of the pursuers does not exceed that of the evader, we solve the game by presenting explicit strategy for the evader which guarantees evasion, i.e. we show that the proposed escape is possible, no matter what controls are adapted by the pursuers. We estimate distances between the evader and pursuers and then we prove the admissibility of our strategy. The game happens in the plane. We show that solution of the evasion problem in the plane implies the solution of the evasion problem in n-dimensional space.

Keywords: Differential game, control, strategy, evasion

……..

On A Linear Differential Game of Optimal Approach of Many Pursuers with One Evader

Category: Fundamental (A)

Assoc. Prof. Dr. Gafurjan Ibragimov
Atamurat Kuchkarov
Institute for Mathematical Research
gafur@science.upm.edu.my
03-89466818

We consider a differential game of approach of many Pursuers and one Evader. The motions of all players are described by linear systems of the same type. Control functions of players are subject to integral constraints. The duration of the game is fixed. The payoff functional of the differential game is the minimum of the distances between the Evader and the Pursuers when the game terminates. The Pursuers try to minimize the payoff functional, and the Evader tries to maximize it. We obtain estimates from above and below for the payoff functional of the game, which can be guaranteed by players and explicitly describe the strategies of the players. From here we obtain that in some specific cases the

value of the game exists, and optimal strategies can be constructed. An illustrative example is considered.

Keywords: Differential game, control, strategy, value of the game

PRPI 2012

UPM's Research & Innovation

INSTITUTE OF HALAL PRODUCTS RESEARCH

Kaedah Alternatif Verifikasi Halal Haram dalam Perundangan Islam

Fundamental (A)

Mr. Mohammad Aizat Jamaludin
Mohd Anuar Ramli and Suhaimi Ab Rahman
Institute of Halal Products Research
mohdaizat@putra.upm.edu.my
03-89417344

Kajian ini menfokuskan kaedah alternatif verifikasi halal haram menurut perspektif Islam dalam penentuan status hukum produk gunaan, sama ada makanan atau bukan makanan. Kebiasaannya, dalam perundangan Islam, kaedah verifikasi halal haram yang digunapakai adalah berdasarkan sumber utama seperti al-Quran, al-Sunnah, al-Ijma' dan al-Qiyas, di samping sumber sekunder yang terdiri daripada al-'Urf, al-Maslahah, al-Istihsan, al-Istishab dan Sadd al-Zara'i`. Selain daripada kaedah yang berlandaskan sumber primer & sekunder tersebut, terdapat juga kaedah verifikasi alternatif lain. Ia telah dibangunkan oleh sarjana hukum Islam seperti al-Istihalah, al-Istihlak, al-Istibra', al-Intiqal, al-Taba'iyyat, al-Intiqal, al-Inqilab, al-Ihraq, al-Takhammur dan al-Takhallul. Kaedah-kaedah ini bersifat sporadik di dalam kitab fiqh klasik dan ia tidak disusun secara sistematik serta belum dibincangkan secara terperinci sebagai penyelesaian dalam menangani isu-isu kepenggunaan masa kini. Dalam kajian ini, kaedah alternatif tersebut akan dibangunkan sebagai sumber verifikasi halal haram barang gunaan semasa dengan beberapa contoh aplikasi yang relevan. Untuk mencapai objektif berkenaan, pengkaji mengaplikasikan kaedah kepustakaan dengan menggunakan metode dokumentasi sepenuhnya. Kitab-kitab fiqh klasik akan dirujuk untuk membangunkan kaedah-kaedah berkaitan agar ia dapat dijadikan sandaran dalam penentuan hukum halal haram. Data-data kualitatif ini akan dikumpulkan dan dianalisis untuk menghasilkan beberapa model analisis verifikasi halal haram menurut perundangan Islam. Hasilnya, beberapa model untuk kaedah alternatif verifikasi halal haram dapat dibangunkan sebagai garis panduan untuk para penyelidik hukum dan pihak industri yang terlibat dalam barangan gunaan sama ada produk makanan atau bukan makanan. Oleh itu, penyelidikan ini akan menyumbang satu penyelesaian alternatif kepada isu-isu kepenggunaan berkaitan dengan produk halal haram semasa.

Keywords: Halal haram, kepenggunaan, makanan, kaedah verifikasi alternatif, hukum islam

Halal Authentication of Meat by a Rapid HPLC Method

Category: Applied Research (B)

Assoc. Prof. Dr. Shuhaimi Mustafa
Ramin Jorfi, Shuhaimi Mustafa, Yaakob Che Man, Dzulkifly B Mat Hashim,
Awis Q Sazili, Pedram Kashiani and Abdoreza Soleimani Farjam
Institute of Halal Products Research
shuhaimi@biotech.upm.edu.my
03-89416541

Food plays an important role in social, cultural and religious life style of every community throughout the world. Authentication of raw materials and finished products and the detection of various forms of food adulteration are of primary importance for both consumers and industries. Religiously, according to Islam, an important factor for Muslim consumers is the halal (lawful) or haram (unlawful) status of the food. Demands for food products with halal authentication are increasing and this trend is expected to continue concurrently with the population growth. Therefore, detection of pork in various food products has been an important subject of study in many countries, especially where religious laws prohibit the consumption of pork products. The current study aimed to differentiate pork from selected meats of beef, mutton, chevon and chicken in raw and cooked based on their primary amino acid contents using reverse phase-high performance liquid chromatography (RP-HPLC) with derivatization by o-phthalaldehyde (OPA) and ultraviolet (UV) detection. The results showed that the most discriminative amino acids between pork and others were valine, serine, histidine, alanine and arginine in raw meat and all amino acids except for alanine in cooked meat. Specifically, valine in raw meat and aspartic acid, threonine and tyrosine in cooked meat might consider as the marker for halal authentication. The findings here lay the groundwork for development of a marker for halal meat authentication based on the amino acids profile.

Keywords: RP-HPLC, amino acids, halal authentication, pork

Method for Extraction of Gelatins in Food and Non-food Products

Category: Product / Innovation (C)

Prof. Dr. Amin Ismail
Institute of Halal Products Research
amin@medic.upm.edu.my
03-89411287

Gelatin protein is commonly used as food additives, adhesive in sweets, as foaming agent and etc. It mainly derived from mammals, especially from pig skin and cow hide due to availability and attainable quality. As the source of gelatin protein become an issues for certain consumers, such as those prohibited to consume any porcine-based products for Muslims, those concerned about the occurrence of bovine spongiform encephalopathy (BSE) disease or swine influenza, vegetarians and sensitised individuals who are prone to allergic reactions, thus had made it as one of the most controversial food proteins in food application. For these reasons, we had developed a method for the extraction and identification of the gelatin protein from processed foods. First,the present invention relates to an extraction solution use to extract gelatin protein from food and non-food products and methods thereof which comprising the following steps; a) extracting the gelatin protein using aqueous acetone, b) separating the extracted gelatin protein in (a) using sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) and, (c) analyzing molecular weight of each sample tested using principal component analysis (PCA) in order to support the estimation that has been made based on (b) (SDS-PAGE only). Second, the invention also relates to a kit for implementing methods aforementioned. This invention has potential to be used as a standard method to extract the gelatin, and identify and differentiate its source in order to ensure the integrity of food industry in declaring the source of gelatin. Moreover, this invention will be helpful to assist the Department of Islamic Development Malaysia (JAKIM) and Department of Chemistry, MOSTI in detecting non-halal gelatin (porcine) for halal certification and monitoring. Furthermore, this invention is simple, not require expensive laboratory equipment, ease of sample preparation as well as can be used routinely for a large number of samples.

Keywords: Gelatin protein, SDS-PAGE, PCA, aqueous acetone, food products, non-food products

Evaluation of Avocado Fat from Malaysian Cultivars for Halal Fat Formulation

Category: Applied Research (B)

Dr. Mohammed Nazrim Marikkar
N.A.M. Yanty and K. Long
Institute of Halal Products Research
nazrinmarikkar@yahoo.com
03-89471840

The preliminary study showed that avocado fats from local Malaysian cultivars are found to contain higher solid fat content (SFC) than the oil from the imported Hass avocado. This property makes avocado fats from Malaysian cultivars to be suitable as raw material for halal fat substitute. As the SFC of the local cultivars are slightly lower than that of lard, they need to be blended with plant fats such as cocoa butter and palm stearin. Out of several blends formulated, avocado blended with cocoa butter and palm stearin in the ratio of AVO: CB: PS=84:9.5:6.5 is found to be compatible to the solidification characteristics of lard. The main advantage of this formulation is the fact that all ingredients used are of local origin. This can be marketed as a fat ingredient for products containing lard as a component. Chinese moon cakes and certain types of cookies are example of this category.

Keywords: Halal fat, lard alternative, avocado butter

.....

Bioconversion of Daidzein to Equol by *Bifidobacterium breve* 15700 and *Bifidobacterium longum* BB536

Category: Fundamental (A)

Prof. Dr. Shuhaimi Mustafa
Salma Elghali, Mehrnoush Amid, Mohd Yaizd ABD Manap, Amin Ismail and Faridah Abas
Institute of Halal Products Research
shuhaimi@biotech.upm.edu.my
03-89416541

Bifidobacteria species were incubated anaerobically with daidzein in Brain Heart Infusion broth at 37°C for 96 h. Equol production started during the first 6 h incubation with *Bifidobacterium breve* ATCC 15700 (*B. breve*) and *Bifidobacterium longum* BB536 (*B. longum*). The pH decreased during incubation of the bacteria with daidzein more than that in its absence. However, there was no significant difference in the growth of bifidobacteria strains when incubated in the culture medium with or without daidzein. The production of

lactic and acetic acids after 96 h incubation with daidzein for *B. breve* was 5.53 and 8.83 mmol l^{-1}, respectively, while for *B. longum* was 6.86 and 7.20 mmol l^{-1}, respectively. Thus, probiotic bacteria were able to produce equol from daidzein, hence dietary supplementation with equol may offer an important approach to provide all consumers with the health-promoting benefits of this metabolite.

Keywords: *Bifidobacterium* spp, phytoestrogens, isoflavones, daidzein, equol

……..

Microbial Polysaccharides and Their Modification Approaches

Category: Fundamental (A)

Prof. Dato' Dr. Yaakob Che Man
Nurul Hawa Ahmad and Shuhaimi Mustafa
Institute of Halal Products Research
hawa@food.upm.edu.my
03-89417344

The rheological properties of gellan-dextran mixture at different ratios (1:1, 1:2, and 1:3) with a total hydrocolloid concentration of 3% (w/v) have been investigated. Strain sweep tests at low frequency were performed in order to ascertain the linear viscoelastic region prior to dynamic oscillatory shear and steady shear tests. The critical strain limit was found to be around 1.0%. The gellan-dextran mixtures at all ratios exhibited shear thinning behavior with values of flow behavior index, n ranging between 0.15-0.66 according to the power law model. The mechanical spectra of 3% (w/v) gellan-dextran mixture at all ratios showed similar pattern where both G and G are frequency dependent while from tan delta the value showed liquid-like characteristic predominated over solid-like nature. Absorbance readings at visible region (450 nm) were used to measure the clarity of gellan-dextran mixture using water as reference.

Keywords: Gellan, dextran, rheology, steady shear, dynamic oscillatory shear

FTIR Spectroscopy Combined with Chemometric for Analysis of Sesame Oil Adulterated with Corn Oil

Category: Fundamental (A)

Prof. Dato' Dr. Yaakob Che Man
Nurrulhidayah Ahmad Fadzlillah and Abdul Rohman
Institute of Halal Products Research
nurrillahi@gmail.com
03-89417344

Sesame oil is an edible vegetable oil derived from sesame seed that has been used as flavor enhancer in Southeast Asian cuisine. This highly valuable oil can be subjected to adulterations with lower price oils in order to gain economical profit. Among ten vegetable oils evaluated using fatty acid (FA) profiles with principal component analysis (PCA), corn oil (CO) has the closest similarity in FAs combine together with sesame oil (SeO); therefore, CO is a potential adulterant in SeO. FTIR spectra at 1072 - 935 cm-1 was chosen for quantification analysis with acceptable values of coefficient correlation (R2), root mean square errors of calibration (RMSEC) and prediction (RMSEP). These combined method using first derivative FTIR spectra in partial least square (PLS) showed well quantified CO in SeO with R2 (0.992), RMSEC (0.53 % v/v) and RMSEP (1.31 % v/v) values. Moreover, the Coomans plot based on Mahalanobis distance were able to discriminate between SeO with adulterated oils such as CO, GSO and RBO.

Keywords: Adulteration, chemometric analysis, FTIR spectroscopy, sesame oil, corn oil

……..

FTIR-ATR Spectroscopy Based Metabolite Fingerprinting as a Direct Determination of Butter Adulterated with Lard

Category: Fundamental (A)

Prof. Dato' Dr. Yaakob Che Man
Nurrulhidayah Ahmad Fadzlillah Shuhaimi Mustafa, Amin Ismail and Alfi Khatib
Institute of Halal Products Research
nurrillahi@gmail.com
03-89417344

Adulteration of butter with cheaper animal fats, such as lard, has become an issue in recent years. A simple and rapid analytical method of attenuated total reflectance (ATR) in Fourier Transform Infrared (FTIR) spectroscopy was developed in order to determine the lard content in butter. The multivariate calibration of partial least square (PLS) model for the prediction of adulterant was developed for quantitative measurement. The model

yielded the highest regression with the correlation coefficient (R2) = 0.999, its lowest root mean square error estimation (RMSEE) = 0.0947, and its root mean square error prediction (RMSEP) = 0.0687, respectively. Cross validation testing evaluates the predictive power of the model. PLS model to be effective as their intercept of R2Y and Q2Y were 0.08 and -0.34, respectively.

Keywords: Butter, lard, FTIR, adulteration, metabolite fingerprinting

……..

Tentative Identification of Volatile Compounds in Commercial Budu, a Malaysian Fish Sauce by using GC-MS

Category: Fundamental (A)

Prof. Dr. Shuhaimi Mustafa
Hajaratul Najwa Mohamed, Yaakob Che Man and Yazid Abdul Manap
Institute of Halal Products Research
shuhaimi@biotech.upm.edu.my
03-89416541

Budu is a famous Malaysian fish sauce, usually used as seasoning and condiment in cooking. Budu is produced by mixing fish and salt at certain ratio followed by fermentation for six months in closed tanks. In this study, four commercial brands of Budu were analyzed for their chemical properties (pH, salt content and volatile compounds). The pH of Budu samples ranged from 4.50-4.92, while the salt (NaCl) content ranged between 11.80% and 22.50% (w/v). For tentative identification of volatile flavor compounds in Budu, two GC columns have been used, DB-WAX and HP-5MS. A total of 44 volatile compounds have been detected and 16 were common for both columns. 3-Methyl-1-butanol, 2-methylbutanal, 3-methylbutanal, dimethyl disulfide, 3-(methylthio)-propanal, 3-methylbutanoic acid and benzaldehye have been identified as the aroma-active compounds in Budu due to their lower threshold values.The results obtained in this study could provide useful information to predict the quality and safety of commercial Budu.

Keywords: Budu, fish sauce, flavors, aroma, volatile compounds

PRPi 2012

UPM's Research & Innovation

INSTITUTE OF AGRICULTURAL AND FOOD POLICY STUDIES

Export Performance and Trade Competitiveness of the Malaysian Cocoa Products

Applied Research (B)

Mrs. Nurjihan Idris
Amna Awad Abdel Hameed, Mohd Azaly Niti and Fatimah Mohamed Arshad
Institute of Agricultural and Food Policy Studies
nurjihanidris@gmail.com
03-89471067

Malaysia cocoa beans have decreasing trend, on the other hand, export of cocoa products such as cocoa butter, cocoa powder and cocoa paste has increased significantly over the years, as Malaysia becomes one of the largest cocoa grinders in the world. However, continuous increase in price of cocoa may affect the Malaysian grinders industry since raw materials have become more expensive. Hence, Malaysia may have to think again on the decision of producing cocoa beans or cocoa products. The second question that needs to be addressed is: Does Malaysia has advantage to compete with other major exporting countries in cocoa beans or products? Thus, this study aims to investigate the competitiveness of Malaysia as compared to other major exporters of cocoa beans and cocoa products. Two instruments are used, that is, relative export advantage index (RXA) and constant-market-share (CMS). RXA measures comparative advantage for these products. CMS technique examines changes in Malaysia export position based on three separate effects, namely; size-of-market, distribution and competitiveness. RXA indicates that through 1991 to 2005, Malaysia has comparative advantage in cocoa butter and cocoa powder. The CMS analysis suggests positive total export gain for both commodities which is derived from competitive effect and size of market effect.

Keywords: Cocoa, competitiveness, relative export advantage index (RXA), constant market share (CMS)

PRPI 2012

UPM's Research & Innovation

INSTITUTE OF TROPICAL FORESTRY AND FOREST PRODUCTS

Annual Rainfall Estimation Based on Two Different Methods

Category: Applied Research (B)

Mrs. Sheriza Mohd Razali
N.A. Ainuddin, A.H. Hazandy and M.S. Helmi Zulhaidi
Institute of Tropical Forestry and Forest Products
sheriza@putra.upm.edu.my
03-89471882

Rainfall is frequently used as a climate index during prolonged dry seasons and extreme rainfall to determine changes in global climate. This study estimates average total rainfall for the study area based on arithmetic mean and the Thiessen polygon methods. The objective was to analyze rainfall variability based on statistical analysis of variance and to produce maps of rainfall variability using isohyetal contour techniques. Based on the two methods, results showed three distinctive rainfall patterns occurred for consecutive years within the study area.

Keywords: Rainfall, negeri sembilan, thiessen polygon

.....

Assessment of Water Content using Remote Sensing Normalized Difference Water Index: Preliminary Study

Category: Applied Research (B)

Mrs. Sheriza Mohd Razali
Ahmad Ainuddin Nuruddin, Hazandy Abdul Hamid and Helmi Zulhaidi Mohd Shafri
Institute of Tropical Forestry and Forest Products
sheriza@putra.upm.edu.my
03-89471882

Normalized Difference Water Index (NDWI) and MODIS Normalized Difference Vegetation Index (NDVI) showed a relationship with annual rainfall and soil moisture. A very significant relationship found in polynomial relationship between annual rainfall with NDVI and MODIS NDVI (r2= 0.830 and 0.983). Higher rainfall was associated with higher NDVI value for both, surface reflectance imagery and MODIS NDVI. This study found no significant relationship in in situ measurement between soil moisture content and mean NDWI. This study suggests the insignificant was associated with insufficient in-situ data. Whereas annual rainfall and mean NDWI for long term period was r2=0.349 which indicate moderate relationship. Further study is require to investigate the NDWI value for long term period and in situ measurements in order to provide insufficient in situ analysis data.

Keywords: NDVI, NDWI, soil moisture

Assessment of NDVI Data for Land Cover Classification Using Gamma Methods

Category: Applied Research (B)

Assoc.Prof. Dr. Ahmad Ainuddin Nuruddin
Sheriza Mohd Razali, Hazandy Abdul Hamid and Helmi Zulhaidi Mohd Shafri
Institute of Tropical Forestry and Forest Products
ainuddin@forr.upm.edu.my
03-89471882

Normalized Vegetation Index (NDVI) is a useful index for determination and assessment of temporal different land cover classes sensed by remote sensing instruments. NDVI is indicating as vegetation status on the ground using index basis. The objective of this study was to assess spatial phonological pattern of land cover for ten years period. Digitally processed of Moderate Resolution Imaging Spectroradiometer (MODIS) satellite image were preprocessed earlier by science team of National Astronautics and Space Administration (NASA). The data were also obtained through the online Data Pool at the NASA Land Processes Distributed Active Archive Centre (LP DAAC), USGS/Earth Resource Observation and Science (EROS) Centre, Sioux Falls, South Dakota (http://lpdaac.usgs.gov/get_data). Image were segmented into different land cover types using unsupervised of sieve and clump processed. Images were spectrally profiled accordingly by different types of land cover and were enhanced using adaptive filtering of Gamma methods based on ENVI image processing software. The land cover map showed clear distribution of NDVI data using the new dimension of satellite imagery data. Clear phonological pattern of NDVI were derived for the study area.

Keywords: Tropical Forests, Malaysia, Time-Series, NDVI" "

……..

Carbon Content of Different Biomass Components of Selected Species in Bubu Forest Reserve, Perak

Category: Applied Research (B)

Assoc.Prof. Dr. Ahmad Ainuddin Nuruddin
Nur Kyariatul Syfinie Abdul Majid, Awang Nor Abdul Ghani and Khamziah Abdul Kudus
Institute of Tropical Forestry and Forest Products
ainuddin@forr.upm.edu.my
03-89471882

Forest plays a vital role in controlling the capacity of atmosphere CO2 where they are also known as a 'carbon sinker' as they manage to significantly capture carbon and store them

as biomass. Tropical forest ecosystem is believed to sequester a large number of carbon (C) compared to other natural ecosystem where the majority of C are stored in the aboveground vegetation. In Malaysia accurate information on aboveground carbon storage is lacking. In Bubu Forest Reserves, 14 trees were selected and felled and the biomass of each component was weighed separately (tree, branches, leaves) and discs from 3 sections (base, middle, top) of the main stem were obtained for further testing After being weighed at the site, all samples were brought to the laboratory for further analysis. Samples were analysed using CNS 2000 Elemental Analyser for C content. This study shows carbon content vary with biomass components with foliage had higher carbon content when compared to stem and branches. Carbon content also varies by species. Most of the carbon content samples was below 50 %. This information is useful in estimating the carbon stock of our forest and for negotiation in climate change forum.

Keywords: Carbon,Forest, Biomass

……..

Durability of Kenaf/Polypropylene Composites under Cyclic Immersion

Category: Applied Research (B)

Dr Edi Syams Zainudin
Wan Mohamad Haniffah Wan Hussin, Khalina Abdan and S.M Sapuan
Institute of Tropical Forestry and Forest Products
edisyam@eng.upm.edu.my
03-89466317

Water can cause degradation in mechanical properties of composites. Degradation products after services life in land fill area is very desirable. Under piles of rubbish, rain and sunny days repeatedly bathe and conditioned (dry) the composites. Furthermore, chemicals and microorganisms tend to degrade natural fibres rather than polymeric materials of natural fibre composites. This study was carried out to understand tensile properties degradation of kenaf/polypropylene composite under cyclic immersion. Composites 40% and 60% fiber loadings are immersed in bleach (16.17%v/v) and water for 3 days of immersion and 4 days of conditioning at room temperature 28°C and 55% humidity. Immersion and conditioning are repeated for 4 cycles. Pattern of degradation has indicated that composites with 60% fibre loading degrades better than composites with 40% fibre loading. Therefore high fibre loading is suitable for disposal products.

Keywords: Degradation, cyclic immersion, fibre loading

Accelerated Weathering of Kenaf High Density Poly-Ethelyne (HDPE) Composite

Category: Applied Research (B)

Dr Edi Syams Zainudin
Mohd Sapuan Salit and Umar Hanan
Institute of Tropical Forestry and Forest Products
edisyam@eng.upm.edu.my
03-89466317

Current research trend in polymeric composites materials is focusing on using natural fibres such as kenaf fibres (Hibiscus Cannabinus) to be use as fillers or reinforcements. Kenaf fibres have several advantages over synthetic fibres such as easy to obtain, low cost, not abrasive hence avoid damaging moulds during composites fabrication process, prevent deforestation by reducing the dependency on wood, sustainable and can be replant.However, biocomposite materials intended for outdoor applications are exposed to weather elements that deteriorate the integrity of the composite's mechanical properties. Determining the material durability under the harsh weather elements provides essential information for product makers and house builders to understand the material lifespan for outdoor application. Choosing a material that has good mechanical properties alone is not sufficient if the material cannot endure the degrading elements of weather. Therefore, testing such as accelerated weathering helps researchers to predict the service life of a new developed material without going through months or years of natural weathering

Keywords: Kenaf,HDPE,accelerated weathering, mechanical properties

……..

Improvement of Hyaluronic Acid Biosynthesis by Streptococcus Zooepidemicus Atcc 39920 and Recombinant Escherichia Coli Rosetta (De3)

Category: Applied Research (B)

Assoc. Prof. Dr. Rosfarizan Mohamad
Lai Zee Wei, Raha Abdul Rahim and Arbakariya Ariff
Institute of Tropical Forestry and Forest Products
farizan@biotech.upm.edu.my
03-89467518

Hyaluronic acid (HA) is a high molecular mass, unsulphated polysaccharide. This polymer is composed of D-glucuronic acid and N-acetyl glucosamine residues linked by alpha-1-3 and beta-1-4 glycosidic bonds. With its biological functions and unique physicochemical

properties, HA has been widely used in the medical and cosmetic fields.In order to achieve effective HA biosynthesis, optimization of medium formulation and development of suitable process strategies are required. The present study was undertaken to investigate the nutritional requirements for growth and high molecular weight HA biosynthesis by Streptococcus zooepidemicus ATCC 39920, using a 2-L stirred-tank bioreactor. The effect of glucose, nitrogen sources and carbon/nitrogen (C/N) ratio on the growth of the strain and on HA biosynthesis were initially investigated. About 2.44 g/L of HA with a high molecular weight (4.36 MDa) was synthesised at an optimal C/N of 2.5:1 (using a mixture of yeast extract and tryptone) in a 2-L stirred-tank bioreactor equipped with a Rushton turbine impeller. Helical ribbon impeller showed efficient mixing in non-Newtonian HA broth. It was able to improve the HA molecular weight from 4.36 to 5.20 MDa. The potential use of n-dodecane and n-hexadecane as oxygen vectors for enhancement of HA biosynthesis by S. zooepidemicus ATCC 39920 was also investigated. The highest HA concentration (4.25 g/L) and molecular weight (15.4 MDa) were successfully obtained when 0.5% (v/v) n-hexadecane and 0.785 m/s impeller tip speed of helical ribbon were used. The maximum HA concentration and molecular weight by the recombinant Escherichia coli was increased by about 16% and 42%, respectively in the 2-L stirred tank bioreactor compared to shake-flask fermentation with a controlled dissolved oxygen tension at 30% air saturation via cascade control of airflow rate and agitation speed. Generally, the optimization and process control strategies have been successfully applied to improve HA biosynthesis using a bioreactor.

Keywords: Hyaluronic acid, Streptococcus zooepidemicus ATCC 39920,helical ribbon impeller, oxygen vector

……..

Removal of Heavy Metals from Steel Making Waste Water by Using Electric Arc Furnace Slag

Category: Applied Research (B)

Prof. Dr. Luqman Chuah Abdullah
Beh Chin Lai, Mohammed Yusof, Mohsen Nourouzi, Thomas S. Y. Choong and F. Rabiei
Institute of Tropical Forestry and Forest Products
chuah@eng.upm.edu.my
03-89466288

This work investigated the reduction of chemical oxygen demand(COD), biological oxygen demand (BOD), total suspended solids (TSS) and the concentration of heavy metals of wastewater from a steel making plant. Adsorption experiments were carried out by electric arc furnace slag (EAFS)in a fixed-bed column mode. The raw wastewater did not meet the standard B limitations, having high values of BOD, COD, TSS, Iron, Zinc, Manganese and Copper. After passing through the fixed bed column, BOD, COD and

TSS values decreased to 1.6, 6.3 and <2 mgL^{-1}, respectively while the concentration of Iron, Zinc, Manganese and Copper were 0.08, 0.01, 0.03 and 0.07 mgL^{-1}, respectively. The results confirmed that EAFS can be used as an efficient adsorbent for producing treated water that comply with the Standard B limitations for an industrial effluent.

Keywords: Adsorption, electric arc furnace slag (EAFS), industrial wastewater, heavy metals

.....

Anti-inflammatory Activity of the Major Compound from Methanol Extract of Phaleria Macrocarpa Leaves

Category: Fundamental (A)

Prof. Dr. Luqman Chuah Abdullah
Rozana Dewi, Salmiah Ahmad and Thomas S.Y. Choong
Institute of Tropical Forestry and Forest Products
chuah@eng.upm.edu.my
03-89466288

Phaleria macrocarpa or Mahkota Dewa is a plant originally found in Papua. The variety usages of this plant such as treatment for cancer, impotency, diabetes mellitus, and skin diseases lead to the studies of verification and validation of the claims made by the Indonesian traditional medicine practitioners. This study was done by targeting on the chemical marker compound, phalerin, to ensure whether this particular compound contribute to the anti-inflammatory activity of the plant. The phalerin was extracted from Phaleria macrocarpa leaves using methanol and the compound was verified by the HPLC, NMR and LCMS. The anti-inflammatory potential of phalerin was evaluated using three in-vitro assays which are Lipoxygenase (LOX), Hyaluronidase (HYA) and Xanthine Oxidase (XO) assays. The phalerin was identified as mild anti-inflammatory compound with percentage inhibition of 34.83±4.64 and 23.47±9.43% in XO and LOX assay respectively. However phalerin does not showing significant activity on HYA assay with 1.34 ±0.57% of inhibition. This study verifies that phalerin does have effects on inflammation and functions moderately on XO and LOX assays.

Keywords: Phaleria macrocarpa, phalerin, anti-inflammatory

Hybrid Biocomposite Design for Aircraft Radomes

Category: Fundamental (A)

Dr. Dayang Laila Abang Abd Majid
Mohd Yusoff Bin Mohd Haris and Khairul Dahri Mohd Aris
Institute of Tropical Forestry and Forest Products
dlaila@eng.upm.edu.my
03-89466395

An aircraft radome is a dome shape structure encapsulating the antenna and protects the antenna from its physical environment. The material for radome aircraft is radio transparent and does not degrade the electrical performance of the closed antenna. Sandwich wall design is a typical wall construction for aircraft radome especially for large aircraft such as Boeing 737 and Airbus A320. However, for small aircraft the typical construction are made up from fiberglass using the conventional lay-up process. The current work explore the feasibility of incorporating natural fibres as part of the radome construction. Natural fibers have advantages such as low density, low cost, renewable and biodegradable. In this work, a novel hybrid biocomposite design suitable for aircraft radome utilizing kenaf fibres as core material is developed. The performance of kenaf as the core material in laminate design of the aircraft radome part manufactured via vacuum infusion process is investigated. The radome laminate design is [e-glass/kenaf/kenaf/e-glass]. E-glass fiber will give protection at outer and inner layer, and kenaf fiber as a energy absorber. The radome mold was taken from the original aircraft radome part Beechcraft Duke 60 twin engine, 4-seater aircraft. The mold preparation was prepared by using parts mold technique through hand lay-up process. By using this mold, the aircraft radome part can be reproduced with different fabrication method such as vacuum bagging, vacuum infusion and resin transfer molding. The vacuum infusion process and the parts model was used to fabricated the new radome part. Upon completion, the part shows promising result and potential to be used as an option with the current hand lay-up process.

Keywords: Aircraft radome, biocomposite, vacuum infusion, hybrid

Modeling Biodegradation and Kinetics of Glyphosate by Artificial Neural Network

Category: Fundamental (A)

Prof. Dr. Luqman Chuah Abdullah
Mohsen Nourouzi, Thomas S. Y. Choong and F. Rabiei
Institute of Tropical Forestry and Forest Products
chuah@eng.upm.edu.my
03-89466288

The present invention provides a method of adsorbing dye by cationized palm kernel shell (PKS) comprising the steps of (a) washing and crushing PKS said raw material; (b) drying washed PKS said prepared raw material; (c) preparing solution of 3-Chloro-2-hydroxypropyltrimethylammonium chloride; (d) puting cationizing solution in reactor vessel; (e) mixing prepared raw material with cationizing solution; (f) keeping quaternization for 24 h; (g) removing material (modified PKS (MPKS)) after completion of reaction; (h) neutralizing and washing MPKS; (i) preparing Reactive Black 5 (RB 5) solution as simulated wastewater; (j) contacting simulated wastewater by MPKS to ion exhchange-adsorption.

Keywords: Glyphosate, biodegradation, Monod model, Haldane model, artificial neural network (ANN)

……..

A Gas Permeability Apparatus for Porous Media

Category: Product / Innovation (C)

Prof. Dr. Alinaghi Karimi
Parida Md Tahir and Adrian Choo Cheng Yong
Institute of Tropical Forestry and Forest Products
karimi.ut@gmail.com
03-89467245

The apparatus of mentioned below can measure gas permeability of all kinds of continuous-porous materials, including wood (longitudinal, tangential, and radial directions), paper, polymer-based materials, etc. Permeability is one of the physical characteristics of porous materials that have significant effect on many capabilities of them, such as impregnation, drying, filtration, etc. The present apparatus is equipped with an electronic time measurement device with milli-second precision; this feature allows the permeability values to have accuracy and precision needed for scientific purposes. This apparatus uses falling water method; the water column can be easily changed according to test design. The

two sensors in the electronic time measurement device are designed so that the distance between them can be easily set to 10, 15, and 20 cm. Also, sensors are mounted on a stand that can simply be moved along the glass tube. This would enable the length of water column to be fixed from 30 cm up to 2 meters. The main skeleton of the whole apparatus is designed so that the diameter of its glass tube may easily be changed from 0.5 to 5 cm in accordance to different standard stipulations, as well as the amount of water displacement required.

Keywords: Gas permeability, porous media, fluid migration

……..

A Water Permeability Apparatus for Porous Media

Category: Product / Innovation (C)

Prof. Dr. Alinaghi Karimi
Parida Md Tahir and Adrian Choo Cheng Yong
Institute of Tropical Forestry and Forest Products
karimi.ut@gmail.com
03-89467245

The apparatus is a combination of various parts which include an air compressor that provides a stated maximum of 10 kg/cm2 of air pressure to the system, a series of stainless steel tubes that is interconnected with valves that stops or release air or water to the different parts of the apparatus, a digital pressure gauge and controller that is used to set an exact pressure that is needed, an air pressure regulator that regulates the pressure of the air coming into the system from the air compressor, a 10 liter stainless steel tank with a single air outlet, a single air inlet, a single water inlet and a single water outlet, three transparent Teflon tubes of three different inner diameters (10 mm, 6 mm and 2 mm), a 0.2 micron micro filter that is used to remove air and particulated matter from the dyed distilled water, a flexible tube that connects the exit of the apparatus to the specially made injector, a specially made injector designed to serve as a connector between the apparatus and the samples without leakage, a basin for collecting water that exits the samples, an electronic balance to weigh the water exiting the samples and a computer with a program installed for recording the data from the balance in a fixed interval (3 seconds). The whole apparatus with the exception of the air compressor, basin, electronic balance and computer is mounted on a stainless steel frame and plywood board. An advantage of this apparatus over existing ones would be the ability to measure longer samples.

Keywords: Water permeability, porous media, fluid migration

PRPI 2012

UPM's Research & Innovation

INSTITUTE OF SOCIAL SCIENCE STUDIES

Perubahan Cuaca: Apa Kata Nelayan Pantai Timur dan Apa Kesannya Ke Atas Aspek Ekonomi, Sosial dan Kesihatan Mereka

Applied Research (B)

Mr. Hayrol Azril Mohamed Shaffril
Bahaman Abu Samah, Jeffrey Lawrence D'Silva and Jegak Uli
Institute of Social Science Studies
hayrol82@gmail.com
03-89471870

Kajian ini telah dijalankan di empat negeri di sepanjang pantai timur Semenanjung Malaysia iaitu Kelantan, Terengganu, Pahang dan Johor Timur. Seramai 300 orang nelayan berdaftar telah dipilih secara rawak (random sampling) untuk dijadikan responden kajian ini. Borang kaji selidik telah digunakan bagi mendapatkan data yang diperlukan . Kajian ini telah ditaja oleh Universiti Putra Malaysia dan Laboratori Pembangunan Mapan dan Pengembangan Pertanian , Institut Pengajian Sains Sosial telah diberikan tanggungjawab untuk menjalankan kajian ini. Kajian ini mempunyai 2 objektif utama iaitu untuk mengetahui pandangan nelayan mengenai perubahan cuaca yang sedang dan telah berlaku dan adakah perubahan yang berlaku ini mempunyai kesan ke atas aspek ekonomi, sosial dan kesihatan mereka. Memang benar terdapat banyak kajian saintifik yang telahpun dilakukan di dalam ataupun luar negara, namun begitu pihak kami merasakan bahawa amat penting untuk mengkaji perubahan-perubahan yang berlaku dan kesan-kesan yang menimpa dari pandangan dan pengalaman nelayan sendiri. Hasil dari kajian ini diharap dapat memberikan input untuk lebih banyak lagi kajian yang berbentuk saintifik di jalankan. Kajian-kajian seperti kesan perubahan cuaca ke atas produktiviti laut, keadaan arus laut, ombak, dan angin di lautan perlu dilakukan dengan lebih mendalam kerana terbukti bahawa semua perkara ini telah menjadi antara kebimbangan utama nelayan yang ditemui. Selain itu, data kajian juga boleh dijadikan sebagai rujukan dan asas bagi agensi-agensi yang berkenaan bagi membentuk strategi adaptasi sosial komuniti khususnya komuniti nelayan dalam menghadapi ancama perubahan cuaca yang semakin mencabar pada hari ini.

Keywords: Perubahan cuaca, persepsi dan pengalaman nelayan, pembangunan komuniti nelayan, aspek sosio-ekonomi nelayan.

Competency and Agriculture Extension Officers in Paddy Development Areas in Selangor

Applied Research (B)

Assoc. Prof. Dr. Azizan Asmuni
Azahari Ismail, Hayrol Azril Mohamed Shaffril and Jasmin Ariff Shah
Institute of Social Science Studies
azizanas@putra.upm.edu.my
03-89468115

This study in quantitative in nature where questionnaire was used as the instrument. There were two main parts of the questions; one of the parts focusing on the competency of the agriculture extension officers which consists of 24 questions and another part of the questionnaire was focusing on the roles of the agriculture extension officers which consist of 14 questions. Through SPSS, relevant and suitable analyses were employed. This study has managed to reveal that the agriculture extension officers in the paddy development areas in Selangor do have a high level of competency and it can be concluded that they were able to carry their roles as the agriculture extension officers effectively. A number of recommendations and discussions are highlighted and expectantly it can aid the agriculture agencies in implementing more strategies to further strengthen their extension officers competencies.

Keywords: Agriculture extension officers, rice paddy industry, competency and farmers

……..

Fungsi Pepatah Tamil dalam Membentuk Kebahagian Keluarga

Fundamental (A)

Dr. Paramasivam Muthusamy
Jamilah Othman and Umah Devi Thandavarayan
Institute of Social Science Studies
param@fbmk.upm.edu.my
03-89468693

Pepatah Tamil mempunyai fungsi untuk membentuk keluarga bahagia dan sejahtera serta berupaya menjadi penyumbang keamanan Negara tidak diketahui oleh masyarakat pada hari ini. Senario yang membimbangkan ini tercetus kerana pepatah Tamil jarang dijadikan sebagai wadah komunikasi kehidupan seharian, persaingan penggunaan bahasa asing yang lebih menjanjikan kemewahan, kesibukan ibu bapa bekerja dan kecanggihan teknologi tanpa sempadan yang meminggirkan fungsi pepatah dalam kehidupan masa kini. Justeru, pengkaji menjelaskan permasalahan dalam aspek institusi sosial kekeluargaan

dan elemen kebahagiaan untuk didikan moral berdasarkan perspektif pepatah Tamil. Penyelidikan yang dijalankan ini menetapkan sebanyak tiga objektif iaitu memberikan gambaran yang jelas dengan meneroka keunikan dan keistimewaan pepatah dari segi tradisi dan pemikiran masyarakat Tamil. Seterusnya, menghuraikan institusi keluarga Tamil dari segi sosial kemasyarakatan melalui pepatah Tamil dan membincangkan cara penggunaan pepatah Tamil yang dapat membantu membentuk keluarga yang sejahtera dalam masyarakat Tamil. Akhir sekali, Teori Keamanan Maslow menjelaskan keperluan asas manusia mengikut hierarki. Kaedah kajian yang dipilih ialah kajian kualitatif dan informan dipilih secara rawak dari sebuah sekolah Tamil di Petaling Jaya, Selangor. Informan yang terpilih ditemuramah untuk mendapatkan maklumat mengenai kajian yang dilakukan. Seterusnya kajian heuristik dan kajian perpustakaan turut dijalankan oleh penyelidik untuk memperincikan konsep dan kepentingan pepatah Tamil serta situasi keluarga Tamil. Maklumat-maklumat seperti pembentukan sesebuah keluarga melalui suami isteri, tanggung jawab anak-anak terhadap ibu bapa turut dibincangkan secara kritis dan berkesan melalui pepatah yang dikaji turut dijelaskan dalam penyelidikan ini. Istimewanya, dapatan kajian ini mendedahkan keunikan dan keistimewaan pepatah dari segi tradisi dan pemikiran masyarakat Tamil serta fungsinya memberikan pengajaran. Sebanyak sembilan pepatah Tamil berjaya dikumpul melalui temuramah dari informan dan melalui kajian ini dapat membuktikan bahawa wujud penggunaan pepatah Tamil dalam kalangan keluarga tetapi semakin berkurangan. Pepatah Tamil dapat melahirkan keluarga yang sejahtera dengan menitik beratkan aspek kekeluargaan iaitu aspek perwatakan suami dan isteri, perwatakan dan peranan anak dari aspek moral.

Keywords: Institusi keluarga, kebahagiaan, keluarga tamil, pepatah tamil, nilai moral

PRPi 2012

UPM's Research & Innovation

INSTITUTE OF TROPICAL AGRICULTURE

Root Colonisation of *Pseudomonas aeruginosa* Strain UPMP3 and Induction of Defence-related Genes in Oil Palm (*Elaeis guineensis*)

Category: Applied Research (B)

Dr. Wong Mui Yun
Sathyapriya Hamid, Sariah Meon and Siti Nor Akmar
Institute of Tropical Agriculture
muiyun@putra.upm.edu.my
03-89474852

Pseudomonas aeruginosa strain UPMP3 was labeled with beta-glucuronidase (gusA) and green fluorescent protein (gfp) for root colonization study of oil palm seedlings for the first time. This strain not only demonstrated effective colonization and proliferation in oil palm roots but also the ability to induce defense-related genes such as chitinase and beta-1, 3 glucanase. The results demonstrate that this strain has the potential to be used as a biocontrol agent against Ganoderma basal stem rot in oil palm. Pseudomonas aeruginosa is known to be a biocontrol agent against plant pathogens, thus, the tagged Pseudomonas aeruginosa strain UPMP3 could be developed into a product and used to study various mechanisms attributed to the biocontrol activities such as colonization of plant parts and induced resistance in any plant-microbe interaction studies. The developed protocols for the detection of induced resistance biomarkers such as chitinase and beta-1, 3 glucanase could be used for screening purpose in oil palm for verifying the biocontrol ability in a particular biocontrol agent. Research institutions and oil palm industry could use the developed product and protocols for the benefits mentioned above. The costs of producing transformed Pseudomonas aeruginosa strain UPMP3 and the screening of biomarkers are considered moderate.

Keywords: *Pseudomonas aeruginosa*, induced resistance, chitinase, beta-1, 3-glucanase, root colonization, biocontrol agent

Loop-Mediated Isothermal Amplification (Lamp): A Rapid Diagnostic Assay for Coconut Cadang-Cadang Viroid (CCCVd) Variants in Oil Palm

Category: Applied Research (B)

Dr. Kong Lih Ling
Sathis Sri Thanarajoo, Kong Lih Ling, Jugah Kadir, Lau Wei Hong
and Ganesan Vadamalai
Institute of Tropical Agriculture
lihling@putra.upm.edu.my
03-89471173

Coconut cadang-cadang viroid (CCCVd) is the causal agent of the lethal Coconut cadang-cadang disease in the Philippines. CCCVd is also associated with orange spotting disease (OS) in oil palm. It was estimated that the average yield gained from the OS-affected palms was 25-50% lower than the healthy palms. In 2006, Vadamalai and others have demonstrated that oil palms in Malaysia contained several sequence variants of CCCVd. These oil palm CCCVd variants were found in low concentration, thus difficult to detect. Hence, rapid detection of CCCVd is vital for prevention and control measures of OS. Several existing methods can be used for detecting CCCVd such as Polyacrylamide gel electrophoresis (PAGE), Ribonuclease protection Assay (RPA), RT-PCR and hybridization, but they are time consuming and inconsistent for CCCVd oil palm variants. Therefore, Reverse Transcription Loop-mediated Isothermal Amplification (RT-LAMP), a novel gene amplification method, was evaluated for detection of oil palm CCCVd variants. RT-LAMP is efficient, rapid and specific in amplifying DNA under isothermal conditions using a set of four specially designed primers and a DNA polymerase with strand displacement activity. CCCVd was detected within 60 minutes by the RT-LAMP method using total nucleic acid extracted from oil palm leaves. This method was able to detect the presence of CCCVd in the infected leaf samples where fluorescence reagent showed colour change from orange to green. Analysis of RT-LAMP product using 2% Agarose gel electrophoresis also showed bands of expected size, ca 150 bp, thus confirming the presence of CCCVd in the oil palm samples.

Keywords: RT-LAMP, coconut cadang-cadang viroid detection, oil palm

UPM BioGreen Biofertilizer for Efficient Production of Rice and Vegetable

Category: Applied Research (B)

Assoc. Prof. Dr. Radziah Othman
Umme Aminun Naher and Qurban Ali Panhwar
Institute of Tropical Agriculture
radziah@agri.upm.edu.my
03-89474924

Biofertilizer 'UPM BioGreen' consists of locally isolated nitrogen fixing, phosphate solubilizing bacterial strains and Glomus mosseae mycorrhiza. Microbes were grown in 2.5 % molasses and mixed into compost mix consists of commercial peat (Peat grow) and empty fruit bunches (EFB) compost. Application of one tone per hectare of this product is able to increase plant biomass, photosynthesis and crop yield with 30% less chemical nitrogen and phosphorus fertilizer. Nitrogen fixing bacteria of this product supply nitrogen for crop requirement. Phosphate solubilizing bacteria and mycorrhiza enhance P solubilization from phosphate rock that improves plant P acquisition and plant growth with reduced P fertilizer. Instead of expensive triple super phosphate (TSP) a cheaper phosphate rock (PR) can be utilized for annual crop production. Phytohormones produced by the microbes construct extensive plant root architecture that increased nutrient uptake from surrounding soil. This product is environmental friendly and suitable for sustainable crop production. UPM BioGreen can be easily applied by farmers by mixing it with organic fertilizer and can be used for crop production especially rice and vegetables. Industries related to organic and biofertilizer production are able to produce this product by using locally available organic materials and industrial byproducts such as molasses. The cost for manufacturing of this product should be less than that of chemical fertilizer."

Keywords: Biofertilizer, UPM biogreen, N fertilizer, phosphate rock, rice, vegetables

.....

Degradation of Oil Palm Waste Toxic Compounds Through Vermicomposting and Its Effects on Earthworm Population

Category: Applied Research (B)

Prof. Dr. Mohamed Hanafi Musa
D. T. Sabrina, A. W. Gandahi, T. M. M. Mahmud and A. A. Nor Azwady
Institute of Tropical Agriculture
mmhanafi@agri.upm.edu.my
03-89474419

The total oil palm cover has increased in the past few years in Malaysia resulting in huge production of oil palm waste which has raised concerns over its disposal. Composting

harmful pollutants in the field could minimize their negative effects on the surrounding environment, including earthworm populations. The purpose of present research was to assess the fresh and composted empty fruit bunch (EFB) effects on earthworm (Pontoscolex corethrurus) population under natural conditions and to observe the effect of the composting process on phenol concentrations, and the types of phenols present under several EFB conditions. Three types of decomposed EFB were designed: (i) vermicompost EFB, (ii) normally composted EFB, and (iii) EFB naturally decomposed in the field, plus a control: fresh EFB. There were 3 cages in each replication for each treatment. Five earthworms were introduced into each cage before the treatments were added. The treatments included control, 37.5 t ha-1 raw EFB, and 37.5 t ha-1 composted EFB. Our results indicated that phenol in the EFB was broken down during EFB decomposition. As the incubation occurred in a closed system, the phenols accumulated during the first to third weeks. Due to the possibly low population of bacteria at that stage, phenol was slowly degraded. Under natural conditions phenol was degraded easily and leached out from the system. Findings regarding types of phenolic compounds in raw and decomposed EFB revealed that only phenolic compound found in fresh EFB was 2,4-bis(1,1-dimethylethyl) phenol. The vermicompost did not contain any phenols. Application of fresh EFB under natural conditions did not drastically reduce the earthworm population. Fresh, composted, and field- composted EFB produced phenol compounds, whereas no phenolic compounds were detected in vermi-composted EFB.

Keywords: Earthworm population, oil palm waste, EFB composting, phenolic compounds

……..

Phytochemical Compounds and Antibacterial Activity of Jatropha Curcas Linn. Extracts

Category: Applied Research (B)

Prof. Dr. Norhani Abdullah
Namuli, A., C.C. Sieo, S.W.Zuhainis and E. Oskoueian
Institute of Tropical Agriculture
norhani@biotech.upm.edu.my
03-89466700

The present study was conducted to determine the phytochemical compounds in different solvent extracts of Jatropha curcas Linn. plant and antibacterial activity of crude extracts. Aqueous, methanolic and hexane extracts of various plant parts were analysed for phytochemical compounds by spectrophotometry, RP-HPLC and GC-MS. Antibacterial activity was studied by paper disc diffusion assay against Gram positive and Gram negative bacteria. The MIC and MBC were determined by micro-broth dilution. The root bark methanolic extract contained high phenolics (11.51 mg gallic acid/g DW) and flavonoids (0.94 mg rutin/g DW). Kernel meal aqueous extract contained high saponins

(0.65 mg diosgenin/g DW) and the methanolic extract contained 1.13 mg/g DW phorbol esters. Phytochemicals detected by RP-HPLC were pyrogallol, gallic acid, naringin, rutin and vanillic acid. The main compounds detected by GC-MS were oxalic acid (root bark), acetic acid and oleic acid (stem bark). Inhibition zones ranged from 8.0 to 17.7 mm. Low MIC (1.2-2.3 mg/ml) and MBC (0.4-6.3 mg/ml) values were observed in methanolic extract of all plant parts. The present study showed that stem bark, root bark and kernel meal of J. curcas contained compounds with antibacterial activities. The results indicate the potential of J. curcas as a source of antibacterial compounds.

Keywords: Jatropha curcas Linn., phorbol esters, phytochemicals, antibacterial activity.

……..

Time Course of ROS Production in Skeletal Muscle Mitochondria from Chronic Heat-Exposed Broiler Chickens

Category: Fundamental (A)

Prof. Dr. Zulkifli Idrus
Azad Md Abul Kalam
Institute of Tropical Agriculture
zulkifli@agri.upm.edu.my
03-89468967

Emerging evidence has shown that acute heat stress (34ÂºC for 12 h) stimulates mitochondrial ROS production in chicken skeletal muscle. More recently we confirmed that chronic heat stress also causes more or less oxidative damage to skeletal muscle in broiler chickens. Little is known, however, about mechanism by which chronic heat stress induced oxidative damage. To address this, we investigated the sequential changes in mitochondrial function and ROS production of heat-exposed chickens. Broiler hicks at 19 days of age were exposed to either constant heat stress (34ÂºC) or kept a control temperature (24Â°C). Pectoralis superficialis muscles were taken after 0, 1, 3, 5, 9 and 14 days of heat exposure. ROS production, oxygen consumption rate and membrane potential (??m) were measured using mitochondria isolated from the muscle. Skeletal muscle mitochondria for control group showed no changes in ROS production throughout the experimental period, whereas that for heat stress group increased after 3, 5 and 9 days and returned to baseline levels after 14 days. A similar trend was observed for ??m in state 4, oxygen consumption rate in state 3, and FCCP-stimulated oxygen consumption rate: ??m in state 4 for heat-stressed group significantly increased after 3 and 5 days, and returned to control levels after 9 and 14 days. Oxygen consumption rate in state 3 and FCCP-stimulated one definitely increased after 3 and 5 days, and after 3, 5 and 9 days of heat exposure, respectively and both rates returned to control levels at 14 days. These results suggest that increases in mitochondrial ROS production observed during a 3-5 d period of heat exposure may occur due to an increase in ??m which possibly resulted from the enhanced substrate oxidation. The possible reasons

why such mechanistic alterations were no longer observed after 14 days of heat exposure are discussed.

Keywords: Mitochondria, ROS, oxygen consumption, membrane potential, chronic heat stress

……..

Switch on The Genes to Leaner Chickens

Category: Fundamental (A)

Assoc Prof Dr Goh Yong Meng
Maryam Royan, Fauziah Othman, Awis Qurni Sazili, Abdoreza Soleimani, Mahdi Ebrahimi, Mohamed Ali Rajion, Intan Shameha Abdul Razak, Ooi Peck Toung and Suria Kumari Ramiah
Institute of Tropical Agriculture
ymgoh@vet.upm.edu.my
03-89463401

Malaysia has among the highest per capita consumption of chicken meat at 35.7 kg in 2010. This is unsurprising as chicken meat is one of the cheapest and constantly available animal protein in the country. In 2010, total daily production of broilers amount to about 1.4 - 1.5 million birds per day, or about 550 million birds a year, providing more than 80 % of the country's annual meat supply. Therefore, reduction of fats in chicken meat represents one of the most practical avenues to minimize animal fat-related health issues in human populations. Our ongoing research has shown that some naturally occurring fatty acids and ligands are capable of reducing fat deposition in chicken meat by up to 10 %. This is equivalent in the reduction of more than 470 g chicken fat consumption per person per year, based on current per capita consumption data. These naturally occurring fatty acids and ligands are postulated to act on various classes of Peroxisome Proliferator Activating Receptors (PPAR) and genes which are known to regulate fat synthesis and deposition. This technology can be incorporated directly in the current feeds and feeding practices at an additional 23 sen/kg of feed, and is readily adaptable to the Malaysian poultry meat industry worth more than RM 2 billion annually (2010).

Keywords: PPAR, chicken meat, fatty acids, fats

Development of High Yielding Synthetic Brassica napus Genotype

Category: Fundamental (A)

Assoc. Prof. Dr. Mohd Rafii Yusop
Md. Abdul Malek, Mohd Razi Ismail and Md. Mukhlesur Rahman
Institute of Tropical Agriculture
mrafii@putra.upm.edu.my
03-89474825

Allopolyploidy plays an important role in plant evolution and confers obvious advantages on growth and breeding compared to low ploidy levels. An attempt was taken to develop allotetraploid Brassica napus L. (AACC, 2n=38) artificially from its progenitor diploid species B. rapa (AA, 2n=20) and B. oleracea (CC, 2n=18). Cross with B. rapa as a female parent was only successful. Colchicine treatment was applied to double the chromosome number. Three concentrations (0.1%, 0.15% and 0.2%) of colchicine treatment were applied. Among the treatments, 0.15% gave the highest success (86%) of chromosome doubling in the hybrid (2n=19; AC). Induction of chromosome treatments derived synthetic B. napus (AACC) were identified with bigger petals, fertile pollens and seed setting in the siliqua. Synthetic B. napus had increased growth over the parents and exhibited comparatively wider ranges with higher coefficients of variations than parents for all morphological characters, yield attributes and seed yield plant-1. Siliqua length as well as beak length in synthetic B. napus was longer than those of the parents. Although flowering time in synthetic B. napus was earlier than both parents, however the days to maturity was little higher over early maturing B. rapa parent. The numbers of seeds siliqua-1 and 1000-seed weight in synthetic B. napus were higher than those of the parents. Finally, synthetic B. napus produced higher seed yield plant-1 than both parents.

Keywords: Synthetic Brassica napus, morphological characters, yield attributes, higher yield

Genetic Diversity of Malaysian Upland Rice Revealed by Quantitative Traits and Microsatellite Polymorphism

Category: Fundamental (A)

Assoc. Prof. Dr. Mohd Rafii Yusop
Mehdi Sohrabi, Mohamed Hanafi Musa and Siti Nor Akmar Abdullah
Institute of Tropical Agriculture
mrafii@putra.upm.edu.my
03-89474825

Rice (Oryza sativa) is one of the most important food crops for human compare to other cereals. Around 3 billion people of the world use rice as a critical or basic food that provides 50 to 80% of their daily calories. Upland rice comprises eleven percent of global rice production and is cultivated on around 14 million hectares. In Malaysia upland rice cultivate in Sabah and Sarawak (165,888 ha). The average yield of upland rice ranges from 0.46 to 1.1 t/ha. In 2005, the total national rice production was roughly 2.24 million metric tons. Plant breeding begins with genetic diversity, which is used as a tool for developing new characteristics or transforming unfavorable varieties. Unfortunately, there is very little information published with regards to breeding, genetics, and morphology characteristics of upland rice in Malaysia. Obtaining comprehensive information on genetics and morphological characteristics as well as genetic diversity of upland rice in Malaysia is important for crop breeding programs. This present research was to evaluated genetic diversity of 50 accessions of upland rice by 12 quantitative traits and 10 SSR markers. Out of 12 morphological tarits, four traits indicated both high level of board sense heritability and genetic advance, namely flag leaf length to width ratio, spikelet fertility, grain yield, and days to flowering. All accessions were divided to six groups by morphological clustering. The Jaccard similarity coefficient between accessions was clustered in seven groups which correlated to regional diversity based on 10 SSR markers. Some accessions suggested for further breeding program according to their Jaccard's similarity. They are including accessions 07537, 07538, 03826, 07574, 07588, 07585, 07540, 07575, 07541, 07543, 07544, 07576, 07571, 07539, 03825, and 03830 from group six and also accessions 07531, 07534, and 07535 from group five.

Keywords: Upland rice, genetic diversity, quantitative traits, SSR markers

Overexpression of Monodehydroascorbate Reductase from a Mangrove Plant (Aemdhar) Confers Salt Tolerance on Rice

Category: Fundamental (A)

Assoc. Prof. Dr. Ho Chai Ling
Shahanaz Sultana, Choy-Yuen Khew, Md. Mahbub Morshed, Parameswari Namasivayam and Suhaimi Napis
Institute of Tropical Agriculture
clho@biotech.upm.edu.my
03-894677475

Rice is an important food crop for more than 50% of the world's population. The growth and survival of rice seedlings decreased as the salinity level increased. Salt stress also affects a number of biological processes such as the uptake of water and essential nutrients from soil, photosynthesis, and dry matter accumulation. In this study, a cDNA encoding monodehydroascorbate reductase (MDHAR), an important enzyme of the ascorbate-glutathione cycle which is involved in the scavenging of reactive oxygen species (ROS) from a mangrove plant (Acanthus ebracteatus), was overexpressed in rice to examine its role in salt tolerance. Three stable transgenic lines overexpressing AeMDHAR were selected in vitro using hygromycin and confirmed by PCR, transcript analysis and enzyme assay. The transgenic rice lines overexpressing AeMDHAR showed a significant increase in MDHAR enzyme activity compared to untransformed plants under NaCl conditions. All transgenic lines showed better yield attributes such as a higher tiller number and increased 1000-grain weight compared to non-transgenic rice. They also showed a higher tolerance to salt at germination and seedling stages. In conclusion, the overexpression of AeMDHAR was shown to be able to confer salt tolerance on rice.

Keywords: Mangrove, monodehydroascorbate reductase, overexpression, rice, salt tolerance

Improving the Performance of Different Oil Palm Progenies by Alleviating Soil Acidity in an Acid Ultisol

Category: Fundamental (A)

Prof. Dr. Mohamed Hanafi Musa
M. Sabir, Jose A. Cristancho, Syed R. Syed Omar and Mohamed Y. Rafii
Institute of Tropical Agriculture
mmhanafi@agri.upm.edu.my
03-89474419

Soil acidity is a major constraint in profitable and sustainable agricultural production in tropical regions. Though, oil palm (Elaeis guineensis Jacq.) is normally grown in acidic soils but sever acidity is hampering its yield potential. In this study, ground magnesium limestone or dolomite and magnesium carbonate were used to alleviate the effect of soil acidity on oil palm seedlings. The ground magnesium limestone or dolomite and magnesium carbonate (0, 1.1, 2.2, 3.3 and 4.4 t ha-1) was applied to an Ultisol dominated by kaolinite (pH in water 4.4). Two oil palm progenies; hybrid (Deli dura_AVROS pisifera) and clonal (clone 366) were grown and their selected morphological, physiological and nutritional characteristics were evaluated under nursery conditions for 8 months. Both amendments significantly increased soil pH and lowered exchangeable aluminium. The performance of hybrid oil palm was significantly better than clonal with best response for morphological and physiological traits recorded at 2.5 to 4.23 t ha-1 with ground magnesium limestone and 2.87 to 3.45 t ha-1 with magnesium carbonate. Both amendments increased nitrogen and magnesium uptake. Ground magnesium limestone decreased aluminium concentration in the third frond significantly whereas both amendments decreased manganese uptake. The clonal oil palm progeny exhibited a better performance on un-amended treatment. This may be explained by the significant higher root growth of this progeny. Soil acidity alleviation improved the oil palm seedling growth. These results are important for the oil palm industry and could be applied in the nursery stage as well as extended to the immature stage. Elaeis guineensis Jacq.,

Keywords: Liming, magnesium, oil palm, photosynthesis, soil acidity, ultisols.

Preparation, Characterisation and Viability of Encapsulated *Trichoderma harzianum* UPM40 in Alginate-Montmorillonite Clay

Category: Fundamental (A)

Mr. Fariz Adzmi
Sariah Meon, Mohamed Hanafi Musa and Nor Azah Yusuf
Institute of Tropical Agriculture
farizadzmi@putra.upm.edu.my
03-83471174

Microencapsulation is a process by which tiny parcels of an active ingredient are packaged within a second material for the purpose of shielding the active ingredient from the surrounding environment. This study aims to determine the ability of the microencapsulation technique to improve the viability of Trichoderma harzianum UPM40 originally isolated from healthy groundnut roots as effective biological control agents (BCAs). Alginate was used as the carrier for controlled release, and montmorillonite clay (MMT) served as the filler. The encapsulated Ca-alginate-MMT beads were characterised using fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA) and scanning electron microscopy (SEM). The FTIR results showed the interaction between the functional groups of alginate and MMT in the Ca-alginate-MMT beads. Peaks at 1595 cm-1, 1420 cm-1 and 1020 cm-1 characterised alginate, and peaks at 1028 cm-1 and 453 cm-1 characterised MMT; both sets of peaks appeared in the Ca-alginate-MMT FTIR spectrum. The TGA analysis showed an improvement in the thermal stability of the Ca-alginate-MMT beads compared with the alginate beads alone. SEM analysis revealed a homogeneous distribution of the MMT particles throughout the alginate matrix. T. harzianum UPM40 was successfully encapsulated in the Ca-alginate-MMT beads. Storage analysis of the encapsulated T. harzianum UPM40 showed that the low storage temperature of 5°C resulted in significantly ($P<0.05$) better storage compared with room temperature (30°C).

Keywords: Microencapsulation, alginate, montmorillonite, *Trichoderma harzianum* UPM40

Method of Extraction and Characterization of Oligosaccharides from Palm Kernel Cake

Category: Product / Innovation (C)

Assoc. Prof. Dr. Liang Juan Boo
Mohammad Faseleh Jahromi
Institute of Tropical Agriculture
jbliang@putra.upm.edu.my
03-89472132

A method for producing multiple oligosaccharides having a potential prebiotic effect from a palm kernel cake includes the steps of providing the palm kernel cake into a solvent, extracting and separating the multiple oligosaccharides from the palm kernel cake, quantifying the multiple oligosaccharides by using at least one chromatography method and characterizing the multiple oligosaccharides. The multiple oligosaccharides act as a prebiotic and substrate for at least one strain of lactic acid bacteria (LAB).

Keywords: Prebiotic, palm kernel cake, oligosaccharides

……..

Elite pisifera Pollen for Commercial Dxp Oil Palm Seed Production

Category: Product / Innovation (C)

Assoc. Prof. Dr. Mohd Rafii Yusop
Noh Ahmad, Mohd Rafii Yusop, Ahamd Kushairi Din and Ghizan Saleh
Institute of Tropical Agriculture
mrafii@putra.upm.edu.my
03-89474825

"The commercial oil palm planting material, DxP, or know as teneras is produced by crossing selected duras with selected pisiferas. In this breeding programme, eleven selected oil palm AVROS pisiferas were crossed with duras using North Carolina Mating Design I (NCMI) crossing scheme for progeny testing, and was evaluated on inland soils, predominantly of Serdang Series. Analysis of variance (ANOVA) showed low genetic variability among pisifera parents for most of the characters indicating uniformity of the pisifera population. Information on combining ability is essential to identify superior parents for hybrid seeds production. There are two types of combining abilities, general combining ability (GCA) and specific combining ability (SCA). GCA is a useful to identify parents for the development of superior genotypes while SCA for providing information about the performance of hybrids. For pisiferas palm as a male parent selection, general combining ability (GCA) may have to be considered. Three pisiferas [P1(0.174/247), P3

(0.174/498), P11 (0.182/308)] were identified of having good GCA for FFB yield. For O/B, the good combiners were P1 (0.174/247), P10 (0.182/348) and P11 (0.182/308). The good combiners for vegetative traits were P6 (0.182/30), P8 (0.182/230) and P9 (0.182/297). They can be considered in for a single trait or in combination with the other for their selection. For instance, P1(0.174/247) and P11 (0.182/308) were good candidates in selecting pisiferas with good GCA for FFB yield and O/B but not for vegetative characters. Pisiferas P6 (0.182/30), P8 (0.182/230), P9 (0.182/297)] have good GCA value for lower trunk height (HT), lower trunk diameter (DIA), small petiole cross-section (PCS) and short rachis length (RL). They can be considered for the production of relatively less vigorous growing palms. The AVROS pisifera progenies exhibit a high mesocarp to fruit and oil to bunch ratios. "

Keywords: *Elite pisifera* pollen, DxP planting material,seed production, general combining ability, FFB yield

……..

Hybrid BI- 4 X 6372-4: A New Potential F1 Watermelon Hybrids

Category: Product / Innovation (C)

Assoc. Prof. Dr. Mohd Rafii Yusop
Bahari Mohd Masaruddin and Ghizan Saleh
Institute of Tropical Agriculture
mrafii@putra.upm.edu.my
03-89474825

Watermelon [*Citrullus lanatus* (Thunb.) Matsum. & Nakai] is one of the most popular fruits in Malaysia. Currently, watermelon is grown in Malaysia more than 3,000 ha with production of 228,800 tonnes. At present, watermelon growers are totally dependent on the imported hybrids seeds mostly from Taiwan and China. But the prizes of seeds are increasing. Moreover, most of the imported hybrids do not produced high yield across the environmental condition in the country. There are good prospects for expansion of watermelon cultivation to fulfil domestic requirement and export markets. Currently there are limited studies in development of watermelon cultivars in the country. Unavailability of breeding materials are the reasons towards the development of quality watermelon cultivars. This present research was undertaken to developed new F1 watermelon hybrids with higher yield and good fruit quality. Four watermelon inbred lines were crossed in full diallel cross design and 12 F1 hybrids watermelon were developed. Out of 12 hybrids, Hybrid BL-14 x 6372-4 exhibited superior performance. Advantages of the hybrid - 1. BL-14 x 6372-4 hybrid of watermelon had shown outstanding performance than the parental lines and and check varieties. 2. Hybrid BL-14 x 6372-4 was found to be highly stable in multi-locations trial for important traits such as vine length, days to flower, days to maturity, total soluble solids content and fruit yield. 3. Parent lines BL-14 and 6372-4

were the best general combiner for earliness in flowering, fruit maturity and flesh colour. 4. Hybrid BL-14 x 6372-4 appeared to have good general adaptability for desirable traits and can be recommended for most environments. This superior hybrid is useful for further large scale evaluation programme before it can be recommended for commercial cultivation."

Keywords: Hybrid watermelon BL-14 x 6372-4, diallel cross, General Combining Ability (GCA); Specific Combining Ability (SCA)

PRPI 2012

UPM's Research & Innovation

SPORTS ACADEMY

Potent Anti-Inflammatory and Analgesic Activity of Zerumbone Isolated from *Zingiber zerumbet*

Category: Applied Research (B)

Prof. Dr. Muhammad Nazrul Hakim
Yunus Adam, Zuraini Ahmad, Zainul Zakaria and Arifah Abdul Kadir
Sports Academy
nazrul.hakim@gmail.com
03-89471133

Zingiber zerumbet, locally known as lempoyang, belongs to the Zingiberaceae family. It is cultivated in the village gardens in the tropics for its medicinal properties. Zerumbone a monocyclic sisquiterpene, is the major constituent of Zingiber zerumbet Smith. In Southeast Asia, Z. zerumbet is being used for its anti-inflammatory and analgesic properties. The objective of this current investigation was to evaluate the in vivo anti-inflammatory and analgesic activities of zerumbone isolated from Z. zerumbet in rats. The results revealed zerumbone potently inhibit inflammation induced by both β-carrageenan and prostaglandin E2, which was statistically similar to the nonsteroidal anti-inflammatory drug (NSAID) piroxicam. Zerumbone also potently inhibited pain in the sabdorminal writhing test similar to the NSAID. Collectively, our results validate the traditional use of this plant and zerumbone has been demonstrated to be a potent anti-inflammatory and analgesic agent.

Keywords: Zerumbone, *Zingiber zerumbet*; anti-inflammation, analgesic

.....

Voriconazole: The Safest Triazole Antifungal Drug?

Category: Fundamental (A)

Prof. Dr. Muhammad Nazrul Hakim
Chung Jun Hung, Azhar Yaacob, Zuraini Ahmad, Zainul A. Zakaria and Arifah A. Kadir
Sports Academy
nazrul.hakim@gmail.com
03-89471133

Voriconazole is a new, potent broad-spectrum triazole systemic antifungal drug, a second-generation azole antifungal that is increasing in popularity, especially for the treatment of invasive aspergillosis and fluconazole-resistant invasive Candida infections. However, it is also known to induce hepatotoxicity clinically. The aim of this study was to investigate the hepatotoxicity and nephrotoxicity potential of voriconazole in vivo in rats. Forty rats were treated intraperitoneally with voriconazole as single (0, 10, l00, and 200 mg/kg) or repeated (0, 10, 50, and l00 mg/kg per day for 14 days) doses. Venous blood was collected for the repeated-dose group on days 1 and 14. Rats were sacrificed 24 hours after the

last dose. Body weight, liver weight, and kidney weight of rats were recorded. Livers and kidneys samples were taken for histological and transmission electron microscopy (TEM) analysis. Results revealed that voriconazole had no effects on serum alanine aminotransferase, aspartate aminotransferase, alkaline phosphotase, gamma glutamyl transpeptidase, blood urea nitrogen, and creatinine for both the single- and repeated-dose groups. However, histologically, in the repeated 50- and 100-mg/kg voriconazole-treated rats, mild focal inflammation was observed. Under TEM, only small changes in the 100 mg/kg/day group were revealed. These results collectively demonstrated that voriconazole did not induce significant hepatotoxicity and nephrotoxicity, even at very high doses.

Keywords: Voriconazole, hepatotoxicity, kidney function, rats

.....

Effect of Low-Impact Aerobic Dance Exercise on Psychological Health Status in Sedentary Women

Category: Fundamental (A)

Prof. Dr. Muhammad Nazrul Hakim
Mastura Johar, Mohd Sofian Omar Fauzee, Bahaman Abu Samah and Salleh Rashid
Sports Academy
nazrul.hakim@gmail.com
03-89471133

Low impact aerobic exercise increases the heart rate for a sustained period is very beneficial for health. Aerobic exercise increases the flow of blood and nutrients to all parts of our body which supports healing, maintaining health and can decrease the stiffness especially to the back and joints that lead to back pain. While many people with back pain are not able to participate in vigorous exercise like running or step aerobics, others find it easier to engage in low-impact exercise. This present study investigated the effect of twelve weeks of low-impact aerobic dance exercise intervention ("aero-mass" dance exercise) on psychological health status among sedentary working women in Putra Jaya. Sedentary participants (age range = 40-55 years; N = 40: BMI > 25) were randomly assigned to two groups: an intervention treatment of "aero mass aerobic dancing" and conventional low-impact aerobic dancing. Classes were held for 50 minutes, 3 days per week, for 12 weeks. Repeated measures were examined at week 1, week 8 and week 12. Mixed repeated ANOVA revealed statistically significant time effects for Total Stress Scores ($p < 0.01$) with eta square = .59 (large effect) at week 8 and week 12. Furthermore, the time by group interaction was also statistically significant for Total Stress Score ($p < 0.05$) with eta square = .18 (large effect). In addition, the result for between-subject effects indicates significant $F (1, 38) = 7.74$, $p < .05$, eta = .17, and therefore there was a significant difference in the stress level scores in the intervention group compared to the control group. Subjects of the intervention group, "aero mass aerobics dancing", experienced the most benefits.

Keywords: Total stress score, aerobic dancing, "Aero-Mass" dance exercise, low impact

PRPi 2012

UPM's Research & Innovation

CENTRE FOR DIAGNOSTIC NUCLEAR IMAGING

Localisation and Prediction of Recurrent Phaechromocytoma/ Paraganglioma(PCC/PGL) Using Diagnostic 18[F]FDG-PET/CT

Applied Research (B)

Dr. Fathinul Fikri Ahmad Saad
A. Kroiss , W.F.E Lau, H. Zanariah , Z. F. Ahmad, C. Uprimny, E. Donnemiller, D. Kendler, A.J. Nordin and I. J. Virgolini
Centre of Diagnostic Nuclear Imaging
ahmadsaadff@gmail.com
03-89471646

This study aims to evaluate the role of diagnostic [18F]fluorodeoxyglucose (FDG)-positron emission tomography (PET)/computed tomography (CT) in localizing and predicting recurrent phaeochromocytoma (PCC)/paraganglioma (PGL). Twenty-three consecutive patients with previous history of PCC/PGL presented with symptoms related to catecholamine excess were included in this study. All patients underwent diagnostic [18F]FDG-PET/CT. Final validation of the diagnosis was made on histology or the long-term clinical follow-up. Two experienced nuclear radiologists analysed PET, the diagnostic CT and PET/CT findings on a per lesion basis and per patient basis. Standardized uptake value (SUV), size and the presence of new metachronous lesions or distant metastasis at a recurrent event were used to determine the local disease control. We investigated 23 patients (10 males and 13 females) with a mean age of 47.00 Â± 17.77 years. Urine catecholamine was increased in 19/22 patients (82.60%). There were 136 sites (mean SUVmax 16.39 Â± 3.47) of the validated disease recurrences. The best overall sensitivity for the diagnostic CT, FDG-PET and PET/CT was (117/136; 86.02%), (119/136;87.50%) and (134/136;98.59%), respectively. Nine patients (34.10%) had local controls on follow-up with mean progression-free disease (PFD) of 19.35 Â± 3.34 months. There were significantly different SUVmax distribution between the local control and the metastatic groups category ($P < 0.05$) of which significant correlation was noted when SUVmax <9.2 ($P < 0.05$; McNemar test). Multiple linear regression analysis revealed the tumour SUVmax to be the independent predictor of the local disease control (adjusted $R2 = 0.138$, $P < 0.05$). In recurrent PCC/PGL, diagnostic 18[F]FDG-PET/CT may substantially localize the PCC/PGL lesions and tumour SUVmax can potentially be used as a potent predictor of local disease control.

Keywords: Localisation, prediction, recurrent, Phaechromocytoma/Paraganglioma (PCC/PGL), 18[F]FDG-PET/CT

PRPi 2012

UPM's Research & Innovation

CANCER RESOURCES AND EDUCATION CENTER

Family Support in Cancer Survivorship

Fundamental (A)

Prof. Dr. Mazanah Muhamad
Mojghan Afshari and Fitrisehara Kazilan
Cancer Resources and Education Center
mazanah@ace.upm.edu.my
03-89472705

This paper raises issues about the role of family members in providing support for breast cancer survivors. Data were collected from 400 breast cancer survivors in Peninsular Malaysia through a custom-designed questionnaire fielded at hospitals and support group meetings. The data were analyzed using descriptive statistics. The analyses show that all family members could be supportive, especially in decision making and help with emotional issues. The spouse was the main support provider among the family members (others were children, parents, siblings and more distant relatives). The results also indicated that a significant percentage practiced collaborative decision-making. Breast cancer survivors needed their family members' support for information on survivorship strategies such as managing emotions, health, life style and dietary practice. The family members' supportive role may be linked to the Malaysian strong family relationship culture. For family members to contribute more adequately to cancer survivorship, it is suggested that appropriate educational intervention also be provided to them.

Keywords: Breast cancer, survivorship, social support, family

……..

Why Breast Cancer Patients Seek Traditional Healers

Fundamental (A)

Prof. Dr. Mazanah Muhamad
Sharan Merriam and Norhasmilia Suhami
Cancer Resources and Education Center
mazanah@ace.upm.edu.my
03-89472705

Traditional healing is a common practice in low and middle income countries such as Malaysia. Eighty percent of Malaysians consult traditional healers or "bomoh" at some time in their life for health-related issues. The purpose of our study was to explore why breast cancer patients visit traditional healers. This is a qualitative study utilizing in-depth interviews with 11 cancer survivors who sought both traditional and Western medicine. The findings revealed the following reasons for which patients seek traditional healers: (1)

recommendation from family and friends, (2) sanction from family, (3) perceived benefit and compatibility, (4) healer credibility, and (5) reservation with Western medicine and system delay. These factors work together and are strongly influenced by the Malaysian cultural context. The issue with the Western health system is common in a developing country with limited health facilities.

Keywords: Breast cancer, traditional healer, traditional complementary medicine

……..

Internet Use and Breast Cancer Survivors

Fundamental (A)

Prof. Dr. Mazanah Muhamad
Mojghan Afshari and Nor Aini Mohamed
Cancer Resources and Education Center
mazanah@ace.upm.edu.my
03-89472705

A survey was administered to 400 breast cancer survivors at hospitals and support group meetings in Peninsular Malaysia to explore their level of Internet use and factors related to the Internet use by breast cancer survivors. Findings of this study indicated that about 22.5% of breast cancer survivors used Internet to get information about breast health issues. They had access to computer in their more personalized spaces such as at their home and in their workplace. Breast cancer survivors tended to use Internet to get information about cancer and treatment options especially on radiotherapy, chemotherapy, health management, treatment side effects and dietary practice. Majority of Internet users believed that information on the Internet were not useful to improve their knowledge about health care issues. Also, significant relationships exist between level of Internet use and five independent variables, including, age, education level, annual income, residence, and race/ethnicity. It is suggested that health care providers should realize how Web-based intervention programs can help breast cancer patients and then encourage patients to use Internet to get highly information to integrate them into their medical and psychological care.

Keywords: Internet use, education, breast cancer survivors, information, demographic characteristics

Traditional Healers and Western Medicine: The Challenge of Addressing Malaysia's Cancer Burden through Collaboration

Fundamental (A)

Prof. Dr. Mazanah Muhamad
Sharan B. Merriam
Cancer Resources and Education Center
mazanah@ace.upm.edu.my
03-89472705

Developing countries share a disproportionate burden of late-stage cancer presentation and cancer-related deaths. This burden is often a function of an inadequately resourced healthcare system along with easier access to and preference for traditional healers. In Malaysia, traditional healers are so embedded in the culture that they are often the first and sometimes only source of cancer information and treatment. The purpose of this qualitative study was to assess the willingness and the means by which Malay traditional healers and Western cancer specialists might work collaboratively in addressing the country's cancer burden. Interviews were conducted in urban and rural areas of Peninsular Malaysia with 14 Malay traditional healers known for treating cancer and with 12 cancer specialists. Findings from traditional healers suggest that there is arange of receptiveness for working with the Western medical system, with Islamic healers being the most receptive. Medical doctors readily acknowledged the presence of traditional healers and their personal willingness to cooperate; however, cooperation was conditional depending on the nature of the healer's practice, the timing of the healer's intervention, and the instituting of government oversight/regulation. Suggestions for fostering interaction and implications for healthcare policy are discussed.

Keywords: Traditional healers, Malaysia, cancer, healthcare policy

PRPi 2012

UPM's Research & Innovation

MALAYSIAN PALM OIL BOARD

One-pot Method for Enzymatic Synthesis of Olein Fatty Hydrazides

Category: Product/Innovation

Mr. Tuan Noor Maznee Tuan Ismail
Yeong Shoot Kian, Hazimah Abu Hassan, Wan Md Zin Wan Yunus
and Nor Azowa Ibrahim
Malaysian Palm Oil Board
maznee@mpob.gov.my
03-89255708

Olein fatty hydrazides were successfully produced from refined, bleached and deodorized palm olein, hydrazine monohydrate and Rhizomucormiehei lipase through a simple one-pot method. The reaction was best carried out at the following conditions: temperature, 40°C; time, 18 h; enzyme amount, 6%; stirring speed, 350 rpm and pH hydrazine monohydrate, 12. Using the optimum reaction conditions, the olein fatty hydrazides obtained have nitrogen content above 9% with more than 85% conversion. FTIR spectrum showed the appearance of the primary amine stretching at frequencies of 3316 and 3290cm-1 and stretching of amide carbonyl group and N-H bending of primary amine at frequencies of 1628 and 1534 cm-1, respectively. As shown by gas chromatography chromatogram, the olein fatty hydrazides consisted of 91.2% hydrazides and 8.8% fatty acids. Gas ahromatography/mass spectroscopy analysis further confirmed that the hydrazides contained palmityl and oleyl hydrazides, while the fatty acids were of palmitic and stearic acids.

Keywords: Olein fatty hydrazides, one-pot method, optimum reaction conditions

PRPI 2012

UPM's Research & Innovation

MALAYSIAN NUCLEAR AGENCY

ULTRACLAWS SF0053

Category: Prototype

Mr. Mohd Noorul Ikhsan Mohamed@Ahmad
Ilham Mukriz Zainal Abidin, Nor Hafzan Sarah Al Muin, Mohd Fajri Osman,
Mohd Azman Che Mat Isa, Amry Amin Abas and Chong Sau Peng
Malaysian Nuclear Agency
ikhsan@nuclearmalaysia.gov.my
03-89112000

ULTRACLAWS SF0053 system is an ultrasonic-based scanning system for evaluation of gaharu volume in standing Aquilaria tree. The system specifically applied for all Aquilaria species which comprise different sizes and ages. It utilizes ultrasonic pulse by imparting the pulse to the wood using an ultrasound device which consists of at least a pair of opposed ultrasonic transducers to measure sound velocity in standing tree. The ultrasonic pulse passes from the transmitter through the trunk of the receivers by direct through transmission ultrasonic technique. Gaharu production is triggered by the inoculation technique where after five years of age the tree is injected with spores. This inoculation process is carried out for a period of 1 to 2 years before the gaharu is produced by the tree and harvested. The challenges are to come up with high quality, the desired grades and predictable volumes of the gaharu formation. However, there is no reliable or scientific technique that can predict or estimate the volume of gaharu produced inside the trunk before it is harvested. ULTRACLAWS SF0053 is equipped with 12 elements of exponential horn type ultrasonic transducers. By using multichannel ultrasonic pulse-receiver, this scanner has the ability to generate 2D slice image of gaharu truck. The system is able to estimate the quantity of generated gaharu by giving out the cross section image of the Aquilaria tree. It is hoped that this newly developed system can give benefits to the gaharu industry in Malaysia and the predictable volumes of gaharu before it can be harvested.

Keywords: Ultrasonic, tomography, aquilaria, gaharu

RT SAFE 053

Category: Prototype

Mr. Mohd Noorul Ikhsan Mohamed @ Ahmad
Ilham Mukriz Zainal Abidin, Nor Hafzan Sarah Al Muin, Amry Amin Abas and Saidi Rajab
Malaysian Nuclear Agency
ikhsan@nuclearmalaysian.gov.my
03-89112000

Radiography testing (RT) is one of the techniques and methods in the field of Non Destructive Testing (NDT). It is widely used in various industries, especially in the oil and gas industry, either for the purpose of maintenance or during the installation of pipe and sheet metal. One of the practical ways to reduce the exposure received by the industrial radiographer is by the use of a collimator; a tool used to focus and control the radiation coming from the guide tube of a radiation source, so that it only travels parallel to as specified direction thus reducing the exposure from unnecessary radiation. However, the utilization of a collimator in the radiography test set-up will result in 3 to 5 times longer set-up time than normal. This normally will result in the in the inspection is performed without the usage of a collimator in order to achieve the targeted output set within the time frame of the inspection; neglecting the very important aspect of safety and requirement of practice laid down by the authorities. Therefore, there is a need for a practical tool that can be used in the field of industrial RT that can facilitate the utilization of a collimator for a convenient and cost/time effective RT inspection. The tool RT Sage 0053 has the capability of holding or sustaining the guide tube of a radiation source during RT inspection setup with a collimator. This innovative invention has managed to expedite RT inspection thus results in an increase of inspection productivity of more than 50% and at the same time improve the consistency of produced RT images quality and the most important thing is it can offer better protection of radiographers which can improve their safety during inspection time.

Keywords: Radiography industry, radiographer, safe distance, annual dose limit

PRPI 2012

UPM's Research & Innovation

UNIVERSITI TEKNOLOGI MARA

E-Merit

Category: Product (A)

Mr. Mohd Idzwan Mohd Salleh
Mohamad Rahimi, Mohamad Rosman, Mohd Zainuri Muhammad, Mohd Azizi Zainudin and Assoc. Prof. Dr. Zulkarnain Yusoff
UniversitiTeknologi MARA
idzwan201@kelantan.uitm.edu.my
09-9762485

E-Merit is a web-based information system that is developed to help Malaysian secondary schools to manage discipline problems among their students more effectively in order to increase the academic performance and extra-curricular to the greater heights. As widely talked about in electronic and printed media, students' misconduct problems at the present level occurred due to lack of awareness on the importance of education for improving their quality of life and lack of parental control by relying 100% school commitment to educate their children. Notification via e-mail and short messaging system will be automatically received when their children are involved in wrongdoing activities. Student disciplinary cases are not merely measured but also the level of academic achievement and extra-curricular activities whether excellent, good, satisfactory or fail. The benefits of the system included its ability to increase the efficiency of managing students' electronic records, reduce the burden of teachers' workload as well as to be the best tool in assisting the detection and prevention of discipline problems. Therefore, E-Merit is expected to be commercialised as the best platform not only among schools but also the public and private institutions of higher learning to excel its corporate image through the development of students' intellectual capital aligned with the national philosophy of education.

Keywords: Web-based Information System, discipline, students, electronic record, intellectual capital

My GLCs

Category: Product Innovation (C)

Dr. Azmi Abd. Hamid
Prof. Dr. Rozainun Abdul Aziz
Universiti Teknologi MARA
azmi226@salam.com.my
03-55444974

This is a software in which all information on GLCs companies can be readily assessed.

Keywords: MyGLCs, government link companies

……..

Shariah Audit Traits

Category: Product/Innovation

Dr. Hjh. Nawal Kasim
Universiti Teknologi MARA
nawal120@salam.uitm.edu.my
03-55444952

A comprehensive Shariah Audit framework focusing on four aspects of issues i.e. framework, scope, qualification and independent of Shariah auditors.

Keywords: Shariah Audit, Islamic financial institutions

TECHPROVED System

Category: Product/Innovation

Dr. Intan Salwani Mohamed
Norzaidi Mohd Daud, Normah Omar and Norli Ali
Universiti Teknologi MARA
intansm@hotmail.com
03-55444953

TECHPROVED System is a diagnostic tool to measure human performance in technology investment.

Keywords: Diagnostic tool, technology investment, human performance

PRPI 2012

UPM's Research & Innovation

UNIVERSITI MALAYSIA PERLIS

Vertical Axis Wind Turbine with Rotating Vanes

Category: Product

Prof. Dr. Ryspek Usubamatov
Ahmed Y. Qasim, Aead M. Ahmed and Zuraidah M. Zain
Universiti Malaysia Perlis
ayhk66@yahoo.com
017-6929380

New impeller type vertical axis wind turbine can be designed with high value of the drag coefficient. This is presented as a special frame design with vertical location of the vanes that create cavity of frames and increases the drag factor coefficient, and reduce the negative torque in other side by rotating vanes and the wind pass freely. Vanes are located on vertical bars that have been installed in hinges of the frames. Such design enables to rotate bars with frames under action of the wind force simultaneously at one direction and independently at other direction. Frames are connected with the shaft, where one end is connected with the electric generator. Frames are designed with angular inclinations that create cavities shape with closed vanes.

Keywords: Wind turbine, design, wind energy

PRPi 2012

UPM's Research & Innovation

UNIVERSITI PERTAHANAN NASIONAL MALAYSIA

Sludge as Absorbent

Category: Product

Assoc. Prof. Dr. Mohd Asri Md Nor
Assoc. Prof. Dr. Ong Keat Khim and Syuriya Mohamad
Universiti Pertahanan Nasional Malaysia
ongkhim@upnm.edu.my
03-90513400

The invention of product is the reuse of sludge as an absorbent. The reuse of sludge is more environmental friendly and more economic as it is able to replace synthetic adsorbent which is a chemical adsorbent.

Keywords: Sludge, adsorbent

.....

SARTAMS: Search and Rescue Tactical Management System 2.0

Category: Product

Captain Assoc. Prof. Dr. Syed Nasir Alsogoff Syed Zakaria
Universiti Pertahanan Nasional Malaysia
syednasir@upnm.edu.my
03-90514431

Many people go lost or missing in dense jungle or forest areas each year. Time is of the essence when trying to locate the lost or missing person. Search and Rescue (SAR) teams will have to locate the person at the search area. Dense jungle or forest environment, with its various thick flora and fauna will hamper SAR efforts. SARTAMS: Search and Rescue Tactical Management System will help SAR teams worldwide to locate lost or missing person in dense jungle or forest area more effectively and efficiently.

Keywords: Geographical information system, global positioning system, network centric technologies, search and rescue

PRPI 2012

UPM's Research & Innovation

UNIVERSITI TENAGA NASIONAL

Emotions in Normative Environment Using Software Agent Technology

Category: Prototype (B)

Dr. Azhana Ahmad
Mohd. Sharifuddin Ahmad, Mohd. Zaliman Mohd Yusoff and Moamin Ahmed
Universiti Tenaga Nasional
azhana@uniten.edu.my
03-89212329

We propose emotions as another component to the belief-desire-intention (BDI) agent architecture, which could enhance the reasoning process for agents to deliberate changes that occur in a normative framework. We postulate that emotions triggered in agents could influence the agents' decisions on the appraisal process, which subsequently enhance their performance. We discuss how emotions are deliberated in an agents' reasoning process that involves its beliefs, desires and intentions in time-constrained situations. This framework with optimization functions exhibits superior performance in time-constrained multiple goal situations when agents are able to achieve their normative goals while maintaining compliance with the norms. We validate these framework by simulating agents' interactions in specific environments to compare the normative and emotional consequences arising out of there interactions. The simulation attempts to tease out agents' decisions and behaviours as consequences of soft constraints imposed on the agent attributed by the framework. The simulation also attempts to investigate the contribution of emotion in a dynamic environment as another additional attribute to the existing framework that augments agents' performance in a time-constrained with multiple-goal situation as attributed by the framework. With emotions-endowed agents in a dynamic environment, significant performance improvement is observed when emotions triggered in agents contribute to enhanced performance in a dynamic environment.

Keywords: Norms, normative environment software agent multi-agent system, emotions

PRPi 2012

UPM's Research & Innovation

UNIVERSITI UTARA MALAYSIA

BMTutor: Kenali Ayat Bahasa Melayu

Assoc. Prof. Dr. Zulikha Jamaludin
Yusnita Muhamad Noor
Universiti Utara Malaysia
eita_yusnita84@yahoo.com
0192816740

Penguasaan Bahasa Melayu (BM) yang lemah di kalangan pelajar terutama pelajar sekolah menengah dalam pembetukan ayat yang gramatis berpunca daripada kelemahan penguasaan tatabahasa yang baik. Permasalahan ini telah diakui oleh pengkaji BM dlama beberapa kajian tentang penguasaan BM yang dinilai berpunca daripada kelemahan pelajar mengenal jenis golongan kata dan pembentukan jenis frasa. Oleh yang demikian, pelbagai usaha telah dijalankan untuk meningkatkan penguasaan BM mereka. Dari segi teknologi, penghasilan aplikasi yang dapat membantu golongan ini mendalami struktur pembentukan ayat dan tatabahasa BM masih belum dibangunkan. Justeru itu, BMTutor dikaji untuk membantu masyarakat terutamanya para pelajar untuk mempelajari struktur pembentukan ayat dan tatabahasa BM secara interaktif. Pembelajaran melalui BMTutor akan menggambarkan struktur pembentukan ayat dari segi jenis struktur pembentukan frasa dan jenis golongan kata bagi setiap perkataan yang terlibat dalam sesebuah ayat. Gambaran yang diberi dipaparkan dalam bentuk pohon penghurai secara automatik. Pengguna boleh memasukkan ayat yang hendak dipelajari dan pohon penghurai akan dipaparkan. Setiap perkataan yang terdapat dalam gambaran pohon penghurai boleh dipilih untuk mempelajari atau melihat jenis-jenis attribut yang terlibat. Attribut yang dimaksudkan terdiri daripada jenis golongan kata, kata terbitan, terjemahan Bahasa Inggeris, imej, audio dan senarai contoh ayat. Senarai contoh ayat yang diberikan bertujuan untuk member gambaran kepada pengguna tentang perkataan yang dipilih agar boleh digunakan dalam konteks ayat yang lain. Setiap contoh ayat yang diberikan boleh dipilih untuk membuat gambaran pohon penghurai yang baru. Secara keseluruhannya, BMTutor memberi ruang kepada pengguna untuk mempelajari struktur pembentukan ayat dari segi frasa dan atrribut yang terlibat dalam setiap perkataan. Pembangunan BMTutor bertujuan untuk memudahkan pembelajaran struktur pembentukan ayat dan tatabahasa BM. Ia juga untuk meningkatkan kajian dalam pemprosesan BM agar boleh diguna pakai oleh pihak tertentu terutama pelajar. Ini kerana pembelajaran melalui visual seperti gambaran pohon penghurai yang dicadangkan akan lebih memudahkan pemahaman mereka disamping menjimatkan masa.

Keywords: BMTutor, pohon penghuni, pohon penghurai ayat BM, attribute perkataan BM

e-WayCool: Antaramuka Pengguna untuk Pengajaran Matematik Tahap 1

Category: Prototype

Mr. Jasni Ahmad
ZulikhaJamaludin
Universiti Utara Malaysia
jasni@uum.edu.my
04-9284785

e-WayCool menggunakan aplikasi edutainment bagi model konseptual yang menggambarkan bagaimana pendekatan multimedia boleh digunakan untuk membantu proses pengajaran dan pembelajaran subjek Matematik Tahap 1 sekolah rendah serta mengekalkan warisan budaya iaitu Wayang Kulit (WK) di kalangan generasi muda di Malaysia. E-WayCool merupakan suatu alternative untuk mempertahankan WK daripada pupus ditelan zaman di sampingmenyokong proses pembelajaran dan pengajaran (P&P). e-WayCool menggunakan antaramuka pengguna Wayang Kulit Digital (DWK) untuk menyampaikan kandungan mengikut sukatan Kokurikulum Standard Sekolah Rendah (KSSR) bagi silibus pendidikan Matematik. Komponen-komponen utama e-WayCool (watak, muzik, lagu, situati, kondisi, scenario, warna) dipersembahkan dalam 5 bentukperwakilan iaitu 2D animasi, visualisasi, audio, realism dan cinematografi dan seterusnya komponen ini diintegrasikan membentuk suatu model konseptual yang berasaskan teori reka bentuk interaksi (IxD) supaya lebih efektif dan efisien untuk proses P&P.

Keywords: Antaramuka pengguna, wayang kulit digital, pemodelan wayang kulit

PRPI 2012

UPM's Research & Innovation

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

TimberMAT: A Floating Foundation System

Category: Prototype

Dr. Chan Chee Ming
Adnan Zainorabidin, Haslindah Razali, Nor Amalina Amrin and Umi Nadrah Aris
Universiti Tun Hussein Onn Malaysia
chan@uthom.edu.my
07-4564402

TimberMAT is a floating foundation system specially designed to support infrastructure on soft soils, like clay and peat. It consists of a natural timber mat sandwiched by lightweight soils, to serve as a (1) reinforced foundation, (2) load transfer platform, and (3) floating platform for construction. The design/product is in line with the philosophy of sustainable development, using natural elements and cost saving materials.

Keywords: Soft soil, foundation, lightweight, construction

PRPI 2012

UPM's Research & Innovation

UNIVERSITI SAINS ISLAM MALAYSIA

Sejadah BB

Category: Product

Mr. Mohd Azmir Mohd Nizah
Najihah Farhah Madon, Nur Nabilah Rapiee, NurIzati Mohd Ijhar,
Muna Majidah Zameram and Nurul Diyanah Sharom
Universiti Sains Islam Malaysia
nabilahrapiee@yahoo.com
019-2833778

Prayer is one of the strengths of a Muslim. It creates relation between God (Allah) and His servants. Thus, as to develop the ummah, Muslims have to increase the quality of prayers. However, nowadays there are a lot of problems or obstacles for Muslims to do well in prayers. Thus, we come out with a solution. Sejadah BB seems to be like a common one but actually it has its specialities. Firstly, it is used to prevent the problem of robbery cases in mosques. It comes with a secret pocket underneath it. You may locate your valuable things inside besides guarding them while you are praying. Now, you can focus on your prayer! You do not have to worry on your purse, watch, handphone and even your laptop anymore. Besides, from a prayer mat, it can be transformed into an elegant laptop bag. It is awesome! Comes with a small and convenient size, it is suitable to be brought everywhere and every time. It will guarantee the safety of your laptop as it has a protectable cover. Sejadag BB is also equipped with adds-on values. As a number of Muslims love to perform prayer in the dark, it comes with a glow-in-the-dark Kaabah on the top. Therefore, it will glow and show itself towards the worshippers of Allah and this helps Muslims to focus in it. In addition, for those who love travelling, Sejadah BB helps them to perform prayer with no doubt on the right direction anywhere. Just open the prayer mat and it will show the direction of the qiblat on the compass. As our product may solve these problems, it may help Muslims in maintaining the best quality of prayers. As to conclude, prayer is the best key towards developing successful ummah.

Keywords: Muslim, quality of prayer, sejadah BB