Synthesis

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Career Success: Don't take it for Granted!

Top Impact Factor Journal Publications

GIS for Paddy

Healthy Oil and Fat Products

RESEARCH NEWS OF UNIVERSITI PUTRA MALAYSIA **ISSUE 24 1ST QUARTER MARCH 2009**

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Are you reading your own copy of the UPM R&D Digest?

Synthesis is the first and only quarterly R&D digest at Universiti Putra Malaysia published in March, June, September and December with the focus on award-wining innovations. It covers research happenings emerging from the various faculties and institutes across the university and provides a brief summary of some of the important research findings of the study conducted at UPM. It brilliantly features special topics that are of national interest in various fields and disciplines.

Scientists must be made aware of how important the impact of their work is and its possible applications on society and public opinion. It is hoped that this digest will provide the opportunity to interact particularly through feedback or direct mail to the scientist from either the private sector or by scientists from other government research institutions.

Synthesis is the official research bulletin of the University and is published by Research Management Centre. It is available free of charge to the academic community.

Readership

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Letters to the Editor

If you have any comments about the content of the publication or any contributions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, *Synthesis*, Publication Division, Research Management Centre, 4th Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to ndeeps@admin.upm.edu.my. The editor reserves the right to edit articles for clarity and space before publication.

Editorial

UPM: a World Leader in New Tropical Agriculture

'UPM: A World Leader in New Tropical Agriculture'. Doesn't this tagline sound familiar to us. It is UPM's refurbished mission towards becoming a premier research institution in Tropical Agriculture.

As a higher education institute which has expertise in tropical agriculture, UPM's researchers should utilize the source that is provided by UPM to endeavor further research in this sector to produce new technologies to enhance and boost Malaysia's agricultural technology at the same time intensifying out agricultural product. These achievements will not only lift the university's name but will also place Malaysia as a leader in tropical agriculture research on the world map.

In fact, agricultural researchers are not the only ones who should be involved in making this tagline a reality. Support from experts from other fields is also important to help UPM achieve its mission. For instance, engineers could innovate new agricultural machinery through research. Together we can elevate tropical agriculture to be leaders in Malaysia, and beyond.

In 1960, agriculture contributed about 38% of Malaysia's gross domestic product (GDP). This value lessens each year, reducing to about 12% in 2001. The lack of land available for agriculture is the main reason for this deficit. With research and development, we can achieve a higher GDP. We can counter the lack of land by producing more harvest/crop per land area per year.

Furthermore, the world is now facing food crisis. This means more effort must be put into research and development in the agricultural sector to increase productivity. Malaysian government has introduced 'Dasar Jaminan Bekalan Makanan 2008 – 2010' (Food Supply Guarantee Policy 2008 – 2010) and UPM could support this policy.

As a part of UPM's family, all of us should strive and work hard to accomplish the university's mission. Don't let the tagline stay a tagline, make it a reality! So, researchers! Grab your lab coat and go to the lab now! Make UPM proud! Make Malaysia proud! RMC

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Spotlight

What are Peer-reviewed or Refereed Journals?

Academic journals are periodical publications in which researchers report the results of their work. Articles are usually peer reviewed.

Peer-reviewed journals (also called refereed journals) are scholarly journals that only publish articles that have passed through this review process. Peer review (also known as refereeing) is the process of subjecting an author's scholarly work, research, or ideas to the scrutiny of others who are experts in the same field.

The terms "refereed" and "peer reviewed" mean essentially the same thing. Most scholarly journals use a process of peer review prior to publishing an article, whereby other scholars in the author's field or specialty critically assess a draft of the article. The review process helps ensure that the published articles reflect solid scholarship in their fields. The peer-review is the process by which a learned journal passes a paper received for publication to outside experts for their comments on its suitability and worth; refereeing.

Peer-Reviewed Journals versus Scholarly Journals

Scholarly journals contain articles written by, and addressed to, experts in a discipline. They are concerned with academic study, especially research, and demonstrate the methods and concerns of scholars. The main purpose of a scholarly journal is to report original research or experimentation and to communicate this information to the rest of the scholarly world. The language of scholarly journals reflects the discipline covered, as it assumes some knowledge or background on the part of the reader. Scholarly journals always rigorously cite their sources in the form of footnotes or bibliographies. Many scholarly journals are published by professional organizations.

While not all scholarly journals go through the peer-review process, it is usually safe to assume that a peer-reviewed journal is also scholarly. RMC

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CAREER SUCCESS:
Don't take it for Granted!

This segment portrays factors that contribute to career success based on three studies that have been undertaken by Professor Dr Maimunah Ismail for the past five years. The studies are:

1. High-Flying Women Academics: Factors Contributing to Success (2003-2005, sponsored by UNESCO, USD 10,000.)
2. Career Aspirations of Male and Female R&D Professionals in Public Organizations and Multinational Corporations (2007-2008, FRGS, RM57.000.)
3. Individual, Interpersonal, and Organizational Factors as Determinants to Career Advancement: A Comparative Analysis between Academics in Public and Private Institutions of Higher Learning (2007-2009, RUGS RM42,800)

Career is one of the sites to see the differential dynamics of employees in any organization. It is simply about interaction of an individual, job and organization, even though it is commonly understood as a sequence of jobs in a life-span of an individual. The outcome of a career is career success, and it is indeed created; hence, we don't take it for granted!

The most often asked questions about career success are: Is career success measurable? What contributes to career success? Does individual or organization play more important role to one's career success? Answer for the first question is that career success is certainly measurable using two approaches, objectively and subjectively. Objective career success refers to the external categories in a profession which is defined by society, one's peers or culture, and illustrates the typical steps towards success. The movement may be horizontal (increased job security, longer vacations) or hierarchical (promotion, different job title). On the other hand, subjective career success reflects an individual's perception of career experience which is influenced by a person's own preferences for development, needs and values. Most of the previous studies had consistently suggested that career success (objective) and non-organizational success (subjective) are interrelated, which then form a basic assumption that a successful individual considers him/herself to have succeeded in both areas.

The second question can be answered by some of the selected factors depicted in Figure 1, which are relevant to careers in academia and R&D-based organizations. The factors are generally divided into individual, organizational and managerial-competency related factors. Self-efficacy is an individual factor which describes the extent to which individuals believe they can successfully complete various tasks associated with career decision making. There are many facets of self efficacy, namely self-efficacy involves making an accurate assessment of one's career interests, skills, goals, and values; self-efficacy for gathering occupational information involves the ability to venture into possible new research areas; self-efficacy for goal selection focuses on the ability to identify a career goal that compliments the individual's values, interests, and skills; self-efficacy for planning describes tasks that prepare an individual for the job market and finally, self-efficacy for problem solving assesses one's resilience when faced with occupational challenges.

Career aspirations are considered as a salient form of motivational element that positively related to both objective and subjective career success. It is about ability to control the direction of individuals' career and to exercise a strong desire and motivation to succeed in a career. Career aspirations, which are related to values, perceptions and effective reactions to job experiences are aspects of the internal career that have significant influence on job satisfaction, commitment and loyalty to an organization. Consequently, career aspiration will determine individual's career decision and choices, which will then lead to one's objective and subjective career success.

Perceived organizational support comprises peer and administrative supports in an organization. Perceived organizational supports affect employee's general affective reactions to their job, such as job satisfaction and positive mood which in turn increase employee's work performance, reduce strains, desire to remain in the organization and lessen withdrawal behaviours.

Organizational socialization enhances employee's work-related outcomes such as organizational commitment, job satisfaction, social relations, performance and organizational citizenship behaviours. It also relates to individual learning process, for instance, through training provided by the organization, understanding the roles, social knowledge while interacting with co-workers, and expectation toward future prospect of the organization.

Networking is used for attaining power within an organization. It is an intelligent aspect of a career. Networking entails more than social interactions with peers. It is about keeping up for latest advancement in the literature, doing collaborative research and supervision, and presenting research work at conferences and publications with other academics of the same interests. Networking in academia and R&D acts as a mechanism to build a sense of community among scholars within a specified field. Networking is also a way of learning about what is going on within a specialization.

As in many organizations, networking is popular based on gender, for instance, formation of network traditionally known as 'old boys network', 'old girls network', and an alumni association. In the academia, academics seem to capitalize on their post-graduate studies to initiate their networking. Thus, their post-graduate studies paved the way for their academic networking circle. The ability to establish contacts with other scholars from around the globe is one of the factors leading to the academics' fast career mobility.

Figure 1: Some correlates of career success

The rapid pace at which technology evolves creates a need for highly skilled individuals to enable, apply, support, configure and adapt IT products and services, particularly using computers. In the years to come IT-based tools will become ubiquitous tools for managing and learning. Hence, computer savvy and digital skills are essential for individuals to increase their marketability, productivity and to have better chances for long term career success. With today's technological society, basic IT-literacy is emphasized and referred to as a stand-alone core competency that will contribute greatly to positive results on personal and professional levels.

To answer the third question above, all the three groups of factors are equally important in determining one's career success. Since career success is an outcome of human behaviour, certainly the individual factors are the most important, followed by organizational and managerial-competency related factors. RMC

Landmark Publications

1. Maimunah Ismail & Mariani Ibrahim (2008). Barriers to career progression faced by women: Evidence from a Malaysian multinational oil company. Gender in Management: An International Journal, 23 (1 & 2), 51-66. (Indexed in SCIMA, Scopus)
2. Maimunah Ismail & Roziah Mohd Rasdi (2008). Leadership in an academic career: Uncovering the experience of women professors. International Studies in Educational Administration: Journal of the Commonwealth Council for Educational Administration & Management, 36(3), 87 – 103.
3. Roziah Mohd Rasdi, Maimunah Ismail, Jegak Uli & Sidek Mohd Noah. (2009). Towards developing a framework measuring public sector managers' career success: Journal of European Industrial Training, 33(3), 232-254 (Indexed in Scopus, Autographics, Business Index, Business Source)
4. Mat Sani Hassan & Maimunah Ismail. (2009) Career Plateau: Experience of Public Sector Managers. Serdang, Selangor: UPM Press (in Malay).
5. Maimunah Ismail, Steve Eric Krauss, and Ismi Arif Ismail (2007). Career Development: Advancing Perspective and Practice. Serdang, Malaysia: UPM Press.

● *SILVER*	*UPM Invention, Research & Innovation Exhibition (PRPI 2008, PRPI 2007, PRPI 2006 & PRPI 2005).*
● ***Excellent Researcher Award***	*for Publication in Social Sciences (2007).*
● ***Best Author Award***	*Journal of Human Resource and adult Learning (2007).*
● ***Best Paper Finalist Award***	*AHRD Conference, Taipei, Taiwan (2005).*
● ***Language Award***	*Malaysian Language Society and Public Bank, first book, Extension: Implication to Community Development (1990).*

Expert's snapshots

Maimunah Ismail is Professor in the Department of Professional Development and Continuing Education, Faculty of Educational Studies, Universiti Putra Malaysia. She has been with UPM as a lecturer for 33 years beginning as a tutor at the Centre for Extension and Continuing Education. Her research interests are gender studies and career development from the perspective of human resource development. She served as the Head of the Department of Professional Development and Continuing Education in the faculty from 2001 to 2007. She is currently the Deputy Dean of Research and Graduate Studies in the faculty. She has published eight academic books and more than 100 journal articles and book chapters. Currently she is on the Editorial Review Board of several international journals and is an active member of the Academy of Human Resource Development (AHRD) and British Academy of Management (BAM).

Special Feature
Top Impact Factor Journal Publications

Impact factor

What is an Impact Factor?

The impact factor has moved in recent years from an obscure bibliometric indicator to become the chief quantitative measure of the quality of a journal, its research papers, the researchers who wrote those papers, and even the institution they work in.

The **impact factor** is only one of three standardized measures created by the Institute of Scientific Information (ISI) which can be used to measure the way a journal receives citations to its articles over time. Citations to articles published in a given year rise sharply to a peak between two and six years after publication. From this peak citations usually decline over time. The citation curve of any journal can be described by the relative size of the curve (in terms of area under the line), the extent to which the peak of the curve is close to the origin, and the rate of decline of the curve. These characteristics form the basis of the ISI indicators impact factor.

The **impact factor** for a journal is calculated based on a three-year period, and can be considered to be the average number of times published papers are cited up to two years after publication. For example, the impact factor 2009 for a journal would be calculated as follows:

A = the number of times articles published in 2008-9 were cited in indexed journals during 2010.

B = the number of articles, reviews, proceedings or notes published in 2008-9.

Therefore, Impact Factor 2010 = A/B

(note that the impact factor 2009 will be actually published in 2010, because it could not be calculated until all of the 2010 publications had been received. Impact factor 2010 will be published in 2011).

Impact factors are only one of a number of measures for describing the "impact" that particular journals can have in the research literature. The value of the impact factor is affected by the subject area, type and size of a journal, and the "window of measurement" used. As statistical measures they fluctuate from year to year, so that great care needs to be taken in interpreting whether a journal has really "dropped (or risen)" in quality from changes in its impact factor. Use of the absolute values of impact factors, outside of the context of other journals within the same subject area, is virtually meaningless; journals ranked top in one field may be bottom in another. Extending the use of the journal impact factor from the journal to the authors of papers in the journal is highly suspect; the error margins can become so high as to make any value meaningless. Professional journal types (such as those in medicine for example) frequently contain many more types of source item than the standard research journal. Errors can arise in ensuring the right types of article are counted in calculating the impact factor. Citation measures, facilitated by the richness of ISI's citation databases, can provide very useful insights into scholarly research and its communication.

Impact factors, as one citation measure, are useful in establishing the influence journals have within the literature of a discipline. Nevertheless, they are not a direct measure of quality and must be used with considerable care. RMC

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The Effect of Magnesium Vacancies on the Intraband Scattering in MgB_2 as Determined by Point Contact Andreev Reflection

The overall set-up of the cooling chamber for the four-point resistance measurement system.

The discovery of a new type of superconductor – MgB_2 in 2001 has revived the research interest worldwide in the hope to search for non-oxide based material with higher superconducting transition temperature, T_c. With a T_c of around 39K, the multiple band structure of the superconductor MgB_2 is responsible for a wide range of observed and predicted intriguing phenomena. For applications purposes, it has been proposed that making the three dimensional (3D) π band dirtier with respect to the more two dimensional (2D) σ band increases the low temperature upper critical field, H_{c2} which determines the sustainability of the material in high magnetic field before losing its superconducting properties. Experimentally, various methods of dirtying this unusual superconductor have been attempted, although it has proven very difficult to selectively dirty one band. For instance, nominal aluminium doping onto the Mg site has inevitably resulted in both the π and σ bands being affected.

Samples are mounted here in order to allow electrical contact to be made on them by copper wires.

In order to introduce structural defects into the π band with minimal distortions introduced into the σ band, bulk samples of varying magnesium content were prepared. The samples used in this study were a series of magnesium deficient Mg_xB_2 bulk samples prepared by mixing crystalline magnesium powder with amorphous boron powder. The powder was mixed in the ratio $_x$Mg:B (where $_x$ = 1.0, 1.5), pressed into pellets, and then heated to 900°C for 15 minutes in an Ar-2% H_2 atmosphere.

XRD analysis showed that the samples were single phase apart from some secondary MgO. The T_c of the samples was basically unchanged as a function of magnesium content being 37.5K for the $Mg_{1.0}B_2$ and 38.0K for the $Mg_{1.5}B_2$ implying the negligible influence on π–σ interband scattering by varying nominal Mg content.

Resistive measurements showed that the H_{c2} of the sample with greater magnesium vacancies was higher than that of the more stoichiometric sample (21T compared to 16T at 5K). Point contact measurements in zero field confirmed that there was no increase in interband scattering between the two samples while measurements in field have allowed us to extract the density of state (DOS) of the π and σ bands and the behaviour of energy gaps in the presence of magnetic field. The data indicates that the more stoichiometric composition has less π band scattering relative to the σ band than the magnesium deficient sample. It is clear that careful control of the magnesium vacancy concentration within MgB_2 can selectively alter the π intraband scattering while minimally affecting the σ intraband scattering and the π–σ interband scattering. The results suggest a method for manipulating the intraband scattering within the π band and therefore a possible route to further increase the low temperature H_{c2}. RMC

This is the electrical system for determination of superconducting transition temperature.

Landmark Publications

1. S. K. Chen, M. Majoros, J. L. MacManus-Driscoll and B. A. Glowacki, 2005, *In situ and ex situ Cu doping on MgB_2*, Physica C **418** 99.
2. S. K. Chen, K. A. Yates, M. G. Blamire and J. L. MacManus-Driscoll, 2005, *Strong influence of boron precursor powder on the critical current density of MgB_2*, Superconductors Science and Technology **18** 1473.
3. S. K. Chen, M. Wei and J. L. MacManus-Driscoll, 2006, *Strong pinning enhancement in MgB2 using very small Dy_2O3 additions*, Applied Physics Letters **88** 192512.
4. C. S. Lue, T. H. Su, B. X. Xie, S. K. Chen, J. L. MacManus-Driscoll, Y. K. Kuo and H. D. Yang, 2006, *Effects of Fe substitution on Tc suppression of MgB_2: A ^{11}B*, Physical Review B, **73** 214505.
5. P. Mikheenko, S. K. Chen and J. L. MacManus-Driscoll, 2007, *Minute pinning and doping additions for strong, 20K, in-field critical current improvement in MgB_2*, Applied Physics Letters **91** 202508.

Award Winner

- GOLD — *UPM Invention, Research & Innovation Exhibition (PRPI 2009).*
- **3rd in the Best Poster Presentation** — *ISESCO International Workshop & Conference on Nanotechnology 2007 (IWCN 2007).*

Reader Enquiry
Chen Soo Kien

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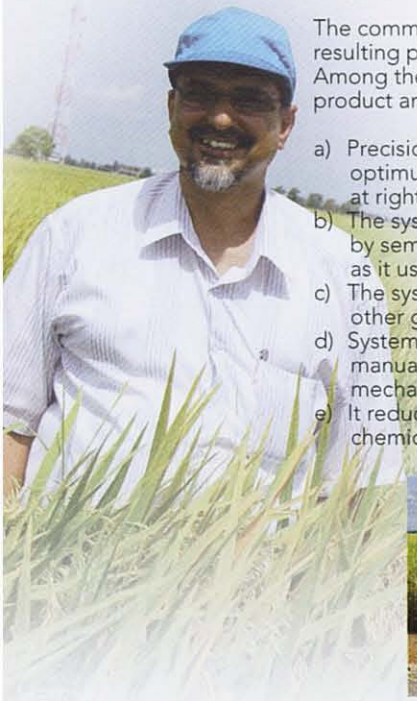
GIS for Paddy:
Precision Farming

Precision farming involves applying the right amount of input at the right location at the right time. Thus, if a certain part of the plantation requires additional fertilizer during the growing stage of the plants, only this portion of the plantation should be given such a fertilizer treatment. This is just commonsense and sounds simple. Unfortunately most agricultural areas in Malaysia do not practice this principle and the common approach used is homogenous fertilization whereby a standard rate of fertilizer is applied to the entire plantation. This is akin to giving everyone in a room a tablet of panadol to swallow if just one person complains of a headache! With the objective of putting the principles of precision farming into practice in Malaysia, Universiti Putra Malaysia collaborated with Remote Sensing Malaysia (a government agency formerly known as MACRES) to initiate the first national precision farming project in Malaysia. Remote Sensing Malaysia acted as the lead agency and played a pivotal role in securing the government grant of RM 1.1 million and helped to coordinate six other government departments involved in this project. Thee agencies were Universiti Putra Malaysia (UPM), Department of Agriculture Malaysia, Integrated development Area (IADA) Barat Laut Selangor, Division of Agricultural Drainage and Irrigation (BPSP), Drainage and Irrigation Department (DID), and the Malaysian Agricultural Research and Development Institute (MARDI).

The study area selected was at Sawah Sempadan, near Tanjung Karang in Selangor. The farmers here are semi-literate and speak little or no English. Computer skills among them were also low. With such a background it was a major challenge for the researchers to design and build a precision farming system that could be implemented on the ground. However, after 3 years of painstaking research and much contributions and sacrifice from the members of the various government agencies that took part in this project, our researches managed to produce a precision farming system in the Malay language that was suitable for field implementation.



The commercial or marketing name of this resulting product is Precision Farmer. Among the unique characteristics of this product are:

a) Precision Farmer system enables optimum use of inputs. Right amount at right location.
b) The system is convenient to be used by semi-literate farmers and managers as it uses local language
c) The system can be customized for other grains
d) System portability and scalability, from manual farming to high-end mechanization
e) It reduces the run-offs of fertilizer and chemicals to the environment

The reduction in the use of fertilizer and chemicals shows great promise. In preliminary field trials, certain plots of paddy land had a savings of 75% of nitrogen, 57% of phosphate, and 100% of potash. This is not just a significant savings in cost but it will also help reduce our environmental pollution from the agricultural practices. This impact on the environment makes the Precison Farmer stand out as an indispensable tool to help safeguard our pristine Malaysian environment.

From the technical point of view, this research focused on adapting computer technology in Paddy Precision Farming Sytem. This is one of the Geographical Information System (GIS) applications in agriculture that provides a user friendly interface that focuses on the farmers and managers as the users of this system. This system was developed within Visual Basic (VB6) environment as a user interface platform and MapObjects as GIS components. It involved GIS programming and provides the functionalities and facilities to its users that are common to the agriculture practices such as query, updating, visualization, agricultural related documents and reports and planting schedule. In addition, this system is easy to access, cost-effective and well protected from unauthorized accesses. The farmers gain exposure to ICT knowledge and skills through the use of the system. An important output of the system is the variable rate fertilizer application map. This map helps the farmers to apply the correct amount of the fertilizer at the right locations, thus optimizing the fertilizer application and safeguarding the environment from excess application of fertilizer.

The system has been field tested and performs to expectations. It offers a broad based approach that can be easily adapted to farmers in Malaysia and used for farmers worldwide. The end product is ready. This product has been developed after thorough research and the resulting interface is clearly presented for the user. It is envisaged that this product will have a significant impact on the paddy farming community and in safeguarding our environment.

Landmark Publications

Abdul Rashid Mohamed Shariff, Nik Norasma Che' Ya, Fauzul Azhan Abdul Aziz, Mohd. Amin b. Mohd. Soom, Anuar Abdul Rahim, Ebrahim Jahanshiri, Web-Based GIS Decision Support System For Paddy Precision Farming, Proceedings of the World Conference on Geographical Spatial Data Infrastructure 11, Rotterdam, 2009.

Fauzul Azhan Abdul Aziz, Abdul Rashid Mohamed Shariff, Mohd. Amin b. Mohd. Soom, Anuar Abdul Rahim, Ebrahim Jahanshiri, Nik Norasma Che' Ya, A GIS based System For Paddy Field Precision Farming, Proceedings of the, World Conference on Agricultural Information and IT, Tokyo, Japan, 24 - 27 August, 2008.

Abdul Rashid Mohamed Shariff, Fauzul Azhan Abdul Aziz, Mohd. Amin b. Mohd. Soom, Anuar Abdul Rahim, Ebrahim Jahanshiri, Nik Norasma Che' Ya, Proceedings of the National Consultative Workshop on Paddy Precision Farming. MAHA 2008. 13-14 Aug 2008.Malaysia Agro Exposition Park Serdang (MAEPS).

- GOLD *Malaysia Technology Expo (MTE 2008)*
- GOLD *British Invention Show (BIS 2008)*
- ***Diamond Special Award:*** *British Invention Show (BIS 2008)*
- GOLD *UPM Invention, Research & Innovation Exhibition (PRPI 2007).*

Reader Enquiry

Abdul Rashid Mohamed Shariff, *Fauzul Azhan Abdul Aziz, Mohd Amin Mohd Soom, Anuar Abdul Rahim, Ebrahim Jahanshiri and Nik Norasma Che' Ya*

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RETECS MAPS:

Real Time Electrical Conductivity of Soil Mapping System®

The characteristics of agricultural land are generally variable. Spatial and temporal variability of the soil chemical and physical properties within a field is unavoidable. To practice precision farming, the traditional field soil sampling and subsequent laboratory tests, which are usually time consuming and laborious, should be replaced by a more rapid and intensive soil sampling system. This could be achieved by using apparent or bulk soil electrical conductivity (ECa) technique for describing soil spatial variability. An electrical conductivity sensor known as VerisEC can be used to measure the average ECa of 0-30 cm (shallow ECa) and 0-90 cm (deep ECa) depths and locate its position by Differential Global Positioning System (DGPS). A summary parameter, ECa, is related to soil salinity and soil texture, which has high correlation with soil cation exchange capacity (CEC), hence soil nutrients content.

In the existing soil ECa mapping system, the ECa sensor cart or probe measures the ECa and the values stored in the data logger (in the tractor cab). ECa maps can be produced later in the office only after transferring from the logger to a mapping software via a diskette. The tractor driver or operator could not view the result of the ECa data collection in the field. This can create missing data points and the operator may need to repeat the data collection.

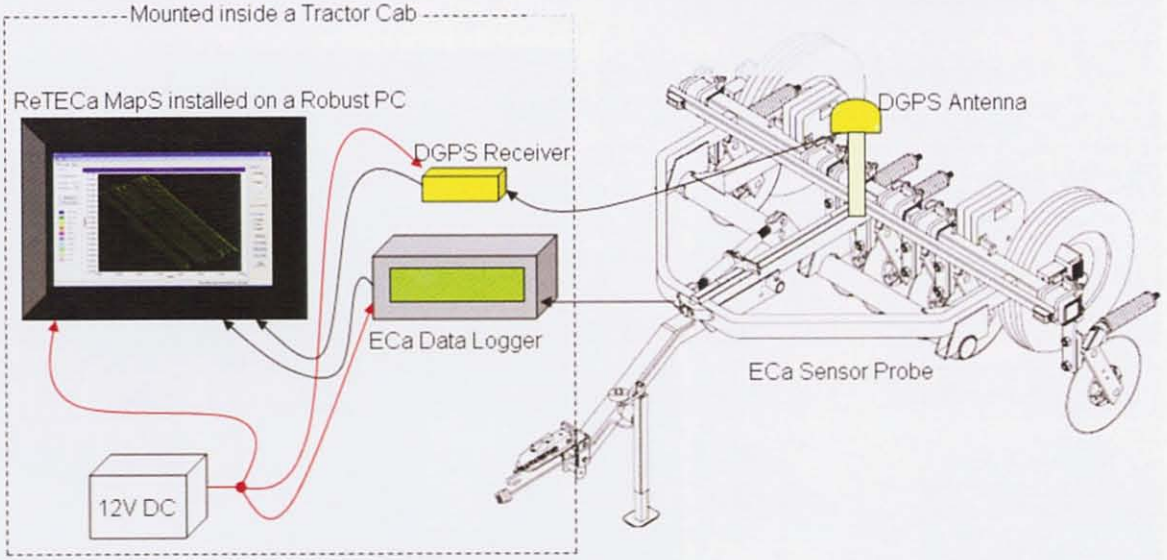

Figure 1: *The innovation is in the development and application of ReTECa MapS software to visualize the collected ECa data on the screen of a robust computer mounted inside the tractor cab as ECa data is being collected in the field by running the EC sensor pulled by a tractor.*

ReTECa MapS software was developed on a programming software known as SharpDevelop. It allows the ECa map to be generated in real time basis and displayed on the screen of a robust computer system mounted on the tractor cab. This real time visualization of ECa values avoids missing data. In the office, the data can be analysed using MAZDEC to produce a prescription maps with fertilizer management zones based on apparent electrical conductivity. RMC

Landmark Publications

Mohd Amin Mohd Soom. SMART Farming Technology Research for New Agriculture. The Ingenieur, Vol 33, pp 23-27 Mac-May 2007. Board of Engineers, Malaysia.

Aimrun W., MSM Amin, M Rusnam, Desa Ahmad, MM Hanafi, and AR Anuar, 2009. Bulk Soil Electrical Conductivity as an Estimator of Nutrients in Maize Cultivated Land. European Journal of Scientific Research, EJSR Vo. 31 No. 1 (2009) pp 37-51.

Chan CS, MSM. Amin, TS Lee ,and CH Mohammud, 2008. Apparent Soil Electrical Conductivity as an indicator of Paddy Soil Productivity. J Trop. Agric. and Fd. Sc. 36(1): 145-153.

Aimrun, W., MSM Amin, Desa Ahmad, MM Hanafi and CS Chan, 2007. Spatial Variability of bulk electrical conductivity in a Malaysian Paddy field: Key to soil management. Paddy Water Environ. Springer Berlin Vol 5 No.2 /June 2007 pp 113-121.

Chan CS, MSM Amin, TS Lee, and CH Mohamud, 2006. A New and Cost Effective Technique in Predicting Paddy Soil Productivity. IEM Journal Vol 67 No 4. December 2006.

Award Winner

- GOLD *Malaysia Technology Expo (MTE 2008)*
- GOLD *UPM Invention, Research & Innovation Exhibition (PRPI 2007)*

Reader Enquiry

Mohd Amin Mohd Soom, *Aimrun Wayayok and Ezrin Mohd Husin*

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Pertanika goes international (31 July 2008 to 31 March 2008)

1. **FOR THE RECORD!:** Professor Walkinshaw *(centre)* and Professor Abu Bakar Salleh and Prof. Datin Paduka Dr. Aini Ideris with *Pertanika* team
2. **HALF DONE! ANOTHER HALF TO GO:** *(from right)* Vice Chancellor, Professor Emeritus Kang, Punjab Agricultural University congratulates Dr Nayan for raising *Pertanika* to an international standard
3. **SEEKING RESPECTABILITY!:** *(from left)* Professor Malcolm Walkinshaw receives a bag full of UPM's prestigious research publications and a token of Malaysian hospitality from Professor Abu Bakar Salleh, Deputy Vice Chancellor (R&I), UPM
4. **DON'T FORGET THE REAL ISSUE!:** *(from right)* Professor Walkinshaw, who sits on the International Advisory Board, Pertanika JTAS suggests Reviewers Board should not be restricted to Malaysian scholars, but should be inclusive of scholars representing other countries
5. **WHY SETTLE FOR LESS:** Professor Emeritus Mohamed Abdel-Ghani *(front)* commented on the excellent image portrayed by Pertanika. Having achieved SCOPUS, the journal should continue seeking additional indexing venues and publicizing the journal throughout Malaysia and beyond
6. **ResearchSEA:** *(from left)* Ruth Francis, Head, Nature Press, UK along with Professor Zubaidi during the Media Workshop organized by ResearchSEA
7. **PRIME TIME:** *(from right)* Professor Zamri and Professor Fatimah taking a journalist approach at the ResearchSEA Media workshop held at USM
8. ***PERTANIKA* GAINS MOMENTUM:** *(right)* Dr Nayan ..... we will provide more avenue to authors who wish to publish their top research in Pertanika journals
9. **GOING THE SMART WAY:** *(centre right)* Professor Zamri sharing his ideas on international media at the Media Workshop for Researchers held in USM
10. **KARAOKE:** Dr. Daranee Hormdee, Khon Kaen University going live at the Media workshop with R&D joyride!
11. **THE FINALISTS:** Participants at the 1-day Media Workshop for Researchers organized by ResearchSEA

ResearchHAPPENINGS

12. **DAYS REMEMBERED:** *(from left)* Professor Fakhru'l with Emeritus Professor Martin Snaith, ex- Pro-Vice-Chancellor University of Birmingham, Ben Ramster, Editorial Manager, Institution of Civil Engineers (ICE), London, UK., and Tuan Haji Mohamed Ghazali at UPM
13. **GOOD BY ITSELF:** An Academic Writing consultant *(centre front)* Ben Ramster, UK with UPM scholars during his visit to UPM
14. **MAKING A STATEMENT:** *(left)* Professor Kadambot Siddique, Chair in Agriculture & Director UWA Institute of Agriculture, Australia being given a token of appreciation by Professor Zulkifli Idrus, Director, RMC.
15. **TAKING SOME TIME OFF:** *(from left)* Professor Emeritus Peter Heggs, Manchester University, Professor Zulkifli Idrus, Professor David Min and Dr. Nayan Kanwal
16. **MERIT COMES FROM MAKING RIGHT CHOICES:** In quest for excellence, Dr Nayan arranged a special meeting with Professor Dato' Rosihan Ali, Editor-in-Chief, Bulletin of the Malaysian Mathematical Sciences Society, USM.
17. **GREAT DIVERSITY:** File photo of Ben Ramster with UPM scholars
18. **GOOD TURNOUT:** Members from the Faculty of Food Science with Professor David Min Scientific Editor, Journal of Food Science, Journal of American Oil Chemists Society
19. **HOLD YOUR HORSES!** *(from right)* Professor Mohamed Ariff, International Advisory Board, *Pertanika* and Professor Shamsher share their valuable experiences on journal management
20. **SET FOR THE FUTURE:** All for the same cause! Making *Pertanika* a Malaysian-International journal..... Prof Abu Bakar Salleh *(centre)* with Prof Ariff and Prof Zamri on his right and Prof Shamsher and Dr Nayan on his left
21. **DUE RECOGNITION:** Professor Abu Bakar Salleh and Professor Mohamed Ariff—sometimes we need to do what we have to do!

Parallel 2PB Software
for Solving Large Non Stiff ODEs

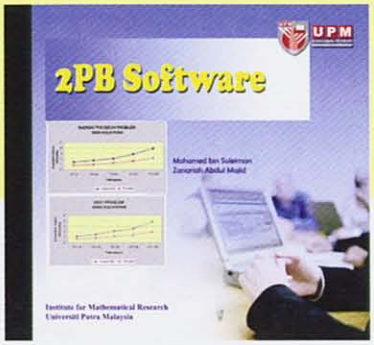

Figure 1: UPM's Parallel 2PB Software for Solving Large Non Stiff ODEs

The development in computer technology has allowed people in science and engineering sectors to apply numerical methods to solve mathematical model arising from physical phenomena. The numerical solutions of large ordinary differential equations (ODEs) systems require a large amount of computing power. The need for an accurate and faster solution has motivated researches at UPM to develop an efficient parallel block software for solving large problems of ordinary differential equations using variable step size and order on a parallel shared memory computer.

The method used in the code will estimate the numerical solutions at two equally spaced points simultaneously within a block. The numerical results show that the parallel execution time is faster than the sequential execution time. The parallel implementation produced good speed up with respect to the sequential timing and hence better efficiency on two processors.

2PB software is very efficient for solving small and large non stiff ODEs. The method developed in the code will solve the small systems of ODEs very fast in block while the large ODEs will be solved very fast in parallel block mode.

The speed up ratio on two processors is defined as $S2 = T0/T2$ where T0 is the time for the fastest serial algorithm for a given problem and $T2$ is the execution time of a parallel program on two processors. *Efficiency* of a parallel algorithm is defined as the ratio of speedup compared to the number of processors used. It can be defined as $E2 = (S2/2) \times 100$. In an ideal parallel system, speed up is equal to the number of processors (P) being used and efficiency is equal to 100%. In practice, speed up is less than P and efficiency is between 0% and 100%, depending on the degree of effectiveness with which the processors are utilised. The performance of the 2PB shows that as the number of equations increased, the speed up has a range of 1.70 to 2.0 and the range of efficiency is between 85% and 100%. Hence, the performance of the parallel system improved for large systems of ODEs.

The source code developed would be useful in science, engineering sectors and education area to solve many mathematical models in the form of ordinary differential equations. RMC

(A parabolic partial differential equations : a semi – discretization of the heat equation)

$$\begin{bmatrix} y_1' \\ y_2' \\ \cdot \\ \cdot \\ \cdot \\ y_N' \end{bmatrix} = \begin{bmatrix} -2 & 1 & & & & \\ 1 & -2 & 1 & & 0 & \\ & 1 & \cdot & \cdot & & \\ & & \cdot & \cdot & \cdot & \\ & 0 & & \cdot & \cdot & 1 \\ & & & & 1 & -2 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ \cdot \\ \cdot \\ \cdot \\ y_N \end{bmatrix}, \quad y(0) = \begin{bmatrix} 1 \\ 0 \\ \cdot \\ \cdot \\ \cdot \\ 0 \end{bmatrix}$$

$N = 18000$ equations $\qquad 0 \le x \le 5$

Source: Hull, T.E. et al. (1972)

Figure 2: Discretization of the heat equation

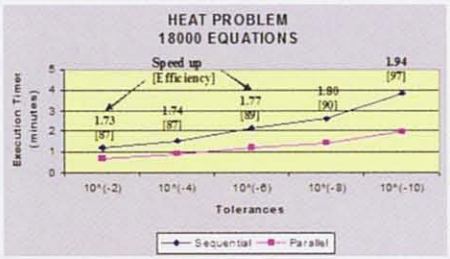

Figure 3: Heat graph

(A radioactive decay chain).

$$\begin{bmatrix} y_1' \\ y_2' \\ \cdot \\ \cdot \\ \cdot \\ y_N' \end{bmatrix} = \begin{bmatrix} -1 & & & & & \\ 1 & -1 & & & & \\ & 1 & \cdot & 0 & & \\ & 0 & \cdot & \cdot & 0 & \\ & & 0 & \cdot & \cdot & \\ & & & & \cdot & -1 \\ & & & & 1 & 0 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ \cdot \\ \cdot \\ \cdot \\ y_N \end{bmatrix}, \quad y(0) = \begin{bmatrix} 1 \\ 0 \\ \cdot \\ \cdot \\ \cdot \\ 0 \end{bmatrix}$$

$N = 18000$ equations. $\qquad 0 \le x \le 10$

Source: Hull, T.E. et al. (1972)

Figure 4: Radioactive equation

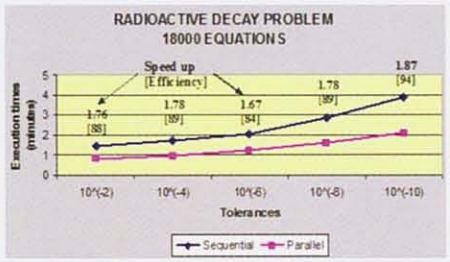

Figure 5: Radioactive graph

SILVER *UPM Invention, Research & Innovation Exhibition (PRPI 2006)*
BRONZE *International Exhibition for Invention, Innovation, Technology & Industrial Design (ITEX 2007)*
GOLD *World Exhibition on Innovation, Research and New Technologies (EUREKA 2007)*

Award Winner

Landmark Publications

Majid, Z.A., Suleiman, M., Ismail, F., Othman, M. (2003). Two Point Implicit Block Method In Half Gauss Seidel For Solving Ordinary Differential Equations. Jurnal Matematika, Vol 19. No 2, pp 91-100.

Zanariah, A. M., S. Mohamed, I. Fudziah and O. Mohamed. (2003). Parallel Two Point Fully Implicit Block Method for Solving Large Systems of Ordinary Differential Equations. In Investing in Innovation 2003, Vol. 5: Science and Engineering, ed. Y.A. Khalid et al., pp. 307-310. Universiti Putra Malaysia Press, Serdang, Selangor

Majid, Z.A. and Suleiman, M. (2006). Parallel Block Codes for Solving Large Systems of Ordinary Differential Equations. International Journal of Simulation and Process Modelling: Special Issue on Mathematical Modelling and Simulation for Industrial Applications. Inderscience Publishers, Vol 2, No 1/2, pp 98-122.

Othman, K.I., Ibrahim, Z. B., Suleiman, M. and Majid, Z.A. (2007). Automatic intervalwise block partitioning using Adams type method and backward differentiation formula for solving ODEs. Applied Mathematics and Computation, Volume 188/2, pp. 1642-1646.

Majid, Z.A. and Suleiman, M. (2008). Variable Step Variable Order Two Point Block Fully Implicit Method for Solving Ordinary Differential Equations. European Journal of Scientific Research, Volume 21, No. 3, pp 521 – 529.

Reader Enquiry
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Development of Healthy Oil and Fat Products

Figure 2: Scientists are investigating on the new methods to treat obesity

Consumers are becoming increasingly aware of the dependence of human health on proper nutrition and a balanced diet. Recent trends in the purchasing patterns of health-conscious consumers have increased demand for food products that offer extra benefits in addition to those associated with nutrition. Functional foods constitute a particularly important emerging category of foods that are receiving increasing attention in this aspect.

Figure 1: Number of obese people worldwide has risen at an alarming rate

Oils and fats are an important food component of our daily diet. However, health experts have warned that the number of fat or obese people worldwide has risen at an alarming rate. Doctors, scientists and nutritionists are now investigating on the role of genetics, metabolism and drugs in contributing to this weight-related problem, as well as new methods to treat it. This, in turn, has directly or indirectly enhanced the very lucrative global anti-obesity market, which currently is in excess of USD 240 billion. The functional oils and fats market has certainly benefited from all this publicity. In the past decade, rising consumer awareness and mandatory governmental legislations on unhealthful fats have partly surged the sales volume of functional oil and fat products.

Edible oils and fats are often characterized by their melting profile which determines its application as a liquid oil or a solid fat. Growing consumer demand for healthful fat products (such as margarines, shortenings, frying fats, confectionery fats, beverage creamers, etc.) that are palatable, can be used for cooking, and possess good textural properties has been the impetus behind the production of various modified fats and spreads, such as low-fat butter products, fat substitutes, and zero-calorie fats. In the early 1980s, physical blending of solid fats with liquid vegetable oils appeared in the edible oils market. Physical blending of fats and oils can lead to solid fat products that harmonize nutrition, and offer certain organoleptic attributes. However, physical blending of fats and oils does not provide a solution to eutectic effects.

Hydrogenated fats (consumed as margarines, shortenings, frying and cooking fats) were once a major source of dietary fat in many countries. It is a solid fat derived from the hydrogenation process of unsaturated vegetable oils such as soybean, canola, corn oils as well as palm oil. Hydrogenation is used to raise the melting points and plasticities of these vegetable oils used for shortenings and margarines, and to achieve the desired texture and oxidative stability. Unfortunately, the commercial hydrogenation process results in the production of trans fatty acids (TFA) which is associated with the increased risk of heart disease. Concerned about health issues regarding TFA, the US Food and Drug Administration (FDA) had required the labeling of TFA in food and edible oil industries. Now, TFA paints an unhealthful image in the edible oil industry prompting many major players to evaluate their products and seek more healthful alternatives to replace hydrogenation.

Figure 3: DAG & MLCT can be used to make these products

Besides blending and hydrogenation, interesterification has been used successfully to modify fats and oils. Recent trends reveal the increased use of interesterification in the oils and fats industry to manipulate properties of solid fat products to replace those manufactured by hydrogenation or physical blending. Interesterification involves redistribution of fatty acids between and within the fat molecule. The resulting product presents the same total fatty acid composition of the original fat, but the positional distribution and physical properties of the resultant product are altered. Two types of interesterification processes are in commercial use – chemical and enzymatic.

Chemical interesterification (CIE) process is a low-cost tried-and-true technology that randomly distributes the fatty acids in the fat molecule. However, CIE process suffers from high oil losses, formation of unwanted side products, risk of flavor reversion and reduced stability. More importantly, the consumption of CIE fats are linked to increased health risks caused by the "unnatural" fatty acid arrangement of CIE fats.

Today, enzymatic interesterification (EIE) process is the choice for fat modification as it has certain advantages over CIE such as milder reaction conditions and selective fatty acid rearrangement on sn-1,3 positions of the fat molecule. EIE is a "natural" process that is simple, clean, safe and cost-effective when running continuously on clean bulk fat. With the growing concern for healthier lifestyles and protection of our environment, EIE is the most promising "green chemistry" choice for the future of the oils and fats industry.

We have made great headway into the area of healthful oils since the commencement of our preliminary work on diacylglycerol oil (DAG) and medium- and long-chain triacylglycerols (MLCT). Consumption of DAG and MLCT oil are claimed to reduce postprandial serum triacylglycerol (TAG) levels, and thus, are beneficial for the prevention and management of obesity. The physiological differences between DAG and TAG observed in animal and clinical trials are due to distinct metabolic fates of the oils after being absorbed via the gastrointestinal tract. Unlike conventional TAG cooking oils that contains only up to 10% (w/w) DAG, these rather light-tasting healthful cooking oils are claimed to contain 80% (w/w) or more of DAG as the main functional component.

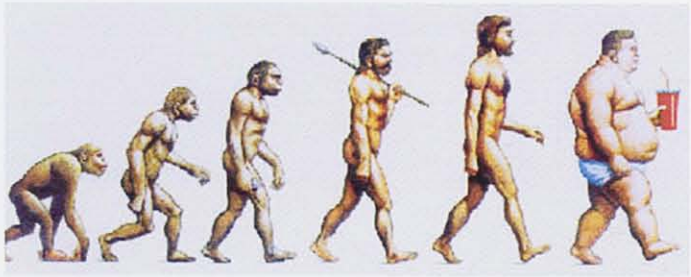

Figure 4: Is it Darwinism?

■ *Turn to Page Fourteen*

In 2006, we forged a close collaboration with Sime Darby Research Sdn Bhd (then known as Golden Hope Research Sdn. Bhd.) on the development of novel processes for production of DAG. We have successfully developed and patented a new process for the production of DAG. The DAG production process is an enzymatic partial hydrolysis process of DAG from conventional TAG oils. Refined, bleached and deodorized (RBD) palm oil is subjected to enzymatic hydrolysis in the presence of a commercial immobilized lipase at specific temperatures and water content to obtain a hydrolysate containing DAG. The crude DAG product is then refined to obtain high purity DAG using conventional deodorization and short-path distillation. The valuable by-product of this process – free fatty acids – will find great use in the oleochemical industry.

To date, we have filed 1 local (PI20056218) and 4 international (EP1803819; US2007/0148745; JP2007-175049; WO2007/075079) patent applications for this invention. Our DAG process is simple and does not require additional plant equipments for its production. Only minor plant modifications are required to convert an existing EIE plant to a DAG production plant.

DAG from palm oil is a solid fat at room temperature, and therefore is very suitable for use as a healthful alternative to conventional hydrogenated or EIE fats. Palm-based DAG can be tailor-made to suit various fat applications (margarines, shortenings, frying fats, etc.) by blending with other vegetable oils. A whole new world of healthful solid fat products can be made possible with the advent of palm-based DAG fats. With excellent marketing strategies, palm-based DAG products may provide a significant boost to the value of palm oil.

Figure 5: We Are What We Eat!

As for MLCT oil and fat, there is only one manufacturer which monopolises the market today. This manufacturer uses the expensive immobilizes enzymes to product the MLCT oil. Our research collaboration with UPM has borned 2 a local (PI 20064041) and 1 international patent (PCT/MY2007/000025). In the patents, we disclosed a novel catalyst for the production of MLCT with significantly reduced process cost. This low-cost process of producing MLCT using the novel catalyst will provide a significant advantage over the current technology. This novel catalyst is a cation-exchange macroreticular-type resin capable of effectively catalyzing the esterification of MLCT from medium- and long-chain fatty acids and glycerol. This catalyst complies with strict food-grade specifications of the United States Food and Drug Administration (USFDA). Our technology utilizes significantly lower temperatures (approx. 110 °C) than that required by conventional catalysts (220 °C and above). Furthermore, this catalyst can be reused and regenerated for many cycles, thereby providing excellent process economics. Crude MLCT yield of at least 40 wt. % can be obtained. Upon purification by short-path distillation, refined MLCT purity of at least 80 wt. % can be achieved. The key innovation of this invention lies in the utilization of widely available low-cost food-grade cation-exchange resins to catalyze the production of high-value MLCT at relatively low temperatures without the high biocatalyst cost related to the use of proprietary immobilized enzymes or product degradation related to high temperature processes of prior art.

As our preliminary results were very encouraging, we are poised to move forward for further developments on the process to bring about the realization of a commercial-scale DAG production. We were also successful in our Technofund application for the DAG project and were awarded a total of RM 4.898 million from MOSTI to further realize the commercial potential of this product. The research collaboration between the Fats and Oils Group from Sime Darby Research Sdn. Bhd. and UPM does not end with the Technofund. The researchers are jointly involved in the preclinical investigation of DAG. The preliminary preclinical work based on in vitro and in vivo approaches will investigate the body fat and cholesterol reduction claims.

Figure 6: (left) Enzymes, (right) are the chemical catalysts that are used for our research

It is undeniable that the current trend in consumer spending is heading towards healthier oils and fats. It is not necessarily the amount of fat, but the type of fat that may determine the functional applications of the fats of the future. The time is indeed ripe for the oils and fats industry to adopt these new technologies to provide consumers with safe and healthful fats. RMC

Landmark Publications

Cheong, L.Z., Tan, C.P., Long, K. and Yusoff, M.S.A., S.K. Lo and Lai, O.M. (2007) Production of a diacylglycerol-enriched palm olein using lipase-catalyzed partial hydrolysis: Optimization using response surface methodology. Food Chem. 105:1614-1622.

S.K. Lo, L.Z. Cheong, N. Ariffin, C.P. Tan, K. Long, M.S.A. Yusoff and O.M. Lai (2007). Diacylglycerol and triacylglycerol as responses in a response surface optimized process for diacylglycerol production by lipase-catalyzed esterification in a pilot packed-bed enzyme reactor. J. Agric. Food Chem. 55:5595-5603.

S.K. Lo, C.P. Tan, K. Long, M.S.A. Yusoff and O.M. Lai (2008). Diaclyglycerol oil-Properties, Processes and Products: A Review. Food and Bioprocess Technology. 1:223-233.

Koh, S.P., N. Ariffin, C.P. Tan, M.S.A. Yusoff, K. Long and O.M. Lai. (2008) Rheological properties, oxidative stability and sensory evaluation of enzymatically synthesised medium-and-long-chain-triacylglycerol-based salad dressings. Eur. J. Lipid Sci. Technol 110:1116-1126.

S.K. Lo, C.P. Tan, K. Long, M.S.A. Yusoff and O.M. Lai (2009). Response surface modelling of 1-stearoyl-3(2)-oleoyl glycerol production in a pilot packed-bed immobilized Rhizomucor miehei lipase reactor. J. Mol. Catal B: Enzymatic. 57:136-144.

- GOLD *Malaysia Technology Expo 2008 (MTE 2008)*
- GOLD *19th International Invention, Innovation & Technology Exhibition (ITEX 2008)*

INS Award for Best Invention in Health
19th International Invention, Innovation & Technology Exhibition (ITEX 2008)

- GOLD *UPM Invention, Research & Innovation Exhibition (PRPI 2008)*
- GOLD *BioInno Awards, BioMalaysia Exhibition 2008*
- GOLD *World Exhibition of Innovation, Research & New Technologies, Belgium (Innova EUREKA 2008)*
- *World Intellectual Property Organization (WIPO) Best Invention by Woman Award*
  World Exhibition of Innovation, Research & New Technologies, Belgium (Innova EUREKA 2008)

Reader Enquiry

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This is the fourth part of the continuing series of this feature article.
The third part was published in Synthesis Issue 23 (December 2008).

Guidelines for Pollution in Drinking Water

Mohammad Reza Mohammad Shafiee, Mohamad Pauzi Zakaria, Nayan Deep S. Kanwal, Mahyar Sakari, Pourya Shahpoury Bahry and Alireza Riyahi Bakhtiari

Water pollution is one of the major and serious health threats to the environment as well as human beings.

There are several pollutants that are a threat to the drinking water and they can be classified in six categories, i.e.

- Microorganisms;
- **Inorganic chemicals**;
- Disinfectants;
- Organic chemicals; and
- Disinfection byproducts;
- Radionuclides

These form the potential pollutants to human drinking water worldwide. The current guideline provides necessary information on these threats. The first three categories have been covered in the previous issue(s) of Synthesis. Information on the fourth category that focuses on Inorganic chemicals is provided in this issue.

Inorganic Chemicals

Contaminant	MRDLG[1] (mg/L)*	MRDL[2] (mg/L)	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water
Antimony	0.006	0.006	• Increase in blood cholesterol; • Decrease in blood sugar	• Discharge from petroleum refineries; • Fire retardants; ceramics; • Electronics; • Solder
Arsenic	0	0.010 as of 01/23/06	• Skin damage or problems with circulatory systems, and • May have increased risk of getting cancer	• Erosion of natural deposits; • Runoff from orchards; • Runoff from glass & electronics production wastes

Definitions:

Asbestos

Asbestos is a fibrous mineral occurring in natural deposits. Because asbestos fibers are resistant to heat and most chemicals, they have been mined for use in over 3,000 different products, including roofing materials, brake pads, and cement. Asbestos is not known to cause any health problems when people are exposed to it at levels above the MCL for relatively short periods of time.

Short-term: Asbestos is not known to cause any health problems when people are exposed to it at levels above the MCL for relatively short periods of time.

Long-term: Asbestos has the potential to cause the following effects from a lifetime exposure at levels above the MCL: lung disease; cancer.

Barium

Barium is a lustrous, machine metal which exists in nature only in ores containing mixtures of elements. It is used in making a wide variety of electronic components, in metal alloys, bleaches, dyes, fireworks, ceramics and glass. In particular, it is used in well drilling operations where it is directly released into the ground.

Short-term: US-EPA has found barium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: gastrointestinal disturbances and muscular weakness.

Long-term: Barium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: high blood pressure.

Beryllium

Beryllium is a metal found in natural deposits as ores containing other elements, and in some precious stones such as emeralds and aquamarine. The greatest use of beryllium is in making metal alloys for nuclear reactors and the aerospace industry.

Some people who drink water containing beryllium well in excess of the MCL for many years could develop intestinal lesions.

This health effects language is not intended to catalogue all possible health effects for beryllium. Further, it is intended to inform consumers of the most significant and probably health effects associated with beryllium in drinking water.

It is released principally in the smoke stacks and ash wastes of power plants which burn coal. It is also found in discharges from other industrial and municipal operations. Rocket exhaust products also consist of various beryllium compounds.

Cadmium

Cadmium is a metal found in natural deposits as ores containing other elements. The greatest use of cadmium is primarily for metal plating and coating operations, including transportation equipment, machinery and baking enamels, photography, television phosphors. It is also used in nickel-cadmium and solar batteries and in pigments.

Short-term: US-EPA has found cadmium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: nausea, vomiting, diarrhea, muscle cramps, salivation, sensory disturbances, liver injury, convulsions, shock and renal failure.

Long-term: Cadmium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: kidney, liver, bone and blood damage. Some cadmium compounds are able to leach through soils to ground water. When cadmium compounds do bind to the sediments of rivers, they can be more easily bio-accumulated or re-dissolved when sediments are disturbed, such as during flooding. Its tendency to accumulate in aquatic life is great in some species, low in others.

....to be continued in Synthesis Issue 25, June 2009

NewsBriefs

128 Years of Trust | Calendar | Ludhiana Tribune | Weather | Archive

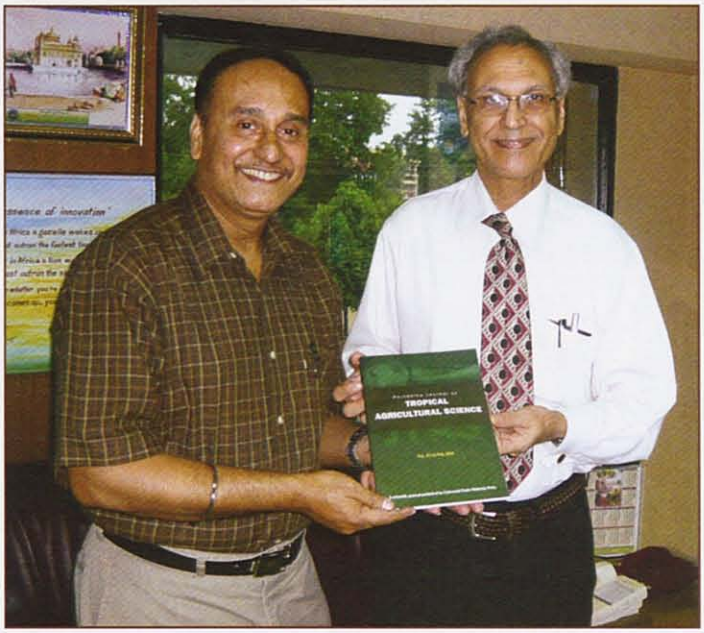
TOP STORIES

Malaysian delegate visits PAU

Tribune News Service

Chandigarh, Wednesday, October 1

Dr Nayan Kanwal, Executive Editor of Universiti Putra Malaysia's prestigious journal, *'Pertanika'* visited Punjab Agricultural University (PAU) and held discussions with Vice-Chancellor Professor Emeritus Manjit Singh Kang. Dr Kanwal presented a copy of the journal to Profesor Kang and expressed hope that postgraduate students from PAU would regard *Pertanika* as a resource to support their research in strengthening their research management capacity. Professor Kang commented that "Punjab Agricultural University would consider *Pertanika* with esteem as he is aware that the journal is doing well and is now an international refereed journal in Malaysia. Professor Kang is incidentally on the International Advisory Board of Pertanika.



Dr Nayan Kanwal, Executive Editor, *Pertanika Journals*, UPM *(left)* presenting a copy of Pertanika JTAS to Professor Emeritus Manjit Singh Kang, Vice Chancellor, PAU

Pertanika is indexed in SCOPUS, EBSCO, AGRICOLA and CABI, said Dr Kanwal.

Professor Kang elaborated on how the PAU was serving the cause of farming in Punjab, saying PAU was ensuring food security to the nation. He further stated that PAU is keen to have an international R&D linkage with UPM adding that he had been keeping connected with the university through its website. He highlighted that India has a well developed agricultural extension system that probably is next to the United States of America. PAU has a well working research-extension linkage and transfer of technology mechanism, explained Dr. Kang. He requested Dr Kanwal if he could initiate the possibility of a MoU between the two universities.

Dr Jagtar Singh Dhiman, additional director, communication, PAU also joined the discussion with Dr Kanwal. He delved on the activities of Centre for Communication and International Linkages. Dr Kanwal also shared the activities of publication division of Research Management Centre, Universiti Putra Malaysia.

Later, Dr Kanwal was taken for a tour to the Museum of Social History of Punjab and showed keen interest as it showcases the way of life of rural Punjab.

UPM Topples other IPTA with 514 R&D Projects

UPM ON TRACK: A UPM Scientist highlighting her research—Research is the only way to move forward!

KUALA LUMPUR 30th Dec – Universiti Putra Malaysia (UPM) is leading other IPTAs with 514 researches and development projects granted under the Fundamental Research Grants Scheme (FRGS).

Deputy Minister of Higher Education, Dr. Hou Kok Chung elaborated on the statement based on the record reviewed from 2006 till 2008 during the Parliament proceedings held recently.

"This is followed by Science University Malaysia (348 R&D projects), National University Malaysia (345), Technology University Malaysia (328) and University of Malaya (278)", he said.

He added that a number of 56 R&D products invented by IPTA have been successfully commercialized with gross sales worth RM44.3mil as June last year,"

"About 311 products have the potential for commercialization," he said.

Hou stated that the Ministry puts strong emphasis on R&D being carried out in the higher education institutes and provides conducive environment that encourages more commercialization activities to manufacture the R&D products.

UPM – Dutch Lady to Study on Milk Nutrition and the Mental Performance on Malaysian Children

MAGNIFICENT: (Second from right) Prof Dr Tai Shzee Yew, Deputy Vice Chancellor (Industry & Community Relations) at the signing ceremony of a joint venture between UPM & Dutch Lady

PETALING JAYA, February 16 - Universiti Putra Malaysia (UPM) and Dutch Lady Milk Industries (M) join hands in a research project to study on milk nutrition and mental performance of Malaysian pre- school children.

The clinical research project with an estimated value of half a million Ringgit is led by Dr. Mohd. Nasir Mohd Talib and a team of three lecturers from the Nutrition and Dietetic Department, Faculty of Medicine and Health Science, UPM.

The research would involve children from the Klang Valley. After having four different dosages of milk, their mental performance would be tested via computerized test series developed by Cognitive Drug Research, an international research institute in the United Kingdom.

An agreement was signed by Prof. Dr. Tai Shzee Yew, Deputy Vice Chancellor (Industry and International Relations) and Mr Hans Laaraker, Director, Dutch Lady Malaysia.

Dutch Lady Malaysia was set up in Malaysia in 1963 by Royal Friesland Foods and became the leader in the dairy products' market in Malaysia since its establishment in Petaling Jaya as Pacific Milk Industries (Malaya).

Pertanika

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Pertanika is an international peer-reviewed leading journal in Malaysia which began publication in 1978. The journal publishes in three different areas — Journal of Tropical Agricultural Science (JTAS); Journal of Science and Technology (JST); and Journal of Social Sciences and Humanities (JSSH).

JTAS is devoted to the publication of original papers that serves as a forum for practical approaches to improving quality in issues pertaining to tropical agricultural research or related fields of study. It is published twice a year in **February** and **August**.

JST caters for science and engineering research or related fields of study. It is published twice a year in **January** and **July**.

JSSH deals in research or theories in social sciences and humanities research with a focus on emerging issues pertaining to the social and behavioural sciences as well as the humanities, particularly in the Asia Pacific region. It is published twice a year in **March** and **September**.

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Wire Mesh Collimator
for Gamma Camera

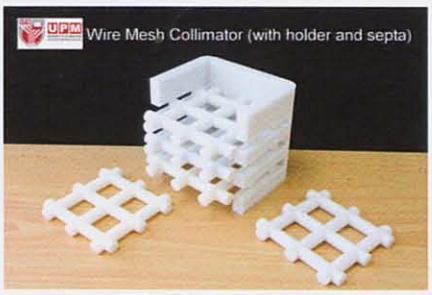

Figure 1: Wire Mesh Collimator with holder and septa

A gamma camera is very useful for cancer detection. To focus the beams of the high energy gamma rays, a collimator is used in front of the gamma camera. There are many types of collimators, but for a general purpose imaging, a multihole collimator is used. Despite its good resolution, the multihole collimator is heavy and bulky, therefore it is difficult to handle. For instance, the multihole collimator of a Toshiba GCA-7100A gamma camera at the Royal Surrey County Hospital, United Kingdom weighs up to 115kg.

Hence, the aim of this project is to solve this problem. Scientists at UPM have introduced a light collimator, with similar or better performance as that of the multihole collimator using a new concept of a wire-mesh collimator. The only undertaken resulted in few achievements.

First, we managed to produce a realistic platform for a gamma camera. This platform can be used with any type of collimators or coded apertures. We also used this model together with a Low Energy High Resolution multihole collimator (of a 140keV Tc-99m), and we validated the results by comparing them with the real experimental gamma camera images obtained from the Royal Surrey County Hospital.

Second, we proposed a design of a wire-mesh collimator which has only 51.2% the weight of the full multihole collimator and produces unprocessed images of comparable quality with those produced by the full multihole collimator. Using Wiener filtering post processing improves the quality of the produces images further. A wire-mesh collimator, with only 39.5% the weight of the full multihole collimator, in conjunction with Wiener filtering, produces images of comparable quality with the unfiltered images produced by the full collimator. Thus, we have demonstrater that a careful hardware design with proper image processing can allow one to replace the 115kg collimator with a 45kg one. RMC

Figure 2: Front View of Wire Mesh Collimator

Landmark Publications

M. Iqbal Saripan, Wira Hidayat Mohd Saad, Suhairul Hashim, Rozi Mahmud, Abdul Jalil Nordin and Mohd Adzir Mahdi, Monte Carlo Simulation on Breast Cancer Detection Using Wire Mesh Collimator Gamma Camera, IEEE Transactions on Nuclear Science, Vol 56 (No. 3), pp1321 - 1324, June 2009.

M. I. Saripan, W. H. Mohd Saad, M. A. Mahdi and A. R. Ramli, Research Notes: Early Cancer Detection with Wire Mesh Collimator Gamma Camera, International Review on Physics, Vol 2(3), pp184-186, June 2008.

M. I. Saripan, M. Petrou and K. Wells, Design of a Wire-Mesh Collimator for Gamma Cameras, IEEE Transactions on Biomedical Engineering, Vol 54(9), pp1598-1612, 2007.

M. Alnafea, K. Wells, N. M.Spyrou, M. Saripan, M.Guy and P.Hinton, Preliminary results from a Monte Carlo study of breast tumour imaging with LEHR collimator and a MURA coded aperture, Nuclear Instruments and Methods in Physics Research A, Vol 563(1), pp146-149, 2006.

Award Winner

- GOLD — *Special Recognition, Jury , Palexpo, Geneva (2008)*
- SILVER — *Malaysian Technology Expo (MTE 2008)*

Special Award — *Nuclear Innovation Award (2008)*

- SILVER — *UPM Invention, Research & Innovation Exhibition (PRPI 2007).*

Patent Pending: *PI20082818.*

Reader Enquiry

M. Iqbal Saripan, *Wira Hidayat Mohd Saad and Ros Ernida Roslan*

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- A Family of Parallel Explicit Group Iterative Algorithm on Shared Memory Multiprocessors (SMPs) Architecture

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- Why Children and Teenagers are Addicted to Computer Games? NEMD Model- Norma™ Engagement Multimedia Design Model

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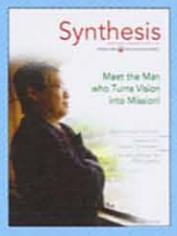

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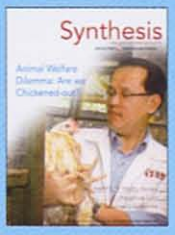

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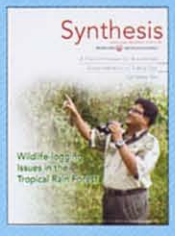

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