UPM

Synthesis

R&D Digest of Universiti Putra Malaysia

ISSN. 0127 – 9394 http://rmc.upm.edu.my/synthesis/ • Issue 14 • 3rd Quarter • Sept. 2006

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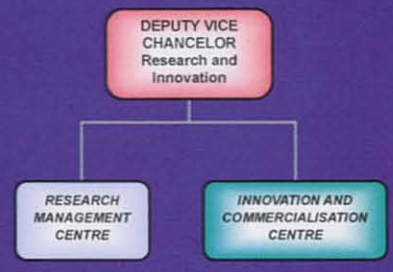
A New Centre to Promote Technology Transfer and Commercialisation — *Innovation and Commercialisation Centre*

"All consultancies related to research activities from the private sector will be handled by ICC" — Director (Innovation and Commercialisation Centre), Professor Dato' Dr. Mohamed Shariff Mohamed Din

The establishment of the Innovation and Commercialisation Centre (ICC) in early 2006 was in line with the objectives of UPM for the management of all aspects of commercialisation and protection of university's intellectual property (IP). The new Centre which started functioning in April is placed under the office of the Deputy Vice Chancellor of Research and Innovation. The functions of the Centre are as follows:

1) Provide support and activate commercialisation by promotion and project management;
2) Management of research output and technology transfer through various modes such as sales or licensing of IP and venture capital;
3) Provide consultancy services to clients within and outside the university by promotion of university expertise and to ensure expertise is duly protected and the client's requirements are fulfilled.

ORGANISATION CHART



The Centre has three units: i) Commercialisation, ii) Promotion and Training and iii) Intellectual Property Rights (IPR).

The Commercialisation Unit deals with pre commercialisation aspects of a research technology, product or intellectual property and provides assistance to the researcher until the project is commercialised. Applications for Commercialisation of R & D funds (CRDF) will be processed by ICC. The CRDF categories of funds involve project feasibility study for commercialisation of a new technology developed by researchers, formation of spin-off company, start up company, commercial production/ manufacturing through collaboration with a small medium enterprise (SME), government listed company (GLC) or large corporation.

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Detection of Microsatellite Loci in Rhinoceros Beetle *Oryctes Rhinoceros* *Using the Randomly Amplified Microsatellites (RAMS) Method*

Award Winner

Rita Muhamad Awang and Tan Soon Guan

Oryctes rhinoceros is an economically important pest to the agricultural sector especially to oil palm industries. Losses of yield due to this pest could reach up to 80% of the crop.

Many control techniques have been adopted in the Integrated Pest Management of the beetles including the use of pheromone. The pheromone, ethyl 4-methyloctanoate, can attract huge numbers of adults. However, it was observed that not all population of the beetles in the field was attracted to the pheromone. This could be due to the fact that the pheromone substance is very specific and employs a compound unique to certain species.

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What's Next

Highlights from the next issue –

- *BLUESS*
- *RAWAT*
- *King Grass Silages*
- *Cocoa Butter Extraction*

Editorial

UPM Continues its Pursuit of Excellence in Education and Research!

In line with the Government's objective to enhance the quality of higher education, universities now have a pivotal role towards establishing the country as a hub of educational excellence.

We are encouraged and heartened to know that UPM has made significant gains in the rankings, rising about 100 places in the world's leading universities according to the QS World University Rankings 2006 conducted recently by the Times Higher Education Supplement (THES).

Our gain in world ranking is a recognition of UPM' global standing by the international community. In our continuing pursuit of excellence in education and research, UPM can contribute to Malaysia's rising reputation and visibility in the global higher education landscape.

UPM's transformation over the past decade to reach a higher echelon was made possible by the UPM community. However, in a competitive fast-changing world, "we must run twice as fast in order to have a shot at global excellence." We have the courage, imagination and sense of mission to accomplish this!

The Publication Unit of RMC has been given the task to upgrade and promote UPM's hallmark Journal— publication of the 3 series of Pertanika Journals. Pertanika first began publication in 1978. Since then, it has established itself as one of the leading multidisciplinary Journals in the tropics. Published by the UPM Press, Pertanika was segregated into three journals in 1992 to meet the need for specialised journals in areas of study in line with the strengths of the university. These are Pertanika Journal of Tropical Agricultural Science, Pertanika Journal of Science and Technology; and Pertanika Journal of Social Science and Humanities. RMC through its Publication Unit will be responsible for managing the Editorial processing of papers submitted to the Journal, and shall generally help to promote the journal particularly but not exclusively in the academic sector, from January 2007.

Pertanika promises to bring you superior content and wider coverage henceforth. It is by such perfection that resources can be made available to nurture and retain, as well as creating platforms to create R&D impact and raise our international standing by supporting promising research. This indeed is also a part of transforming. A good university teaches. A great university transforms – transforming people into creative talents. That, in a nutshell, is the direction UPM is taking in its quest for global excellence.

Let us each do our part.

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Spotlight

University Rankings!

UPM must continue to strive for continuous improvement and excellence....

Ranking universities will remain controversial for the foreseeable future. But there is much less argument than there was two years ago about whether the process should even be attempted. Universities continue to define themselves internationally, both at subject level and as whole institutions. Different rankings have emerged in the past 12 months, and there is broad acceptance that cross-border comparisons are here to stay in higher education.

In view of the propelled world economy, universities have become more self-consciously global: seeking students from around the world who represent the entire spectrum of cultures and values, sending their own students abroad to prepare them for global careers, offering courses of study that address the challenges of an interconnected world and collaborative research programmes to advance science for the benefit of all humanity. The World University Rankings will continue to focus on research, teaching and international outlook, attempting to give a picture of current strengths rather than the backward look that is inherent in tallies of Nobel prizes and other accolades from past decades.

The basis of the rankings rely mainly on six measures. Qualitative and quantitative forms of data each account for half the total score. The qualitative data is based on our belief that the people who know most about university quality are those who work in them or are closely connected to them. The other half of the rankings scores are made up of quantitative measures.

Teaching and research are the main activities that occur in universities. Measures designed to capture the quality of these activities accounted for 40 per cent of the total score in rankings according to the Times Higher/QS World University Rankings. Teaching is measured by the classic criterion of staff-to-student ratio. The next measure, relating to research, is examined by how much intellectual power a university has relative to its size. It is based on citations of academic papers, since these are regarded as the most reliable measure of a paper's impact. The analysis are compiled by dividing the number of citations by staff numbers to correct for institution size and to give a measure of how densely packed each university is with the most highly cited and impactful researchers.

The final 10 per cent of the score is intended to determine how global universities are: 5 per cent is awarded on the basis of the percentage of overseas staff each university has, and a further 5 per cent for its percentage of overseas students. This measure is intended to help mobile staff and students by giving them an impression of how international a university may be. But because this measure counts for only 10 per cent of the total score, it is not possible for an institution to do well in the overall table on this measure without being excellent in other categories.

Under the Malaysian scenario, overall, there has been an upward shift in the public universities standing in the world rankings in 2006. Universiti Putra Malaysia (UPM) has made significant gains in the world university rankings. To leap-frog, the internationalisation process is one way forward. In building a knowledge-based society we have to be a lot more open so we need to get to know more universities worldwide, sell ourselves, and make ourselves known. We can be champions on the domestic front, but knowledge transcends borders and we must therefore push to the new frontiers.

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Carbon Dioxide Enrichment Technique for the Lowland Controlled Environment System

Award Winner

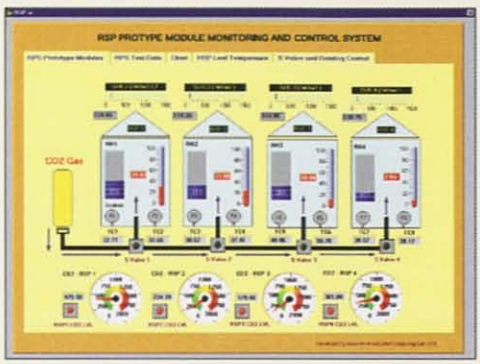
Hawa ZE Jaafar

Following the 1997 Asian Financial Crisis, Malaysian total food imports soared from RM3.5 billion (1985) to RM10.7 billion (1997) and to 13.9 billion in 2003. Since then there has been renewed interest in agriculture sector. With government's proclamation to make agricultural sector as the third engine of growth and income generation, some RM1.5 and RM2.8 billion were allocated in the budgets of 2005 and 2006, respectively. In an effort to advance agricultural development, the introduction and modernization of innovation and technology concerning agriculture imprint a bigger role.

Crop production under controlled environment (CE) system using structures/rain shelters is one such technology that has contributed tremendously to the Malaysian agriculture industry, especially in the highlands. Under this system, both the aerial and root environments of plants can be manipulated, modified and controlled for optimal growth and development. Thus, it ensures high production, adequate off season supply and accessibility to safe, nutritious and high quality food crop at affordable prices. It also creates the potential for the growing of temperate vegetables and fruits in the lowlands. In 1991, the production of high value vegetable crop such as tomato, sweet pepper, hot pepper and leek stood at respective 81, 74, 50 and 45 t ha^{-1}. Since then, production under CE system in the lowlands of Malaysia has denoted a leveling off with little improvement in productivity. With creation of competitive global market and government's call to increase domestic food production to reduce food import bills, a technology alleviation to enhance crop production and productivity was developed. This was carried out by bringing the crop closer to its photosynthetic potential through carbon dioxide (CO_2) enrichment or fertilization. The greatest advantage of CO_2 enrichment is in the enhancement of the photosynthate production particularly under adverse climatic conditions, and this would be most realized in the vegetative growth of young plants. However, with supra-optimal temperature condition in the tropical lowlands CE, the benefits of CO_2 enrichment may not be achieved.

Growth house prototype equipped with CO_2 gas delivery, microclimate control and monitoring system

Hence, to enable the establishment and development of a practical CO_2 enrichment technique for annual crops in the tropical lowlands, a growth house prototype, equipped with gas containment and heat dissipation capabilities was developed. Strategic enrichment technique based on the microclimatic pattern and plant-physiological characteristics was applied using an intelligent gas delivery and control system, interfaced with real-time microclimate monitoring and data acquisition system. Increased levels of CO_2



Computer interfaced microclimate data acquisition system using CO_2-dedicated software

by 1-, 2- and 3-folds at 750, 950 and 1150 ± 50 µmol mol^{-1} imposed on 7-day *Brassica chinensis* var. *chinensis* seedlings enhanced the overall growth. In relation to the non-enriched crop, earlier maturity/harvesting age was achieved by almost 10 days with increasing total biomass by 25-50%, and total leaf area by 10-20%. The harvest from enriched crops also exhibited high quality produce of uniform size with deep green colour, crispy texture and prolonged shelf life under non-refrigerated condition. Most of the physiological parameters of crop under elevated CO_2 also increased especially in the 3-fold elevated CO_2 condition as compared to the non-enriched treatment, as long as other interacting micro-environmental factors affecting plant growth were kept at optimum.

The findings thus implied that this innovative CO_2 enrichment technique for the tropical lowland CE system has great potential in the commercialisation of annual crop production. Another practical application of the technology is in the seedling management in nursery industry. Recent work to enhance growth of oil

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Mitsozyme™: Natural Enzyme Supplement for Poultry

Norhani Abdullah, Ho Yin Wan, Lan Ganqui and Syed Jalaludin Syed Salim

Mitsozyme™ is a freeze-dried bacterial preparation that can be used as a natural enzyme supplement for poultry. It contains *Mitsuokella jalaludinii*, a new bacterial species isolated from the rumen of cattle. The bacterium produces high phytase enzyme and other digestive enzymes like α-amylase and protease.

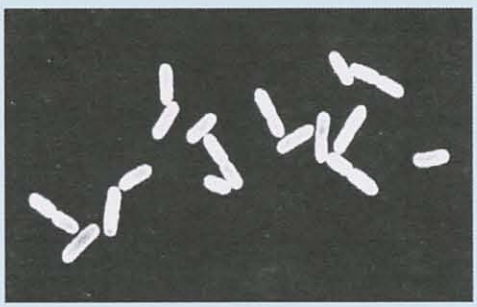
The phytase enzyme is capable of hydrolyzing phytate compounds present in legume seeds, cereals and oil crops which are commonly used as feed ingredients in poultry feeds. Phytate compounds have been considered as an anti-nutritional factor because they chelate important minerals like P, Ca, Zn, Cu, Mn and Fe and bind protein to form insoluble phytate-protein complexes. These nutrients are poorly utilized as chickens lack the enzyme phytase. Phytase production by *M. jalaludinii* was strongly induced by phytate present in the growth medium. Rice bran and soybean milk were found to be the best carbon and nitrogen sources, respectively.

The phytase enzyme produced by *M. jalaludinii* is very active at pH 4.0 – 4.5 and stable up to 60°C. Feeding trials conducted on broiler chickens fed corn-soybean meal

Chicks used in the feeding trial

diets with various levels of available P for 42 d have shown the ability of Mitsozyme™ to enhance P utilization in broilers fed low non-phytate P feed. The addition of 250 U phytase/kg feed into low non-phytate P feed is adequate to optimize the performance of chickens. Mitsozyme™ also increases retention of other minerals like Cu, Zn, Ca and Mn in the tibia. The digestive enzymes (α-amylase and protease) present in Mitsozyme™ further enhance the digestive process of the chicken. Hence, the feed intake, feed conversion rate, body weight gain, the apparent metabolisable energy value and digestibility of N and DM of feed are also improved.

These results indicate the effectiveness of the product in improving the nutritive value of the feed in poultry. Mitsozyme™ supplementation will reduce the use of inorganic P in feed and the amount excreted in poultry waste, thus reducing P pollution of the environment.



Scanning electron micrograph of Mitsuokella jalaludinii

Bronze – *IPTA R&D Expo 2005.*
SILVER – *Expo Science, Innovation & Technology (EXPO S&T 2004).*

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■ *From Page Three*

palm seedlings with CO_2 enrichment resulted in tremendous increase in all the gas exchange parameters implying potential enhanced growth under enrichment that can induce early transplanting.

Another work with tropical fruit seedlings may promise a reduced juvenility period. Both applications of CO_2 enrichment technology for the annual crop production and nursery management will enhance productivity of Malaysian agriculture thus fulfilling objectives of the national agriculture policy.

Increased biomass with enrichment (above left) compared to non-enriched plant (above right). Respective simultaneous increased root growth in enriched plant (below left) versus root from non-enriched plant.

Bronze – *Malaysia Technology Expo 2006 (MTE 2006).*
Bronze – *UPM Invention, Research & Innovation Exhibition (PRPI 2005).*
SILVER – *IPTA R&D Expo 2005.*
SILVER – *International Exhibition of Inventions, New Techniques & Products (Geneva Palexpo 2005).*

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LaSt 24: A Novel Nanocomposite-based Controlled Release Formulation of Latex Stimulant

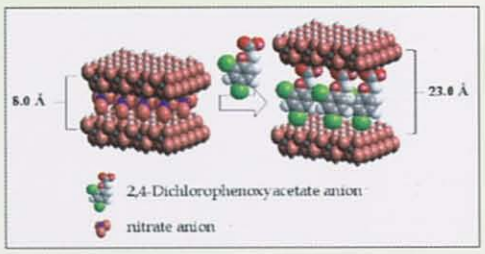
Award Winner

Asmah Haji Yahaya, Mohd. Zobir Hussein, Adila Mohamad Jaafar, Zulkarnain Zainal and Loo Hee Kian

Dichlorophenoxy acetic acid (2,4-D) has been widely used as a herbicide for the control of broad-leaf weeds in agriculture, and for control of woody plants along roadsides and railways. It is also one of the chemicals used in Agent Orange, a herbicide formulation used as a jungle defoliant during the Vietnam war. Apart from those mentioned it can also be used as a plant growth regulator to control fruit drop, such as on tomatoes to cause all fruits to ripen at the same time for machine harvesting.

2,4-D is also widely used as latex stimulant to increase the latex output of old rubber trees.

However, 2,4-D is also widely used as latex stimulant, around the world including Malaysia, to increase the latex output of old rubber trees. For such purpose, the formulation containing this chemical is normally directly applied onto the bark of the rubber trees. Human exposure will be primarily to those applicators as well as the rubber tapers considering their close proximity to the rubber trees during tapping.



The process of intercalation of 2,4-D in the interlayer of double hydroxides to form the nanocomposite

Among the health effects attributed to the use of 2,4-D include damage to the nervous system, kidneys and liver although there is inadequate evidence to state whether or not 2,4-D has the potential to cause cancer from lifetime exposure. Many scientists believe there is no safe level of exposure to a carcinogen. Such substances may also have the potential for causing reproductive damage in humans.

LaSt 24 is on the way to provide us with a safer alternative. Still using the chemical for the function it needs to perform, as a latex stimulant, the user will not be openly exposed to it. The process of its preparation involves intercalation/encapsulation of 2,4-D in the interlayers of double hydroxides, converting it to a nanocomposite. The procedure is simple and cheap. It can be carried out via direct method or ion exchange technique.

The main advantages of LaSt 24 include higher stability of the active agent (2,4-D), prolonged duration of action (exhibits controlled release property), maximized efficacy and environmental friendly (no direct contact with the users). The release of the active agent into the plant fluid is expected to take place via ion-exchange with anions present. RMC

GOLD – *UPM Invention, Research & Innovation Exhibition (PRPI 2005).*
GOLD – *International Exhibition of Inventions, New Techniques & Products (Geneva Palexpo 2005).*
Bronze – *IPTA R&D Expo 2005.*

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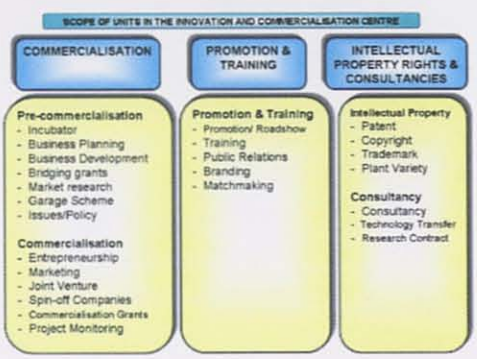
Research products or technologies that are ready for market will be considered for various modes of Commercialisation. These modes could include the establishment of joint venture or spin-off company, entrepreneurship, or others which will be decided on a case by case basis.

The Training and Promotion unit serves as an awareness hub to ensure that UPM researchers are aware of IPR and issues related to the value of IPs and their management. Various training programmes through workshops, seminars and small group dialogues or clinics for individuals and campaigns will be continuously held to enhance the awareness amongst UPM staff. The promotion unit will be proactive in road shows to present UPM's manpower expertise and IP assets to the private sector. The Unit will also work closely with Research Management Centre (RMC) during exhibitions to promote new technologies.

The IPR Unit of ICC assists staff members to search database for "prior art" to ensure their application for patent are in proper order. The Patent Committee which was previously under RMC now continues to function under ICC to screen all applications submitted for patent registration.

The Commercialisation Unit works together with IPR Unit to build a portfolio for all the university's IPs. Inventors for each patent will be requested to make their presentation with respect to the technology/innovation and the prospects of commercialisation. These sessions will be held with the inventors throughout the year. The portfolio information building will help the ICC to evaluate the marketability and value of the patent and attempt to promote the technology to interested private companies.



All consultancies related to research activities from the private sector will be handled by ICC. A monitoring system will be established to ensure the terms of reference (TOR) or the expectations of the clients are fully met by the consultants. RMC

Research

Biotechnology Asia 2006 *(9-11 August 2006)*

AWARD WINNING R&D: Prof. Dr. Maziah Mahmood from Biotechnology and Biomolecular Sciences bags a GOLD medal for her innovative research on *"Phenylalanine Ammonia Lyase"*.

OUTSTANDING PERFORMANCE: Prof. Dr. Mohd Zobir Hussein *(centre)* from Science won two medals *(1Silver & 1 Bronze)* for his inventive R&D.

FLAMBOYANT SUCCESS: Silver medal winner, Assoc. Prof. Dr. Rozita Rosli *(right)*, Deputy Dean (Research) from Medicine and Health Sciences exhibiting her pioneering research to the judge.

SENSE OF ACHIEVEMENT: Assoc. Prof. Dr. Siti Shapor Siraj *(right)* from Science demonstrating her R&D to the judge. She won a Bronze medal.

FITTING REWARD: Assoc. Prof. Dr. Raja Noor Zaliha, Deputy Dean (Research), Biotechnology and Biomolecular Sciences, highlighting her innovative product, *RNPeptiZyme* that won a Bronze medal.

BEST BUDDIES: Assoc. Prof. Dr. Amin Ismail from Medicine and Health Sciences and *"Natural Food Antioxidants and Nutraceuticals"* make the best buddies! This R&D won a Bronze medal.

QUEST FOR KNOWLEDGE: Two postgraduate students showing keen interest in RMC's R&D publications.

ENCOURAGED: Two postgraduate students *(right)* keen in UPM's innovative and revolutionary R&D.

Agrobio Exhibition 2006 *(27 July – 1 Aug 2006)*

THE SUCCESS OF AGRICULTURE: was the theme of The Agrobio Exhibition 2006 held from 27th July to 1 Aug in conjunction with UPM's 30th Convocation at the Bukit Expo.

OUTSTANDING IDEAS: *(From Right)* Prof. Dr.Muhamad Awang former Deputy Vice Chancellor (Academic) exchanges ideas with Assoc. Prof. Dr. Mohd Noor Abd. Wahab from Biotechnology and Biomolecular Sciences.

TRANSFORMING UPM: UPM to make great strides. *(from left)* Prof. Radin Umar, Y.Bhg. Tan Sri Dato' Sri Hj. Zainul Ariff Hj. Hussain & Assoc. Prof. Ir. Dr. Mohammad Razali Abdul Kadir.

MORALE BOOST: Y.Bhg. Tan Sri Dato' Sri Hj. Zainul Ariff Hj. Hussain, Chairman, UPM Board of Directors *(centre)* with UPM's top officials accompanying him during the event.

DOING IT THEIR WAY: Y.B Dato' Sri Hj. Zainul Ariff Hj. Hu the opening ceremony while officers witness the occasion.

EYE FOR DETAIL: Assoc. Prof. Dr. Raha Abd. Rahim, keenly explaining her exhibit to Y.Bhg. Tan Sri Dato' Sri Hj. Zainul Ariff Hj. Hussain and Prof. Dr. Nik Mustapha Raja Abdullah *(partly hidden)* while Prof. Radin Umar *(back)* looks on.

RESEARCH FOR SALE: *(from left)* Prof. Dr. Zulkifli Shamsuddin and Assoc. Prof. Dr. Syed Omar from Agriculture talk about their commercialisable R&D with Prof. Dr. Abu Bakar Salleh and Y.Bhg. Tan Sri Dato' Sri Hj. Zainul Ariff Hj. Hussain.

KEEPING ABREAST OF DEVELOPMENTS: The R&D Agro products displayed draws Mr.Jamali Janib's interest.

EXULTATION: *(from right)* Y.Bhg. Tan Sri Dato' Sri Hj. Zainul Ariff Hj. Hussain and Prof. Dr. Zulkifli Shamsuddin thinking out of the box!

ADVANCED TECHNOLOGY: *(fr* Dr. Wan Ishak Ismail from Institute Technology (ITMA) keen to explain innovative exhibit to Prof. Dr. Nik M while Assoc. Prof. Dr. Azali Moham upon.

Happenings

IPTA R&D Roadshow 2006 *(22 June 2006)*

PURSUIT OF KNOWLEDGE: *(from left)* Prof. Dr. Nor Aripin Shamaan and Prof. Dr. Abu Bakar Salleh exchanging views with Dato Prof. Dr. Hassan Said, Director General, Department of Higher Institution Management, Ministry of Higher Education, Malaysia.

PERLUDE TO THE R&D GENIUS: *(from left)* Prof. Dato' Dr. Mohamed Shariff, Director, Innovation and Commercialisation Centre (ICC), UPM, Prof. Dr.Nor Aripin Shamaan, Assoc. Prof. Dr. Raha Abd. Rahim both Deputy Directors, RMC and Prof. Dr. Zulkifli Idrus, Director, RMC

OUTSTANDING CONTRIBUTION: Prof. Dato' Dr. Mohamed Shariff *(right)* receiving a token of appreciation from the organiser of the event.

WIDENING SUPPORT: Prof. Dr. Abu Bakar Salleh presenting a knick-knack to the organiser.

INSPIRATIONAL TALK: Dr. Lau Wen Hong from the Agriculture faculty delivering a stimulating talk on "A process for producing biopesticie" during the event.

MAKING A COMMITMENT: Prof. Dr. Nor Aripin Shamaan as one of the chairpersons delivering his speech at the occasion.

ENCOURAGING: One of the Speakers', Assoc. Prof. Dr. Thamer Ahmad Mohammed from Engineering elaborates his views.

PARTICIPATION: *(from left)* Mr. Jamsari Tamsir, Head, Research & Innovation Division, Deputy Vice Chancellor (R&I) Office with Assoc. Prof. Dr. Mohd. Hair Bejo cheering the presenters.

Tan Sri
in officiates
senior

HELPING HANDS: Y.Bhg. Tan Sri Dato' Sri Hj. Zainul Ariff Hj. Hussain in his lighter moments with Prof. Dr. Zulkifli Idrus during his round at the exhibition.

INPEX International Show 2006 *(7-10 June 2006)*

A LIFT FOR NORHAFIZAH: *(3rd from left)* Dr. Norhafizah Abdullah from Engineering with UPM's Vice Chancellor Prof. Dr. Nik Mustapha Abdullah *(on her left)*, Coordinator UPM delegation Assoc. Prof. Dr. Ratnasamy Muniandy and Deputy Vice Chancellor (Research & Innovation) Prof. Dr. Abu Bakar Salleh *(on her right)*.

IMPRESSIVE SHOW: Dr. Norhafizah Abdullah and her research team won a GOLD medal at INPEX International Show 2006 for their inventive R&D in Biology Related Products category.

THE FINAL TWO: *(from right)* Assoc. Prof. Dr. Sabira Khatun and Dr. Norhafizah Abdullah both from Engineering emerged the winning champions at the INPEX International Show winning 4 medals and 2 Special awards.

left) Prof.
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ooks

EXCITING DIALOGUE: UPM's Vice Chancellor Prof. Dr. Nik Mustapha *(centre)* speaks his mind with Prof. Dr. Zulkifli Idrus *(left)* while *(from right)* Dr. Raha, Prof. Abu Bakar and Mr. Jamali hear attentively.

PACE-SETTER: *(left)* Assoc. Prof. Dr. Sabira with Ms. Jennifer Lawlor, INPEX 2006 Trade Show Director, USA after receiving two Excellent Awards (Best Invention of the Asia Pacific Rim, & Korea Invention Association Promotion (KIPA) Award).

WINNERS ALL: Malaysian Delegates with INPEX Jury Vice President — *(from left)* Prof. Rossli (UiTM), Dr. Norhafizah (UPM), Dr. Tommy (UiTM), Dr. Ratnasamy & Dr. Sabira (UPM), Vice President Jury (USA), Dr. Salmiah & Dr. Samirah (UiTM).

FOR THE RECORD: Assoc. Prof. Dr. Mohd Adzir Mahdi, Deputy Director, RMC giving a token of appreciation to Mrs. Fadzilah Ahmad Din, Director, MASTIC during a briefing session, *"KRSTE.my"* organised by RMC on 29 August 2006.

MBzyme: Nanobioterial as Catalyst for Green Organic Syntheses

Mohd Basyaruddin Abdul Rahman, Noor Mona Md. Yunus, Uswatun Hasanah Zaidan, Mahiran Basri, Mohd. Zobir Hussein, Norazizah Shafee, Raja Noor Zaliha Raja Abdul Rahman and Abu Bakar Salleh

Award Winner

MBzyme is an effective nanobioterial catalyst in powder form that increases the efficiency of chemical reaction. Its use is greatly enhanced due to its environmental friendliness and economical application in various industrial biocatalysis.

MBzyme is an immobilized enzyme of Candida rugosa on heat-treated layered double hydroxides. It is easily reproducible and can be tailored to suit the need in the industry

Nanobioterials as effective future catalyst for green route in organic synthesis, offers clean and mild reaction conditions, shows a potential use in increasing productivity, efficiency and quality output. MBzyme has been uniquely developed by immobilizing enzyme on layered nanocomposites with high degree organization of nanoparticles, by means of inexpensive adsorption technique. Control of distance and orientation of multilayers that afford fine-tuning of unique mechanistic properties has improved the specific surface area (>100 m^2/g), hence substantially increases the density of enzyme adsorbed by more than 70%. It contains up to 4 mg enzyme protein per gram. This helps to reduce enzyme costs to a minimum.

Understanding of new materials at the molecular level has become increasingly critical in the new era of biological materials science and nanotechnology. Key elements in molecular self-assembly are chemical complementarities and structural compatibility, versatility and reproducibility. Particles of desired shape and size generated by lyophilisation have improved the pore sizes. On addition of nanocomposites, the pore size control and high physical strength could also be achieved. These immobilised enzymes were stable, enabled continuous process and reuse of enzyme in esterification reaction to produce various value added and specialty esters from oleochemicals (wax esters) and petrochemicals (adipate esters). MBzyme exhibited good selectivity to all acids (oleo- and petrochemicals) and high catalytic activity (more than 90%) and product purity, which is comparable to other commercially available immobilized enzyme. Purity of the product is very crucial in food processing and pharmaceutical industry since contamination could cause serious toxicological, sensory, or immunological problems.

This technology presents current and potential areas for using nanobioterials to carry out desirable targeted chemical reactions and to neutralize dangerous side products via green and environmental benign route. Furthermore, it may expand and diversify markets for economical exploitation in agro-industrial development, pharmaceuticals, fine chemicals and reduce toxicity in chemicals produced and consumed. It offers excellent stabilization properties, is non-toxic, with high purity that makes it also safe and is biodegradable.

MBzyme aims at using modern biotechnology for production of biodegradable chemicals from renewable resources.

SILVER – *UPM Invention, Research & Innovation Exhibition (PRPI 2005).*
Bronze – *IPTA R&D Expo 2005.*
Young Scholars Award 2005 – *The American Chemical Society.*

Reader Enquiry

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Detection of Microsatellite Loci in Rhinoceros Beetle *Oryctes Rhinoceros*...

■ *From Page One*

Oryctes rhinoceros adult

In-depth study of the genetic structure of *O. rhinoceros* can contribute to efforts to formulate effective strategies for controlling their populations because we have preliminary data which indicated that there may be a cryptic species complex for this species. The utilisation of molecular markers such as single locus DNA microsatellites seems particularly valuable for this purpose.

In the present study, an efficient and rapid method for detecting microsatellite sequences in the genome namely Randomly Amplified Microsatellites (RAMs) has been used to isolate microsatellite markers for *O. rhinoceros*. The PCR products of a RAMs primer containing the targeted microsatellite repeat motif of $(GT)_{10}$ were cloned, and a total of 26 positive clones were identified. Fifteen of these positive clones were analysed through automated DNA sequencing. A total of 31 microsatellite regions were detected and 18 primer pairs were designed. These could then be tested for their abilities to amplify polymorphic single locus microsatellite markers for this species.

GOLD – *UPM Invention, Research & Innovation Exhibition (PRPI 2005).*
Bronze – *IPTA R&D Expo 2005.*

Reader Enquiry

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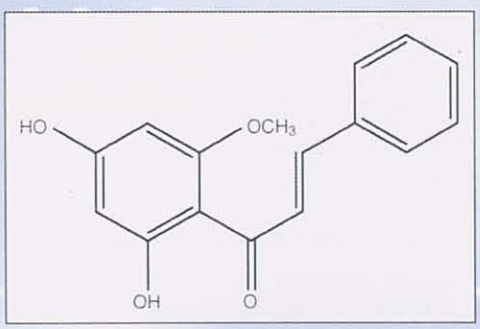
Cardamonin: *a Drug-like Phytochemical with Anti-inflammatory and Immunomodulatory Properties*

Award Winner

Daud A. Israf, Syahida Ahmad, Nordin Hj Lajis and Khozirah Shaari

Inflammation is a disease process that occurs during the development of many chronic disease conditions from asthma to stroke. Probably the most common ailment related to inflammation known to public is arthritis. Inflammation is an immunological process that is beneficial but can be triggered to cause excessive damage to tissues. Although non-steroidal anti-inflammatory drugs (NSAIDs) are mainstay in the therapeutic armament against inflammatory disease, issues of fatal side effects especially following chronic usage are becoming of serious concern. Our research focuses on the discovery of new drug leads from plants that may be used to replace the currents NSAIDs with less or minimal side effects.

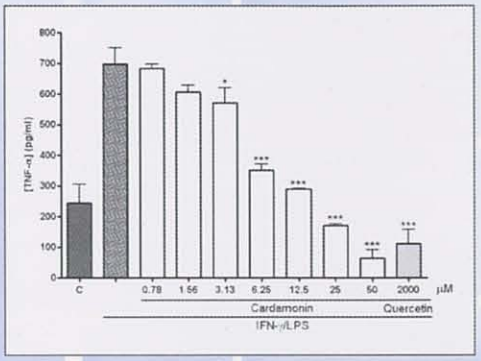


The chemical structure of cardamonin (2',4'-dihydroxy-6'-methoxychalcone).

Cardamonin is a chalcone compound that we have isolated from *Alpinia rafflesiana*. This plant is a member of the zingiberaceae family (gingers). It is well known through traditional medicinal systems that gingers contain many compounds of therapeutic value. Cardamonin (2',4'-dihydroxy-6'-methoxychalcone) has shown bioactivity in model cellular systems of inflammation in which it inhibits cellular synthesis of major pro-inflammatory mediators and is selective in its effects upon pro-inflammatory enzymatic systems. Human blood assays showed that cardamonin could inhibit the biosynthesis of both prostaglandin E_2 (PGE_2) and thromboxane B_2 (TxB_2). The selectivity of cardamonin upon cyclooxygenase (COX) enzyme isoforms (COX-1 and COX-2) indicates that this compound is more selective towards inhibiting COX-2 expression, making it less toxic. Cardamonin also inhibits other pro-inflammatory mediators such as nitric oxide (NO) synthesis via suppression of inducible nitric oxide synthase (iNOS), intracellular oxygen radicals, TNF-α, interleukins 1β and 6 (IL-1β, IL-6) and enhances synthesis of the anti-inflammatory cytokine IL-10.

Recent findings at UPM have shown that cardamonin exerts these effects through suppression of nuclear translocation of the p65NF-κB transcription factor and also the suppression of phosphorylation of both extracellular-regulated kinase 1 and 2 (ERK 1 & 2) and p38 mitogen-activated protein kinase (MAPK), these are major signaling molecules involved in inflammatory-related diseases.

In conclusion, cardamonin is a potential drug lead for potent and selective anti-inflammatory drug development. With adequate funding it is possible to scale up production and/or modify the structure to enhance its effects via chemical synthesis.



Significant inhibition of TNF-α synthesis in RAW 264.7 macrophage cells following an overnight incubation with cardamonin. Quercetin was used as an internal drug control.

Bronze – *IPTA R&D Expo 2005.*
SILVER – *Expo Science, Innovation & Technology (EXPO S&T 2004).*

Reader Enquiry

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NewsBriefs

AgroBio Exhibition

AgroBio Exhibition was held from 27 July - 1 August 2006 from 10.00 am to 7.00 pm daily at Bukit Ekspo, UPM Serdang in conjunction with UPM's 30th Convocation and was open to the public. The theme of the exhibition was "Gemilang Pertanian" / the success of Agriculture, UPM menjana upaya, pertanian menjana pendapatan negara / UPM generates efforts, Agriculture generates revenue for the country.

Thirty-five R&D products from UPM were displayed at a special booth designed for this event. The R&D products were displayed in six major categories— agriculture machinery, fertilizer technology, products from halal food and herbs, plant and animal clinics, aquaculture, and banana research group.

The exhibition drew attention of many visitors, industry players and students around the region, and aimed to celebrate the success of graduates who had a major role in making UPM as a centre for education in agriculture excellence. The exhibition was officiated and graced by Y.Bhg. Tan Sri Dato' Sri Hj. Zainul Ariff Hj. Hussain, Chairman, UPM Board of Directors.

Several activities including some cultural presentations by students were scheduled to cheer both the exhibitors as well as visitors.

Turn to centre page for pictorial news.

IPTA R&D ROAD SHOW 2006

The IPTA R&D Road show 2006 organised by the Ministry of Higher Education, the National SMI Consultative Centre (NASMIC) and IPTechXchange, with a theme, "Increasing Competitiveness thru' New Technologies" was held on 22 June 2006 at Universiti Teknologi MARA (UiTM), Shah Alam. The aim of this road show was to gather researchers from Public Institutions of Higher Learning (IPTA) and industry representatives, and provide an opportunity for them to promote their new technologies, R&D inventions and products. The 4 public universities which participated the roadshow were Universiti Malaya (UM), Universiti Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM) and Universiti Teknologi MARA (UiTM).

The event was officiated with a keynote address by Dato' Prof. Dr. Hassan Said, Director General, Department of Higher Institution Management, Ministry of Higher Education. The organiser also invited representatives from each university who gave an overview of research and technology at their universities respectively. Prof. Dato' Dr. Mohamed Shariff Mohamed Din, Director of Innovation and Commercialisation Centre (ICC), UPM gave a stimulating talk on R&D commercialisation in UPM.

The road show was divided into 2 sessions. In the first session, a seminar entitled, "Incentives for New Technologies under 9th Malaysia Plan" was presented by Dato' Anuar Md Nor, Director of the Global Bonanza S/B. Mr Lok Choon Hong, Director of the PINTAS Consulting Group presented a seminar entitled, "Patent Strategies for Commercializing New Technologies".

In the second session, there were 18 presentations emphasizing 3 categories; Advanced Manufacturing Technology, Inventions in Biotechnology and Inventions in Information and Communications Technology (ICT). These were presented by the representatives from UiTM, UM, UPM and UKM respectively.

Turn to centre page for pictorial news.

INPEX International Show 2006

The INPEX International Show was held at Monroeville, Pittsburgh, USA from 7-10th June. It was one of our largest exhibitor showings to date with more than 350 inventors from 20 countries around the world who came together to take part at America's Largest Invention Trade Show attracting some 35,000 visitors. The show featured innovations ranging from an upside-down Christmas tree, to new power tool and fitness ideas, to a love-detection collar for pets.

The exhibition not only gave inventors a place to display their new products and technologies but also an opportunity to network business and industry by interacting with other inventors and entrepreneurs from around the world who displayed their latest inventions, innovations and technologies.

In addition, it also provided an opportunity for local researchers to compete at the international level giving them a chance to Commercialise their successful R&D products.

Universiti Putra Malaysia won 6 awards comprising 3 gold and 1 bronze medals, and 2 special awards. The exhibits were represented by two groups of inventors and each group received awards at this prestigious International Show.

Assoc. Prof. Dr. Ratnasamy Muniandy from the Engineering faculty was appointed as one of the member of the international Jury. Assoc. Prof. Dr. Sabira Khatun and Prof. Dr. Borhanuddin Mohd Ali won three medals comprising two gold and one bronze for their inventive research entitled, "Enhanced Micro Mobility Test-Bed in Multicast Based Mobile Ipv6 Wireless Networks". In addition, they also received two special awards; the KIPA Special Award from the Korea Invention Promotion Association, and another special award, Best Invention of the Pacific Rim from the INPEX.

Dr. Norhafizah Abdullah, Assoc. Prof. Dr. Rozita Rosli, Assoc. Prof. Dr. Fakhru'l-Razi Ahmadun and Assoc. Prof. Dr. Robiah Yunus also won a gold medal for their innovative research entitled, "Isolation & Encapsulation of Cassava Linamarin in Biodegrdable Nanoparticles for Cancer Cells Targeting",

Turn to centre page for pictorial news.

Geneva-Palexpo 2006

The International Exhibition of Inventions, New Techniques, and Products, Geneva was held at Palexpo, Geneva, Switzerland from 5-9th April 2006. The event aimed to give researchers an opportunity to promote their new inventions, techniques and products. It also provided an avenue to the researchers for commercializing their R&D products. This year the exhibition was a host to extremely large delegations from Malaysia, Russia and Iran, whose governments gave welcome support to their inventors.

There were 152 exhibitors from Malaysia including researchers from Public Institutions of Higher Learning (IPTAs) who took part in this exhibition. Universiti Sains Malaysia (USM) obtained the maximum awards— 14 medals.

Out of 10 R&D exhibits displayed by Universiti Putra Malaysia (UPM), 8 received awards comprising 3 gold, 2 silver and 3 bronze medals.

Assoc. Prof. Dr. Asmah Yahaya from Science received a gold medal (merit from Jury) for her innovative research, "LaSt 24" while Prof. Dr. Kaida Khalid also from Science also received gold for his inventive research, "Dual Frequency Microwave Latexometer and Liquid Moister Meter". Dr. Aini Mat Said from Human Ecology and Assoc. Prof. Dr. Fakhru'l-Razi Ahmadun from Engineering also received the gold medal for their inventive research, "Expert System for Socio-technical Disaster Management".

Recipients of Silver and Bronze medals are given below:

	Medal	Award Recipient
1	Silver	Hawa Ze Jaafar (Assoc. Prof. Dr.) *Agriculture*
2	Silver	Mohamad Pauzi Zakaria (Assoc. Prof. Dr.) *Environment Studies*
3	Bronze	Muhammad Rezal Kamel Arifin (Mr.) *Mathematical Research (INSPEM)*
4	Bronze	Abdel Magid S Hamouda (Prof. Dr.) and Wong Shaw Voon (Assoc. Prof. Dr.) *Advanced Technology (ITMA)*
5	Bronze	Abdel Magid S Hamouda (Prof. Dr.) and Wong Shaw Voon (Assoc. Prof.) *Advanced Technology (ITMA)*

FactFile

For the record

Innovation Adopters—Managing the Change!

This year RMC has undergone many changes with new focus and new goals being just some of the things showing that we are adapting to the needs of the country's call towards establishing the country as a hub of educational excellence.

The Publication Unit of the Research Management Centre has taken a major role in reshuffling and restructuring its strategies, goals etc — along, of course, with its Centre's support.

The unit is faced with an imminent task of retooling and focusing more on quality research publishing activities to fit current developments and needs of our researchers at UPM. A holistic approach is imperative in meeting the challenges of producing reputable and excellence-oriented work. Various strategic steps and plans have also been set forth by the unit to attract UPM's academia towards publishing more scientific papers in refereed journals, etc. One way of achieving this would be by encouraging our scientific community to contribute their research findings in UPM's inhouse publications such as UPM's hallmark journal, *"Pertanika"*, and prestigous R&D Bulletin, *"Synthesis"*.

Pertanika, a three series journal—*Pertanika* Journal of Tropical Agricultural Science, *Pertanika* Journal of Science and Technology; and *Pertanika* Journal of Social Science and Humanities, is currently published twice a year. From early 2007, RMC through its Publication Unit will be responsible for managing the editorial processing of papers submitted to the Journal, and shall generally help to promote and boost the journal particularly but not exclusively in the academic sector.

Mrs Azimah Jaafar, Assistant Admin Officer from the Research Grant Unit, RMC recently received an *Excellent Service Award 2005*, in recognition annually to her hard work and persistence in her job. This award is presented to deserving employees by UPM.

Mrs. Azimah Jaafar

Have Your Say

If you have any comments about the content of the newsletter or any contributions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, Synthesis, Publication Unit, Research Management Centre, 4th Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to ndeeps@admin.upm.edu.my.

Check it out

UPM Research Directory, *Part 1: Products, Services and Expertise,* and *Part 2:* Staff Profile—*Faces of Innovation*, Edition 2005, published by the Publication Unit, Research Management Centre, UPM. Editors: Nayan Deep S. Kanwal, Zulkifli Idrus and Raha Abd. Rahim. ISSN 1675-7823 is available for distribution. If you are interested for a copy, please contact the Publication Unit, Research Management Centre at 03-8946 6192 or 8946 6029 for further details.

Read this – a call for contributions!!

If you have any contributions comprising feature articles or research write-ups that you would like us to publish in the esteemed columns of Synthesis or any suggestions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, Synthesis, Publication Unit, Research Management Centre, 4th Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to ndeeps@admin.upm.edu.my or rschinfo@admin.upm.edu.my The editor reserves the right to edit articles for clarity and space before publication.

A Glance at Research Inventions & Innovations at UPM[1]

Continued from Issue 13, 2nd Quarter (Jun. 2006)...

No.	Faculty/ Institute	Researcher	Innovation	Research Cluster	Project Number	Allocation
342.	Science and Environmental Studies	Nor Azah Yusof	Simultaneous detection of heavy metal employing an optical fibre sensor and artificial neural network	SAE	09-02-04-0818-EA001	RM96,080
343.	Science and Environmental Studies	Nor'Aini Mohd. Fadzillah	Oxidative defense responses of various banana cultivars to Fusarium wilt	BAB	09-02-04-0331 EA001	RM183,400
344.	Science and Environmental Studies	Norani Abdul Samad	In vitro mass propagation of virus-free orchid hybrids and cultivars by conventional methods and bioreactors	BAB	01-02-04-0094 EA001	RM189,120
345.	Science and Environmental Studies	Norhani bt. Abdullah	The production of avian egg yolk antibody (IgY) against E. coli and Salmonella bacteria	AFF	01-02-04-0095 EA001	RM216,000
346.	Science and Environmental Studies	Radzali Muse	Production of carotenoids from the pummelo (Citrus grandis L. Osbek) plants (retaceace family) and their antioxidant activities by using biotechnology techniques	BAB	09-02-04-0762-EA001	RM125,840
347.	Science and Environmental Studies	Radzali Muse	Production of flavonoids and essential oils from the rutaceae plants by using tissue and cell culture technique	BAB	09-02-04-0333 EA001	RM92,560
348.	Science and Environmental Studies	Raja Noor Zaliha Raja Abdul Rahman	Expression and characterization of organic solvent tolerant lipase from bacillus sphaericus 205y	BAB	09-02-04-0763-EA001	RM194,500
349.	Science and Environmental Studies	Raja Noor Zaliha Raja Abdul Rahman	Enhancement of enzymatic activity and thermo stability of lipase	BAB	09-02-04-0336 EA001	RM265,800
350.	Science and Environmental Studies	Rosta Harun	Identification of environmental ethics components suitable for educating Orang Asli-The Suku Temuan Subethnic group	EMA	07-02-04-0741-EA001	RM87,580
351.	Science and Environmental Studies	Rusea Go	Conservation and diversity of limestone orchids in Peninsular Malaysia and Sarawak	MEE	08-02-04-0249 EA001	RM187,732
352.	Science and Environmental Studies	Shaharin Ibrahim	Development of integrated quantitative groundwater assessment system for engineering and environmental application	MEE	03-02-04-0414 EA001	RM171,580
353.	Science and Environmental Studies	Sidek Hj. Ab. Aziz	Glass formation and thermo-acoustic properties of bismuth oxide system	SAE	09-02-04-0550 EA001	RM217,000
354.	Science and Environmental Studies	Sidik Silong	Rational synthesis of novel side-group liquid crystal polymers for optical data storage materials	MEE	09-02-04-0450 EA001	RM136,000
355.	Science and Environmental Studies	Siti Khalijah Daud	Varietal identification and genome mapping in Malaysia banana (Musa sp)	AFF	09-02-04-0451 EA001	RM172,000
356.	Science and Environmental Studies	Suhaimi Mustafa	Rapid Detection and Enumeration of Bifidobacterium longum by Real-Time PCR Targeting the Bile Salt Hydrolase (BSH) gene	BAB	09-02-04-0857-EA001	RM157,000
357.	Science and Environmental Studies	Syed Tajuddin Syed Hassan	Conservation ecology of predation and parasitism in agroecosystems	MEE	08-02-04-0426 EA001	RM186,000
358.	Science and Environmental Studies	Tan Soon Guan	Development and application of DNA microsatellite markers for the biodiversity characterization of the green-lipped mussel, Perna viridis	BAB	09-02-04-0353 EA001	RM223,000
359.	Science and Environmental Studies	Tan Wee Tee	Electrochemical studies at chemically modified electrodes	SAE	09-02-04-0354 EA001	RM185,000
360.	Science and Environmental Studies	Tan Wen Siang	Display of hepatitis B surface antigens on bacteriophages: a new approach for designing therapeutic proteins	BAB	09-02-04-0355 EA001	RM100,000
361.	Science and Environmental Studies	Taufiq Yap Yun Hin	Modification, Characterization and Catalytic Activity of Vanadium Phosphorus Oxide (VPO) Catalysts for the Synthesis of Meleic Anhydride from Partial Oxidation of n-Butane	SAE	09-02-04-0356 EA001	RM182,800
362.	Science and Environmental Studies	Umi Kalsom Yusuf	Flavonoid extracted from some selected medicinal plants and their antioxidant properties	HAS	09-02-04-0360 EA001	RM180,000
363.	Science and Environmental Studies	Umi Salamah Hassan	Genetic Variability of Seagrasses in Malaysian waters	AFF	09-02-04-0361 EA001	RM196,000
364.	Science and Environmental Studies	Wan Mahmood Mat Yunus	Development of real-time photoacoustic instrument for gas analysis using a single wavelength laser for gas analysis using a single wavelength laser excitation	SAE	09-02-04-0455 EA001	RM194,440
365.	Science and Environmental Studies	Wan Md Zin Wan Yunus	Preparation and characterization of clay-natural rubber nanocomposites	MEE	09-02-04-0365 EA001	RM123,000
366.	Science and Environmental Studies	Wan Mohamad Daud Wan Yusuf	Correlation of dielectric properties with processing and microstructure in stannates and plumbate systems	SAE	09-02-04-0456 EA001	RM231,700

to be continued...

[1] Data presented IRPA RM-8 (as at Cycle 1, 2004); Total 416 EAR Grants, sorted by PTJ & Name.

†The description of the some of the above inventions and innovative research products available for commercialisation at UPM are contained in the books — "**R&D at UPM**: *Creating New Frontiers of Innovative Research*", First Edition, and "**R&D at UPM**: *Research Snapshots*", First Edition, ISSN. 1675-1248, Editors: Nayan Deep S. Kanwal, Mohd. Shahwahid Hj. Othman and Sidek Hj. Abd. Aziz, Published by Research Management Centre (RMC), UPM, available from Publications Unit, Administration Building, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia. Tel: +603 8946 6028 / 8946 6192, Fax: +603 8942 6539, e-mail: rschinfo@admin.upm.edu.my

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- Development of Ultrasonic and Microwave Techniques for Detection of Decay in Wooden Cross-Arms
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- The Human Security System (S 3000)

- Synthesis and Fabrication of NiZnCu ferrite Cores via Sol-gel Technique
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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 Unit, 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.

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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.

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Researchers, academicians, postdoctoral researchers, technicians, postgraduate studentships, research institutions, techno-entrepreneurs, venture capitalists and laypeople.

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