FRIM in FOCUS

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# AWARD WINNING R&D 2014


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# ADDRESSING THE INDUSTRY NEED—THE HTD® WAY

## HTD® Memenuhi Keperluan Industri

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**Dato' Dr Abd Latif Mohmod, Choo Kheng Ten & Dr Woon Weng Chuen**


The National Intellectual Property Award 2014 (above) and HTD® logo (above right)

**The high temperature drying (HTD) technology is the latest green technology developed by FRIM for timber processing. The project is a successful implementation of a FRIM programme of national interest. It addresses the current socio-economic concerns of the country's timber industry over the increasingly stringent requirements imposed by various developed countries for environmentally-friendly products.**

The high temperature treatment on rubberwood lumber is a non-toxic physical treatment replacing the use of borate as the main preservative for rubberwood. The study was initiated in response to the European Union (EU) Directive which was imposed on certain wood treatment chemicals, particularly on borate which is classed as the repro-toxic category under the Dangerous Substance Directive 67/548/EEC. Directed by the Malaysian Cabinet, FRIM researched for alternatives to the conventional chemical substances in treatment of rubberwood.



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*Cover photo: Among the awards won in 2014, with FRIM Administration building as the background (Photo: Asmar Hassan)*

The HTD® system developed by FRIM offers a unique solution to an important production sector in the national economy, namely the rubberwood furniture industry and the rubber smallholders.

**Solution to the problems faced by the furniture industry—An enhanced green technology for improved production and product quality**

The HTD® technology eliminates the use of standard Bethell chemical treatment. It saves time and energy by reducing the processing cycle time by more than 80%; for example from 12 days to two days. Other than enhanced quality, HTD® treated timber is of better dimensional stability compared to lumber treated by conventional methods. Furthermore, the shorter kiln resident time also translates into faster turn around, enables just-in-time production and lowers stock holding cost. From the energy perspective, drying consumes up to 70% of the energy requirement for manufacture of most wood products; therefore, energy savings leads to a significant lowering of total energy cost. Lower energy consumption means a more efficient and cost-saving operation, thus increasing the competitiveness of the industries involved.

**Environmentally-friendly patented technology: Trademark, branding and process certification for quality assurance of HTD® product**

In January 2014, the Deputy Minister of Natural Resources and Environment (NRE), Dato' Sri Dr James Dawos Mamit launched the FRIM HTD® Trademark, a brand for quality and environmentally-friendly high temperature treated timber, after officiating a related forum. The trademark was first filed in Malaysia and Thailand, and later in China, Singapore, South Korea and Indonesia.

The HTD® system adheres to the FRIM Code of Practice for an effective process. Monitoring and recording of the HTD® process, especially during the plasticisation phase and accelerated drying-cum-high temperature treatment phase, is crucial to achieve the desired output of the operational performance and maintaining the quality of the processed material. Using programmable logic control instrumentation, the established HTD® protocol is the input for the process control, monitoring and recording for each production batch, in which records are kept for annual audit checks. The code of practice also involves procedures for in-house quality checks and phytosanitary measures in handling of both raw and processed materials for effective hygiene control.

HTD rubberwood with enhanced grain features

**International market acceptance and establishment of HTD® plants in other countries**

Successful commercialisation of the HTD® technology is attributed to engaging an industry partner with sound technical background to upscale and reengineer FRIM basic technology into a commercial production unit. FRIM has licensed the rights to Advance Low Pressure System (ALPS), a local wood-based company, to commercialise the HTD® Technology in Malaysia and Thailand. Several expansion projects to establish HTD® plants in Sabah, East Malaysia and other ASEAN countries are in the pipeline.

The HTD® products have been successfully marketed by ALPS with trial consignments sent to Thailand, China, Australia, Singapore and South Korea. IKEA (Thailand) for instance, has since specified HTD® lumber in their purchasing programme.

The company is expanding its production capacity by setting up new HTD® factory plant to cater for other potential market, especially for South Korea, Japan and the United States of America. Apart from rubberwood, FRIM and ALPS are exploring the application of HTD® on other low to medium tropical timbers. The HTD® technology has received enquiries from major rubber producing countries such as Thailand and Indonesia, including other countries such as China, Japan, South Korea, Bangladesh and Liberia.


The National Innovation Award 2013


Commonwealth Association for Public Administration and Management

CAPAM

Certificate of Achievement

CAPAM takes great pleasure in recognizing

Development of Lumber Treatment Technology
Forest Research Institute Malaysia

as a Finalist in the
2014 International Innovations Awards.
The submission has been recognized as being innovative and an exemplary model in the following awards category:

Innovation in Government Services and Programmes

Ms. Gay Hamilton
Executive Director & CEO

The finalist certificate for the Commonwealth Public Administration and Management Award under the *Innovations in Government Services and Programme*

**Transferable lesson learned**

*Provide R&D that meets the industry's needs* is the essence of the HTD® technology, whereby FRIM's mission is to serve the country by providing the technical support and carrying out R&D activities. These activities are conducted with close collaboration with the stakeholders, especially the wood-based industries, plantation owners and the rubber smallholders. Working hand-in-hand with its commercial partner provides FRIM the opportunity to upscale its R&D outputs to a commercial level. The technology transfer is an invaluable experience whereby market changes and the adaptability of industry players according to the technological advancements and market regulations are constantly monitored.

**Awards and Recognitions on the HTD® technology**

The HTD® project was awarded the Public Service Award in 2005, by the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) of the Prime Minister's Department. In 2013, the HTD® research team won the prestigious National Innovation Award for the successful commercialisation of the Malaysia-and-US-patented HTD® technology. Other awards won in 2013 include the Green Invention Order of Merit Award, the Forestry Order of Merit Award, the World Inventor Award Festival, Korea and the FRIM Director General Innovation Award.

October 2014 capped a fruitful year for the HTD® research team, led by FRIM Director General, Dato' Dr Abd Latif Mohmod. The HTD® Project won first place for the National Intellectual Property Award, organised by the Intellectual Property Corporation of Malaysia (MyIPO). The team was selected as a finalist for the Commonwealth Public Administration and Management Award under the *Innovations in Government Services and Programme*. In addition, a member of the research team was awarded the outstanding doctoral research award by the International Union of Forest Research Organizations (IUFRO) at the XXV IUFRO World Congress held 5-11 October 2014 at Salt lake City, Utah, USA.

Earlier patents were granted for the HTD® technology from the United States of America in March and Malaysia in October 2013 (Patent No US8397400B2 and MY149935), while most recently a patent was granted in Singapore (August 2014; Patent No. SG180413). Patents were also filed in five other countries, namely Thailand, Indonesia, China, Vietnam and India.

*Choo Kheng Ten who helmed the project from 2002–2014 is presently a FRIM Fellow to oversee the implementation and commercialisation activities of HTD technology with the collaboration of an industry partner. He was formerly the head of Timber Processing Technology Programme before he retired in 2004.*

**ABOUT THE MAIN AUTHOR**

Dr Sik Huei Shing is the Head of Environmentally-Friendly Treatment of Wood Unit, Forest Products Division, FRIM. She has a BSc in Forestry from Universiti Putra Malaysia and a PhD from Universiti Kebangsaan Malaysia. Her research areas include environmentally-friendly processing of timber specifically in the high temperature treatment of plantation timbers.

# ORGANIC PHASE CHANGE MATERIAL NANOCAPSULE

## Bahan Nanokapsul Organik Berubah Fasa

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**Energy requirements in buildings contribute to about 40% of the total annual global power consumption. A significant portion of the energy is spent on heating and cooling appliances to maintain a comfortable temperature in the building; the energy also produces up to one-third of the world's green gas emission and adds considerably, to the depletion of the conventional energy resources.**

Thermal energy storage has been identified as one of the solutions to reduce energy demand in buildings, particularly for temperature maintenance. Scientists are exploring new substances such as nanomaterial (nano is a prefix in the International System of Units, SI which denotes a factor of 10–9, or one billionth) which is capable of storing thermal energy for later use. Nanomaterial is extremely minute-sized substances discovered to have many usage potentials, one of which is storing the sun's heat and releasing it at night.

Reducing dependency on temperature control appliances such as air-condition and heater lowers the building's energy consumption. FRIM scientists collaborated with Universiti Putra Malaysia to invent a method to encapsulate the organic phase change material into nano-sized capsules for thermal energy storage in intelligent building applications. Nanocapsules are shells made from nontoxic polymer that have remarkable energy saving capabilities, simple to manufacture, suitable for batch production and have diverse applications. The nanomaterial produced is flexible and can be used in powder or paste form.

The invention entitled "Nanocapsule organic phase change material as advanced thermal energy storage for energy saving, intelligent building application" won a gold medal at the 5th International Engineering Invention and Innovation Exhibition (i-ENVEX 2014) held 11-13 April 2014 at Universiti Malaysia Perlis (UniMAP). The project which was led by Tumirah Khadiran including three other team members namely Prof Dr Mohd Zobir Hussein, Prof Dr Zulkarnain Zainal and Dr Rafeadah Rusli was nominated under the category Class D: Building, Construction & Material.


Tumirah Khadiran with her invention


The gold medal and certificate won at i-ENVEX 2014 for invention of the nanocapsule

The i-ENVEX 2014 exhibition with the theme "Engineering for Society" saw participation from 19 countries including Cambodia, China, Egypt, Indonesia, Georgia, Canada, Kazakhstan, India, Iraq, South Korea, Philipines, Oman, Armenia, Kyrgystan, Turkmenistan, Moldova, Ukraine, Romania and Malaysia. Four hundred inventions were showcased, gathering more than 500 inventors worldwide.

*Information and photos by Tumirah Khadiran (tumirah@frim.gov.my)*

# ROVBAM TECHNOLOGY FOR FURNITURE COMPONENT AND INTERIOR PRODUCT

## Teknologi RoVBAM untuk Komponen Perabot dan Produk Dalaman

**Dr Abdul Hamid Saleh**
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**Yanti Abd Kadir, Tuan Anis Nadia Tuan Mohd Saipudin**

1. Chairs and souvenir items from RoVBAM technology
2. Bamboo as raw material for RoVBAM products

**Bamboo is a non-wood forest produce which supplies raw material for a number of industries in Malaysia. From the botanical aspect, bamboo belongs to the subfamily Bambusoidae, in the grass family Graminae. Bamboo is the second most important non-wood forest produce in Peninsular Malaysia next to rattan. Bamboo is found abundantly and widely distributed in Malaysia. There are 59 species of bamboo in the Peninsular Malaysia from seven genera: *Bambusa, Dendrocalamus, Dinochloa, Racemobamboos, Schizostachyum, Thyrsostachys and Gigantochloa.***

There are 14 bamboo species being commercially utilised in Malaysia by the bamboo-based industries, while report by the Malaysia Timber Industry Board shows in 2014 there are 250,000 and 200,000 ha of planted and wild bamboo available respectively. Bamboo is extensively used for park landscape, recreation areas and urban forestry. Apart from making chopsticks, musical instruments, toothpicks and consumed as food, bamboo can also be used as material for furniture.

Rotary Veneer from Bamboo (RoVBAM) is the first technology for bamboo rotary peeling using *Dendrocalamus asper* (buluh betong). *D. asper* was selected for RoVBAM production due to its large diameter and thick culm wall, in addition to the possibility of harvest of between three and five years of planting.

The common industry practice for producing bamboo veneer in Malaysia utilises the slicing technique (on blocks of bamboo strips or plybamboo) which requires more manufacturing steps. The production of RoVBAM lessens the manufacturing process and reduces the production cost. In addition, RoVBAM veneer maintains the natural characteristic of bamboo nodes which gives the material a unique characteristic in comparison to wood veneer.

The rotary peeling, lamination and hot pressing techniques can be used on RoVBAM for furniture and souvenir-making. Essentially, the material can be practically moulded, then hot-pressed into (for example) chairs of multitude shapes and styles, depending on the creativity of the designer. In addition, scraps, off-cuts and wastes from the main process can be made into souvenir items which further reduce waste and increase bamboo recovery.

The RoVBAM method of production was successfully patented while publications on the technology are available to the global audience. Much potential is yet to be realised by the innovation and it is anticipated that RoVBAM will be commercialised not only in Malaysia, but globally.

The FRIM RoVBAM technology for furniture component and interior product team accumulated a range of awards for their innovative product.


Yusni Idris

The RoVBAM team with the main prize for Best Research Award during FRIM Award Day for 2013


The ITEX certificate for RoVBAM

Selection of bamboo materials according to diameter and wall thickness for maximum yield

↓

Poles cut to 27 inches length

↓

Knots removed to prevent blade damage

↓

Soaked in water to maintain the green moisture content while removing starch and extractives

↓

Boiled in water for one hour to soften fibres

↓

Peeled using the modified bamboo peeler

↓

Veneers dried to 9-12% moisture content using the roller conveyor dryer

↓

Veneers cut according to product

↓

Production of furniture, flooring components, interior fittings and souvenir

**RoVBAM manufacturing process**

During FRIM Innovation Day 2013, two RoVBAM innovations won a gold medal for chair and a silver medal for interior and souvenir products respectively. In 2014, FRIM won a gold medal for chair and a silver medal for plyboard (panel furniture and interior products) at the Malaysia Technology Expo (MTE) 2014, Kuala Lumpur. FRIM was also awarded a silver medal at the Innovation, Invention and Design Expo (IIDEX) 2014 for plyboard (interior and souvenir products).

FRIM successful pursuit of excellence was repeated when altogether five FRIM innovations won gold medals at ITEX 2014 at the Kuala Lumpur Convention Centre (KLCC). These include the ROVBAM technology and the hybrid bamboo veneer flooring (HBVF) entries.

Recently, during FRIM Award Day held on 19 June 2014, the RoVBAM team won first place for Best Research Award for the laminated bamboo veneer moulded components for selected furniture design project.

## ABOUT THE MAIN AUTHOR

Dr Abdul Hamid Saleh is the Head of the Furniture Design Unit, Forest Products Division, FRIM. He has 23 years of experience in research and development particularly on raw material, product design, furniture technology, ergonomic, anthropometric and computer aided design (CAD). His PhD on material, design and technology was granted by Universiti Sains Malaysia.

Yusni Idris

# KUNJUNGAN SULTAN PERAK KE SPF BIDOR

## Sultan Perak Visits SPF Bidor

**14 September 2014**— DYMM Paduka Seri Sultan Perak Darul Ridzuan, Sultan Nazrin Muizzuddin Shah Ibni Almarhum Sultan Azlan Muhibbuddin Shah Al-Maghfur-Lah merasmikan Program "AEON Forestry Tree Diversity Planting" di Stesen Penyelidikan FRIM Bidor, Perak. Program anjuran AEON sempena The Malaysia-Japan Friendship Forest Programme dengan kerjasama FRIM dan Kementerian Sumber Asli dan Alam Sekitar (NRE) turut menyaksikan penanaman pokok merawan bunga (*Hopea pubescens*)oleh Sultan Perak. Seramai 1000 peserta daripada Malaysia dan Jepun bergabung tenaga menanam 8000 pokok pelbagai spesies. Turut hadir ialah Dato' Dr Abd Latif Mohmod (Ketua Pengarah FRIM) dan Dato' Dr Mohd Ali Mohamad Nor (Timbalan Ketua Setiausaha NRE).

1. Sultan Perak mendengar penerangan daripada Ketua Pengarah FRIM tentang spesies serta kaedah penanaman pokok
2. Sultan Perak menanam pokok merawan bunga

1. Panda betina gergasi Liang Liang terima lawatan diraja
2. Delegasi lawatan Yang di-Pertuan Agong ke Zoo Negara

# KUNJUNGAN YANG DI-PERTUAN AGONG KE ZOO NEGARA

## Yang di-Pertuan Agong Visits Zoo Negara

**17 September 2014**— DYMM Yang di-Pertuan Agong Tuanku Abdul Halim Mu'adzam Shah dan DYMM Raja Permaisuri Agong Tuanku Hajah Haminah berkenan berangkat ke Zoo Negara, Kuala Lumpur untuk melihat pasangan panda gergasi, Xing Xing dan Liang Liang. Keberangkatan tiba Seri Paduka berdua di Pusat Konservasi Panda Gergasi disambut Timbalan Menteri Sumber Asli dan Alam Sekitar Datuk Seri Dr James Dawos Mamit dan Presiden Zoo Negara Datuk Seri Zaharin Md Arif. Turut serta ialah Dato' Sri Zoal Azha Yusof (KSU NRE), Datuk Dr Abd Rahim Nik (TKSU NRE) dan Dato' Dr Abd Latif Mohmod, (Ketua Pengarah FRIM).

*Gambar: Yusni Idris*


FRIM menerima Anugerah Harta Intelek Negara 2014 (kategori paten)

# FRIM RAIH ANUGERAH HARTA INTELEK NEGARA 2014

## FRIM Clinches the National Intellectual Property Award 2014

**2 Oktober 2014**—Sistem pengeringan kayu suhu tinggi atau lebih dikenali sebagai HTD® (High Temperature Drying) memenangi tempat pertama Anugerah Harta Intelek Negara 2014 (AHIN) bagi kategori paten. Pegawai FRIM yang hadir bagi menerima hadiah berupa trofi, medal WIPO, sijil penghargaan dan wang tunai RM10,000 ialah Dato' Dr Abd Latif Mohmod (Ketua Pengarah), Choo Kheng Teng dan Dr Woon Weng Chuen.

Penyelidik utama yang membangunkan sistem ini, Dr Sik Huei Shing dan Choo, membuat pembentangan di MyIPO pada 3 April 2014 untuk penilaian akhir bagi menentukan pemenang utama kategori tersebut. Abd Latif turut hadir untuk memberi input beliau semasa sesi pembentangan bersama Andre Accad, Ketua Pegawai Eksekutif Syarikat Advanced Low Pressure System (ALPS) Sdn Bhd yang merupakan rakan kerjasama FRIM dalam mengkomersialkan sistem HTD.

Sementara itu, Sik juga ialah pemenang Anugerah Penyelidikan Kedoktoran Cemerlang IUFRO (Kesatuan Pertubuhan Penyelidikan Hutan Antarabangsa) bagi ijazah kedoktorannya mengenai pembangunan teknologi HTD®. Majlis penyampaian anugerah ini diadakan pada 11 Oktober 2014 sempena Kongres Sedunia IUFRO ke-24 di Salt Lake City, Amerika Syarikat.

*Gambar: Yusni Idris*
*Sumber berita: www.frim.gov.my*


Ketua Pengarah dengan sijil CAPAM yang diterima oleh FRIM

# FRIM TERIMA PENGIKTIRAFAN CAPAM

## FRIM Receives Recognition from CAPAM

**23 Oktober 2014**—FRIM menerima sijil pengiktirafan sebagai finalis Anugerah Inovasi Antarabangsa Persatuan Komanwel bagi Pentadbiran Awam dan Pengurusan (CAPAM) 2014 di Majlis Makan Malam Presiden CAPAM yang berlangsung pada 21 Oktober.

FRIM dan Polis DiRaja Malaysia (PDRM) merupakan dua pasukan Malaysia yang berjaya ke pusingan akhir anugerah inovasi antarabangsa yang diadakan sempena persidangan dwitahunan CAPAM di Putrajaya.

FRIM dicalonkan menerusi pembangunan teknologi rawatan kayu iaitu teknologi pengeringan kayu suhu tinggi (HTD®) di bawah kategori Inovasi dalam Perkhidmatan dan Program Kerajaan; manakala PDRM bagi sistem pemantauan bandar raya selamat (SPBS/SCMS) untuk kategori Penggunaan Inovatif Teknologi dalam Perkhidmatan Awam yang berjaya dimenanginya.

Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod mengetuai pasukan penyelidik yang membangunkan teknologi pengeringan kayu menggunakan suhu tinggi (HTD) ke majlis penyampaian anugerah yang disempurnakan oleh Ketua Setiausaha Negara, Tan Sri Dr Ali Hamsa.

*Gambar: Yusni Idris*
*Sumber berita: www.frim.gov.my*

*Berita lain di ms 13*

# BIODEGRADABLE KIDNEY TRAY FROM ANTIMICROBIAL KENAF CORE PULP

## Dulang Ginjal Boleh Urai daripada Pulpa Teras Kenaf Berciri Anti-Bakteria

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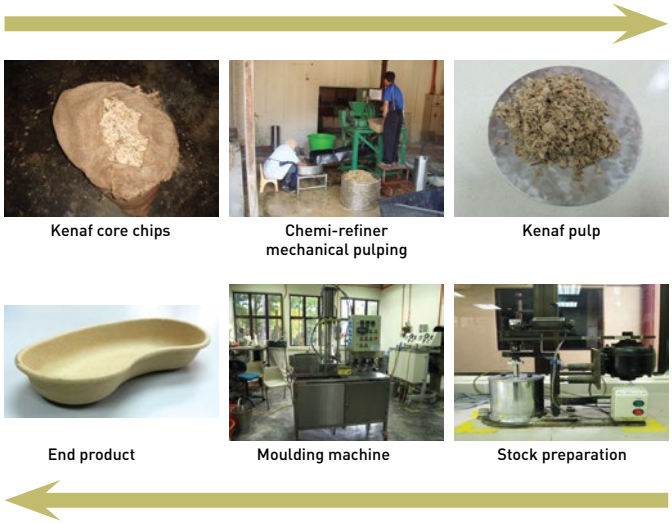
**The natural fibre industry is growing in importance because of the material's sustainability and technical properties. One of the most economically important crop in the Asian-Pacific region is kenaf (*Hibiscus cannabinus,* L), which is sought for its fibre. Kenaf was introduced recently in Malaysia, with 10,000 ha to be planted under the East Coast Economical Region (ECER) development programme.**

Kenaf plant grows quickly, rising up to 4 m height in a period of four to five months. Kenaf stem consists of two distinct parts; the long fibre bast and the short fibre core. It is not recommended to process the parts together due to differences in chemical composition, fibre length and chemical properties.

Pulp and paper products of lignocellulosic (plant-based) nature are often used in places that require high level of hygiene standards. Using conventional methods, the products have to be sterilised before use to avoid microbe contamination. FRIM however, has developed pulp and paper-based products that can detect and retard bacterial activities upon contact. The products were developed as a result of an exploration on the potential modification of kenaf core cellulose pulp. Cellulose is a component of the cell wall for plant structure and rigidity. The modification incorporates the antimicrobial agent polyhexamethylene guanidine hydrochloride (PHGH) on the fibres in a process called cellulose grafting.

Kidney tray is a container for holding medical utensils or items such as forceps, surgical knives, cotton swabs and gauze. Kidney tray is an indispensable item in hospitals and clinics. The development of kidney tray antimicrobial biodegradable moulded product led by Dr Rushdan Ibrahim was FRIM initial effort in using locally available kenaf core. The purpose of the invention is for establishing new process parameters and creating a demand for kenaf that will benefit planters, especially in the east coast. The potential market for this product would include 6500 hospitals and clinics throughout Malaysia.




The process of producing antimicrobial and biodegradable kidney tray

The tray uses five months old kenaf core chips from the V36 variety as its base material. The converting process of kenaf core chip into the end product involves processing kenaf from core chips into pulp using a chemi-refiner mechanical pulping machine. The kenaf pulp is later added for stock preparation which then goes to the moulding machine that produces the kidney tray.

The innovation has several advantages in terms of providing alternative material for kidney tray manufacturing with added antimicrobial and biodegradable functions. Using the Malaysian kenaf cultivar as base material increases the utilisation of local materials and creates a positive impact to the environment by reducing demand on timber and petroleum-based materials. From the economic perspective, using local kenaf reduces the import of pulp and paper kidney tray thus lowers the currency outflow. The invention also promotes indigenous technology developed by FRIM which was also patented (*PI 2014700313*). Since its development, two Malaysian companies have expressed interest to commercialise the product. The innovation also won a gold medal at the International Technology Expo 2014, which was held on 9 May 2014 at Kuala Lumpur Convention Centre.


The ITEX certificate for antimicrobial kidney tray

*Information and photos: Dr Rushdan Ibrahim (rushdan@frim.gov.my)*

# MATHEMATICAL MODELS FOR ALKALINE PULP AND PAPER PROPERTIES OF OIL PALM EFB FIBRE

## Model Matematik bagi Ciri-ciri Pulpa dan Kertas Alkali daripada Gentian Tandan Kosong Kelapa Sawit

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**Pulp and paper are mostly made from wood sourced from natural or planted forests. The local consumption of pulp and paper in Malaysia is fairly huge, amounting to more than RM5 billion (a figure recorded in 2008) imports of pulp, new and recycled papers. Other than wood, various types of plant biomass in the form of industrial waste are plentiful and can be utilised for pulp and paper manufacturing. The oil palm industry in Malaysia for instance, generates up to 20 million tonnes of oil palm empty fruit bunches (EFB) annually as residues.**

Plant biomass is converted into pulp using methods such as chemical or mechanical pulping, or a combination of both methods, known as hybrid. Mechanical pulping is used for making newsprint and magazine paper, as well as carton boxes and a variety of other products. Chemical pulping on the other hand is used mainly to make printing and writing paper.

Chemical pulping for softening of biomass fibres into pulp can be conducted using alkaline, organic, acidic or biochemical-based methods. The quality of paper produced eventually will depend on the type of treatments applied. FRIM developed mathematical models for pulp and paper properties based on the experimental data generated from alkaline pulping. The study was used to determine the optimum alkaline pulping treatment for a desired pulp and paper quality by measuring the influence of sulphidity, anthraquinone (digester additive), cooking temperature and cooking time. Pulp quality was determined using factors such as yield, viscosity and kappa number (the presence of residual lignin in pulp) whereas the paper quality was determined using its structural, mechanical and optical properties.

The mathematical models will guide in producing all types of paper from alkaline pulp of EFB. Using the developed models, pulp properties for various types of paper can be predicted thus supporting the factory operators' work. The models developed by Dr Rushdan Ibrahim won FRIM a gold medal for Innovation and Invention Award during the Malaysia Technology Expo (MTE) 2014, which took place from 20-22 February 2014 in Kuala Lumpur.

*Information: Dr Rushdan Ibrahim (rushdan@frim.gov.my)*
*Photos: Yusni Idris*


Asmar Hassan

*Top:* The certificate won at MTE 2014 for invention of mathematical models for alkaline pulp and paper properties of oil palm EFB

*Bottom:* Dr Rushdan Ibrahim (right) with Datuk Dr Abu Bakar Mohamad Diah, Deputy Minister of Ministry of Science, Technology and Innovation Malaysia (MOSTI) during MTE awards presentation ceremony

# *BAECKEA FRUTESCENS* (CUCUR ATAP) FOR GOUT

## *Baeckea frutescens* (Cucur Atap) bagi Rawatan Gout

*Baeckea frutescens* or cucur atap is a shrub discovered as having usage for gout treatment

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**Gout is an intensely painful type of arthritis, now an increasingly common medical problem in Malaysia. The disease is characterised by a sudden onset of severe pain and swelling from inflammation of the affected joint. Gout develops from an accumulation of excess uric acid in the body which causes uric acid crystals to deposit in the joints. Excess uric acid can result from increased uric acid production or decreased elimination of uric acid from the body. Certain purine-rich food and medication can also cause an increase in uric acid levels thus leading to gout.**

Medical attention is essential in the treatment of gout, but the condition can be managed effectively with natural measures such as herbal remedies. *Baeckea frutescens* or cucur atap is a shrub of the Myrtaceae family that shows potential as a gout remedy. Traditionally known as a diuretic herb, *B. frutescens* can be easily found in the east coast of Peninsular Malaysia, particularly at Terengganu.

Concoction of an herbal remedy requires standardisation to confirm the identity, quality and purity of the herbal material and products. Every standardised batch of herbal products must have the correct amount of substance, known as the chemical or biological marker for consistenty in quality.

Plant chemical or phytochemical studies conducted by FRIM on *B. frutescens* have since successfully identified and isolated the active compound BF 6322, which has potential anti-gout properties. Gout is attributed to the formation of uric acid via the activities of xanthine oxidase enzyme. BF 6322 acts by inhibiting the xanthine oxidase enzyme activity, avoids the formation of uric acid and prevents gout. The standardised extract of *B. frutescens* (SEBF) has been optimised and developed based on the presence of BF 6322 using qualification analyses and evaluation of anti-gout properties.

The gout treatment using *B. frutescens* project is led by Dr Fadzureena Jamaludin with team members comprising Siti Nur Aisyah Mohd Hashim, Saidatul Husni Saidin, Noor Rasyila Mohamed Noor, Mohamad Jemain Mohamad Ridhwan, Dr Pin Kar Yong , Dr Nik Musaadah Mustapha, Hani Idayu Bani, Abdull Rashih Ahmad and Azman Mohamed. The project produced two prototype products—BaeckSE spray and *B. frutescens* capsules and was registered for patent search (ID 14/2012) and patent application: PI 2014000187. An Option Agreement was also signed with Alfa Hijauan Emas Sdn Bhd for the research which won a double Gold Medal at the International Technology Expo, ITEX in 2009 and 2014 respectively.

*Information and photos by Dr Fadzureena Jamaludin (fadzureena@frim.gov.my)*


BaeckSE spray and *B.frutescens* capsules

# PINGAT EMAS ANUGERAH BIOINNO BAGI INOVASI BULUH

## Gold Medal for Bamboo Innovation

**21 November 2014**—Dr Mohd Khairun Anwar Uyup mengetuai kumpulannya untuk memenangi Pingat Emas Anugerah BioInno yang dianjurkan sempena pameran BioInovasi di Pusat Persidangan Kuala Lumpur (KLCC). Buluh lapis gred luaran ialah calon tunggal yang mewakili FRIM, di mana ahli kumpulannya terdiri daripada Dr Hamdan Husain, Dr Paridah Md Tahir, Siti Rafidah Mahmud, Mat Yaacob Che Wan dan Mohd Faizul Mohd Shukari.

# TIGA MAKMAL TERIMA ANUGERAH KECEMERLANGAN IKM

## Three Laboratories Receive IKM Excellence Award

Dr Wan Rasidah (tiga dari kanan) dan warga Makmal Kimia Tanah dengan sijil anugerah Perak IKM yang dimenangi

**5 Disember 2014**—Makmal Kimia Tanah (MKT), Program Hutan Ladang menerima anugerah Perak Kecemerlangan Makmal Institut Kimia Malaysia (IKM) 2014 kerana berjaya mengekalkan anugerah kecemerlangan selama 10 tahun berturut-turut bermula pada tahun 2005 sehingga 2014. Anugerah disampaikan oleh Dato' Ahmad Ridzuan Ibrahim (felo IKM) sempena Malam IKM 2014 di Pusat Konvensyen Sime Darby.

Selain MKT, Makmal Analisis Awetan Kayu dan Makmal Ujian Komposit Kayu dari Bahagian Keluaran Hutan turut menerima anugerah tersebut.

Terdahulu, pada 17 November MKT juga menerima pensijilan akreditasi MS ISO/IEC 17025 bagi 'penentuan kalium dalam tisu tumbuhan dan bahan berasaskan tumbuhan' (sijil no: SAMM 670) daripada Jabatan Standard Malaysia.

*Sumber berita: www.frim.gov.my*

# KP FRIM DILANTIK FELO ASM BAHARU

## FRIM DG Elected New ASM Fellow

Abd Latif (kanan) menerima pengiktirafan felo baharu ASM daripada Perdana Menteri Malaysia

**8 Disember 2014**—Ketua Pengarah (KP) FRIM Dato' Dr Abd Latif Mohmod yang juga penerima Anugerah Saintis Penyelidikan Terbaik Malaysia (TRSM) Akademi Sains Malaysia (ASM), dilantik sebagai felo ASM yang baharu. Beliau menerima pengiktirafan tersebut di majlis Penganugerahan Felo 2014 di JW Marriot Hotel, Kuala Lumpur yang dirasmikan oleh Perdana Menteri, Dato' Sri Mohd Najib Tun Abdul Razak.

Ketua Pengarah FRIM dipilih bersandarkan kepakaran beliau dalam penyelidikan tentang produk, ciri-ciri, pemprosesan dan penggunaan produk hutan bukan kayu seperti buluh, rotan, dan palma, dalam disiplin Sains Pertanian Biologi dan Sains Alam Sekitar. Perdana Menteri menyampaikan sijil pengiktirafan felo baharu kepada Ketua Pengarah dan 20 saintis lain. Bagi tahun ini, ASM memberi pengiktirafan satu Felo Kehormat, dua Felo Kanan, dan 34 Anugerah TRSM.

*Gambar: Yusni Idris*
*Sumber berita: www.frim.gov.my*

Kulat peringkat tinggi dilihat menggunakan mata kasar: *Microporus xanthopus* (kiri) dan *M. Affinis* (kanan)

# APA ITU KULAT?

## *What is Fungus?*

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**Dr Salmiah Ujang**

**Ahli pengkaji kulat, seperti pengkaji hidupan yang lain bergantung kepada ekspedisi meredah hutan bagi mencari dan mengenal pasti spesies-spesies kulat yang baharu. Keseronokan bagi penyelidik kulat ialah apabila mereka berjaya membawa pulang pelbagai spesies kulat yang unik untuk dianalisis. Merakam gambar kulat dan mengambil sampel tanah juga perlu dijalankan untuk penyelidikan lanjut. Malaysia yang beriklim tropika mempunyai kepelbagaian spesies kulat yang tinggi yang masih belum diselidiki sepenuhnya. Peluang penyelidikan yang luas ini dimanfaatkan antara lainnya oleh institusi-institusi penyelidikan seperti FRIM.**

Kulat ialah organisma yang tidak berklorofil dan sering dijumpai tumbuh di dahan kayu yang reput, ranting, dedaun, tunggul kayu, pangkal pokok dan juga di atas tanah. Kulat perlu menjalankan aktiviti pereputan untuk mendapatkan nutrien dan berperanan sebagai penghurai bahan dalam ekosistem.

Berdasarkan saiznya, kulat terbahagi kepada dua jenis iaitu kulat peringkat tinggi dan peringkat rendah. Kulat peringkat tinggi boleh dilihat dengan mata kasar seperti *Microporus xanthopus* dan *M. affinis*, manakala kulat peringkat rendah hanya dapat dilihat menggunakan mikroskop seperti *Aspergillus* sp dan *Trichoderma* sp.

Kandungan protein kulat yang tinggi menjadikannya sesuai sebagai makanan, manakala nilai ubatannya pula menerima permintaan yang tinggi di kalangan pengamal perubatan tradisional dan moden. Walau bagaimanapun, kulat juga berperanan sebagai patogen kepada spesies-spesies tertentu.

### Kulat sebagai sumber makanan

Sejak dahulu lagi kulat yang tumbuh secara semula jadi dikutip sebagai sumber makanan dan protein bagi masyarakat setempat. Kulat yang boleh dimakan lebih dikenali sebagai cendawan seperti cendawan kukur, cendawan busut, cendawan tiram, cendawan butang dan cendawan telinga kera. Pelbagai spesies kulat kini ditanam secara komersial bagi memenuhi permintaan pasaran.

Banyak kajian menunjukkan bahawa kulat mengandungi khasiat seperti vitamin B, antioksidan dan garam mineral, tetapi terdapat juga kulat yang beracun. Justeru, pengutipan kulat di hutan untuk dimakan perlu dilakukan dengan berhati-hati dan teliti kerana spesies beracun kadangkala menyerupai spesies yang boleh dimakan.

### Kulat sebagai ubat

Kulat dalam rawatan tradisional telah digunakan secara meluas oleh masyarakat pribumi Malaysia. Antara kulat yang popular di kalangan pengamal perubatan tradisional ialah cendawan merah (*Pycnoporus sanguineus)* bagi rawatan sakit mata dan cendawan susu harimau (*Lignosus* sp) bagi meningkatkan tenaga batin dan melegakan batuk. Cendawan lingzhi (*Ganoderma* sp) pula digunakan

Kulat peringkat rendah dilihat menggunakan mikroskop: *Aspergillus* sp (kiri) dan *Trichoderma* sp (kanan)

koleksi kultur FRIM yang terdapat di Makmal Mikologi Kayu, Bahagian Keluaran Hutan telah dikutip di kawasan kampus tersebut. Spesimen-spesimen kulat selanjutnya dikultur menggunakan bahagian spora dan tisu. Kultur kulat ini tersedia untuk digunakan dalam ujian ketahanan kayu atau disimpan sebagai bank kultur.

Contoh cendawan yang boleh dimakan: Cendawan tiram, *Pelurotus sajorcaju* (kiri) dan cendawan kepala monyet, *Hericium erinaceaus* (kanan)

bagi mengelakkan penyakit barah, manakala cendawan serangga (Cordyceps) bagi menghindarkan penyakit radang hati.

Beberapa kajian saintifik telah membuktikan keberkesanan ubatan daripada kulat. Namun begitu, hanya ubatan yang telah mendapat kelulusan Kementerian Kesihatan sahaja yang dibenarkan untuk pasaran umum. Penggunaan secara tradisional tanpa sokongan kajian pula sama sekali tidak digalakkan.

Fungsi kulat yang pelbagai ini semakin diketahui ramai, seiring dengan peningkatan bilangan pengusaha kulat yang memasarkannya sebagai makanan dan produk penjagaan kesihatan, terutamanya dalam perubatan alternatif. Kulat yang berpotensi ini boleh didapati di seluruh negara termasuk kampus FRIM yang mempunyai taburan kulat seperti *Microporus xanthopus, M. affinis, Trametes* sp, *Lentinus* sp dan *Ganoderma* sp. Sebahagian


Kulat sebagai ubat: (kanan, mengikut jam) lingzhi, cendawan susu harimau, cordyceps dan cendawan merah

**TENTANG PENULIS UTAMA**

Noor Azrieda Abd Rashid merupakan seorang pegawai penyelidik di Makmal Mikologi Kayu, Bahagian Keluaran Hutan, FRIM. Beliau menjalankan penyelidikan berkaitan ketahanan kayu terhadap kulat berdasarkan standard American Society for Testing and Materials (ASTM) dan BS EN (European Standards).

# TRANQUIL M, COMPOUND FOR HEALTH FROM *AQUILARIA* LEAVES

## TranQuil M, Sebatian untuk Kesihatan daripada Daun *Aquilaria*

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Rosdi Mohamad

BioMalaysia 2013

FRIM Innovation and Invention Day 2012

**Plants contain highly beneficial compounds known as antioxidants that have the ability to repair cell damage within the plant system. Humans also benefit from antioxidants as they enhance person's health by fighting free radicals and repairing oxidative damage. Free radicals are the by-product of cellular activities which lead to various chronic diseases and aging symptoms in humans.**

With the many benefits of antioxidants now known, market demand for plant-based cosmetics and nutritional products is increasing rapidly. As such, the search for new active plant ingredients with high antioxidant properties for standardisation and extraction is fairly crucial.

The project team led by scientists from the Development of Herbal Products Programme with expertise from other programmes has developed a useful antioxidant herbal-based standardised extract. The leaves of *Aquilaria* species, a plant better known for its capability of producing a highly prized resinous wood substance or agarwood, was found to also produce antioxidants. The compound (extract) named TranQuil M exhibited high antioxidant property which possesses high levels of total phenolic content (a laboratory index of antioxidant strength) and oxygen radical absorbance capacity (ORAC—absorbance strength of free radicals). The benefits of TranQuil M also include skin lightening properties.

TranQuil M extracts are produced without using chemical solvents and synthetic preservatives thus are suitable to be mixed in beverages and emulsion for skin care products. The technology is intended to assist the agarwood small and medium scale industry entrepreneurs to penetrate local and global markets in the cosmetic, healthcare and food segments.

The TranQuil M project which was funded by the Ministry of Agriculture and Agro-Based Industry (MOA) has collected three innovation awards. The Gold Award was received during the 25th International Invention, Innovation and Technology Exhibition 2014, held in Kuala Lumpur from 8-10 May, while two Silver Awards were received for the BioInnovation Awards 2013, BioMalaysia, held in Johor Bahru from 21-23 Oktober and FRIM Innovation and Invention Day 2012 held in Kuala Lumpur from 28-29 November.

The project was conducted with assistance from staff of the Natural Products and other Divisions, as well as from the Herbal Technology Centre.

### ABOUT THE MAIN AUTHOR

Siti Humeirah Ab Ghani is a research officer at the Herbal Product Development programme, Natural Products Division, FRIM. She obtained her MSc in Natural Product Chemistry from Universiti Putra Malaysia and BSc in Conservation Biology from Universiti Malaysia Sabah. Her specialisation includes natural products chemistry and product development.