

Laporan Tahunan 2008 Annual Report



Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia



Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia
Malaysian Forestry Research and Development Board



Kementerian Sumber Asli dan Alam Sekitar
Ministry of Natural Resources and Environment



- Kulit depan/Cover :
1. Anak benih *Pteleocarpa lamponga* (tembusu tikus)
A seedling of *Pteleocarpa lamponga* (tembusu tikus)
 2. Papan *Acacia mangium*, spesies bukan-tempatan berkualiti sederhana yang cepat tumbesarnya
Wooden planks of *Acacia mangium*, a fast growing medium quality exotic timber species
 3. Hutan Pamah Dipterocarpa
Lowland Dipterocarp Forest

Rasional Kulit Depan

Cover Page Rational

Cahaya suria menyinari anak pokok yang terletak di antara dua kepingan papan kayu melambangkan metafora harapan dan penghargaan kepada alam sekitar. Ia menunjukkan transisi tumbuhan kecil kepada pokok-pokok besar serta hutan tropika sebagai latar belakangnya. Ini mengingatkan kita akan kepentingan pokok dalam mengurangkan pencemaran udara dan pemanasan global, mengurangkan hakisan tanah dan lain-lain dalam kehidupan kita.

A ray of sunlight shining on a small plantlet, sprouting between two pieces of wooden planks is a metaphor of hope and appreciation towards the environment. It shows the transition of a small plant evolving to big trees and then into a dazzling tropical forest in the background. It reminds us of the importance of trees in reducing air pollution and global warming, reducing soil erosion and other effects it has on our lives.

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LEMBAGA PENYELIDIKAN DAN PEMBANGUNAN PERHUTANAN MALAYSIA
MALAYSIAN FORESTRY RESEARCH AND DEVELOPMENT BOARD

- 02 **Laporan Pengerusi**
Chairman's Report
- 07 **Ahli Lembaga MFRDB**
MFRDB Board Members

- 10 **Jawatankuasa Kewangan dan Perjawatan**
Finance and Establishment Committee
- 11 **Jawatankuasa Audit**
Audit Committee



Kandungan
Table of Contents

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
FOREST RESEARCH INSTITUTE MALAYSIA

- 13 **Laporan Ketua Pengarah**
Director General's Report
- 17 **Pengurusan Tertinggi**
Senior Management
- 19 **Visi, Misi & Objektif**
Vision, Mission & Objectives
- 20 **Fungsi**
Functions
- 21 **Piagam Pelanggan, Dasar Kualiti dan Slogan Kualiti**
Clients' Charter, Quality Policy and Quality Slogan
- 22 **Carta Organisasi**
Organizational Chart
- 24 **Aktiviti Utama R&D**
R&D Highlights
- 46 **Pemindahan Teknologi**
Technology Transfer
- 54 **Dana Penyelidikan dan Pembangunan**
Funding for Research and Development
- 60 **Khidmat Perundingan**
Consultancies
- 65 **Hal Ehwal Antarabangsa**
International Affairs

- 77 **Sistem Pengurusan Kualiti**
Quality Management System
- 83 **Petunjuk Prestasi Utama**
Key Performance Indicators
- 85 **Anugerah dan Pengiktirafan**
Awards and Recognition
- 91 **Tanggungjawab Sosial Korporat**
Corporate Social Responsibility
- 94 **Hari Anugerah**
Awards Day
- 99 **Aktiviti Lain**
Other Activity
- 101 **Kewangan**
Finance
- 104 **Lawatan Rasmi**
Official Visits
- 106 **Perjawatan**
Establishment
- 110 **Latihan**
Trainings
- 112 **Penerbitan**
Publications
- 156 **Pegawai**
Officers

Laporan Pengerusi *Chairman's Report*

Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia

*Malaysian Forestry Research and
Development Board*

Saya berasa sangat bertuah kerana berpeluang buat kali ketiga selaku Pengerusi Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia (MFRDB) untuk berkongsi dengan anda semua perasaan bangga dan gembira dengan pertumbuhan dan kejayaan FRIM pada 2008.

It is a privilege that I am given this opportunity for the third time, as Chairman of the Malaysian Forestry Research and Development Board (MFRDB), to share with you, my feelings of pride and joy in the growth and achievements of FRIM in 2008.

Penilaian Semula Prestasi

Memang tidak dapat dinafikan bahawa di kalangan pihak-pihak yang berkepentingan, FRIM merupakan antara institusi penyelidikan dan pembangunan perhutanan yang terulung. Pada 2008, Lembaga telah memperakui sejumlah RM10.8 juta diterima untuk projek penyelidikan baharu dari pelbagai dana penyelidikan Kerajaan (iaitu Rancangan Malaysia ke-9, ScienceFund) serta agensi-agensi luar (iaitu UNDP, ITTO) serta dari dana Lembaga termasuklah Tabung Luar Jangka dan Geran Penyelidikan dan Prakomersialisasi. Dana-dana ini digunakan untuk memulakan atau membantu pelbagai projek penyelidikan dan prakomersialisasi, dari penerokaan hinggalah kepada pemuliharaan sumber-sumber semula jadi, pembangunan dan ujian hasil-hasil hutan hinggalah kepada kajian bioprospek dan sosio-ekonomi. Lembaga telah melulus dan memperakui sejumlah 11

Performance Review

There is without a doubt that within the global circle of tropical forestry stakeholders, FRIM emerges among the top on the list of leading research and development (R&D) institutions. In 2008, the Board endorsed R&D projects worth RM10.8 million through a number of avenues including funds from the Malaysian Government (i.e. the Ninth Malaysian Plan, ScienceFund, TechnoFund), external agencies (i.e. UNDP, ITTO) as well as the Board, which includes the Contingency Fund and the Research and Pre-Commercialization Grants Fund. These funds were used to initiate or support a wide range of R&D and pre-commercialization projects, from exploration to conservation of natural resources, development and testing of forestry products to bioprospecting and socio-economic studies. A total of 11 Memoranda of Understanding (MoUs) and 14 agreements were approved and endorsed by the Board with various stakeholders and industrial parties to

memorandum persefahaman dan 14 perjanjian dengan pelbagai pihak yang berkepentingan dan industri ke arah meningkat dan membina keupayaan R&D di FRIM, memenuhi permintaan pasaran serta keperluan pihak-pihak yang berkepentingan.

Tahun 2008 menyaksikan pelbagai projek penyelidikan yang signifikan berjaya ditamatkan, dan penghasilan penerbitan yang berimpak tinggi, reka cipta dan komersialisasi hasil daripada penemuan baharu yang akan dilaporkan dalam laporan Ketua Pengarah. Bagaimanapun, saya ingin memaklumkan tentang kejayaan menamatkan dua projek negara yang diamanahkan kepada FRIM iaitu *Conservation and Sustainable Use of Peat Swamp Forests and Associated Wetlands Ecosystems Project* dan projek kerjasama FRIM-MTIB-MTC MWIA tentang pembangunan produk kayu bernilai tambah (bingkai tingkap kayu berlaminasi). Projek Hutan Paya Gambut yang dibiayai oleh UNDP-GEF-Danida yang bermula sejak tahun 2002 bukan sahaja menghasilkan penemuan yang menarik serta meningkatkan kesedaran terhadap kepentingan hutan paya gambut, malahan projek ini telah membentuk Pelan Pengurusan Bersepadu untuk tiga kawasan di negeri Pahang, Sabah dan Sarawak. Di samping itu, lapan projek IRPA dan ScienceFund turut berjaya ditamatkan pada tahun 2008.

Dengan penglibatan pengusaha tempatan, FRIM berjaya membangun dan menguji bingkai tingkap berlaminasi yang bermutu tinggi, yang digunakan dalam pembinaan perumahan di Eropah, khususnya di Jerman. Jenama Lamtec Malaysia® kini didaftarkan di Malaysia dan Eropah, dan menerima pensijilan kualiti dari ift-Rosenheim (Jerman)—sebuah badan pengujian, pematuhan dan pensijilan Eropah dengan akreditasi antarabangsa. Di samping itu, pada tahun 2008 FRIM turut dilantik sebagai badan pematuhan dan pengujian bagi ift-Rosenheim. Secara tidak langsung, projek ini telah menggandakan nilai eksport bingkai tingkap berlaminasi Malaysia berbanding tahun 2004.

"Kualiti teras kecemerlangan." Selaras dengan slogan kualitinya, FRIM sekali lagi berjaya memenuhi standard pensijilan antarabangsa seperti ISO 9001:2000, EN ISO 9001:2000; BS EN ISO 9001:2000 dan MS ISO 9001:2000. Justeru, saya ingin merakamkan ucapan tahniah kepada warga kerja FRIM yang menjadikan kualiti sebagai budaya kerja mereka. Tentu sekali ini akan meningkatkan prestasi dan sumbangan secara keseluruhan sebagai seorang individu, sebuah institusi dan yang paling utama, sebagai anggota masyarakat.

further enhance and build R&D capacities in FRIM, meet market demands as well as the needs of her stakeholders.

The year 2008 witnessed the completion of numerous projects of high significance and the production of high-impact publications, inventions and the commercialization of discoveries made by FRIM, which I believe, will be reported in the FRIM Director General's report. However, I wish to acknowledge the completion of two projects of national significance entrusted to FRIM, namely the Conservation and Sustainable Use of Peat Swamp Forests and Associated Wetlands Ecosystems Project and the FRIM-MTIB-MTC-MWIA joint project on value-added wood products (laminated wood scantling) development. The UNDP-GEF-Danida-funded Peat Swamp Project, which commenced in 2002, not only revealed remarkable findings and enhanced the awareness of its importance, but also concluded with the development of the Integrated Management Plan for three sites in Pahang, Sabah and Sarawak for biodiversity and conservation of peat swamp forests. In addition, eight research projects under the Intensification of Research in Priority Areas (IRPA) and ScienceFund were completed in 2008.

With the participation of local manufacturers, FRIM successfully developed and tested high-quality laminated window scantling, which is used in European housing construction, particularly in Germany. The brand Lamtec Malaysia® is now registered in Malaysia and Europe, and has received quality certification from ift-Rosenheim (Germany)—a European testing, surveillance and certification body with international accreditation. In addition, FRIM was also appointed as a surveillance and testing body for ift-Rosenheim in 2008. Indirectly, this project has doubled the export value of Malaysian laminated window scantlings compared with 2004.

"Quality is the pillar of excellence": FRIM stays true to her quality slogan by again fulfilling the international certification standards such as ISO 9001:2000, EN ISO 9001:2000; BS EN ISO 9001:2000 and MS ISO 9001:2000. In this regard, I would like to congratulate FRIM staff for their resilience in preserving quality in their work culture, which undoubtedly will enhance their overall performance and contribution as individual's, an institution and more importantly, as members of their community.

Growth and Development

Significant changes were made in 2008 to ensure that the continuous growth and development of FRIM were in line with the nation's aspiration and market demands. Three new working committees, namely Forest Biotechnology, Forest Products and ICT Development, were established to steer FRIM into newer heights and to ensure R&D in FRIM is market-driven and remains relevant to current needs. The "Deanship" System was also introduced

Pertumbuhan dan Pembangunan

Perubahan penting telah dilakukan pada tahun 2008 untuk memastikan pertumbuhan; dan pembangunan FRIM adalah sejajar dengan aspirasi negara dan permintaan pasaran. Tiga jawatankuasa kerja yang baharu iaitu Bioteknologi Perhutanan, Keluaran Hutan dan Pembangunan ICT telah ditubuhkan untuk membawa FRIM dan seterusnya memastikan R&D di FRIM sebagai pemacu pasaran serta terus relevan terhadap keperluan masa kini. Sistem dekan turut diperkenalkan untuk jawatan Pengarah Bahagian dan Pengarah Program. Setiap kitaran yang berakhir setiap tiga tahun, bertujuan untuk memberi peluang kepada individu yang berkelayakan untuk membangunkan R&D di samping meningkatkan keupayaan pengurusan. Sebagai galakan kepada penyelidik FRIM untuk terus cemerlang, menyebarkan dan mengkomersialkan penemuan penyelidikan, insentif kewangan dan sijil akan diberikan kepada mereka yang berjaya menerima anugerah reka cipta dan inovasi serta mereka yang berjaya menerbitkan kertas saintifik dalam jurnal berfaktor impak tinggi.

Dari segi fizikal, Pusat Biodiversiti Hutan Tropika telah disiapkan dan menempatkan koleksi herbarium yang terbesar dengan lebih daripada 300 000 spesimen. Kemudahan terbaharu ini mampu menampung sehingga 600 000 spesimen, lima hingga sepuluh tahun yang akan datang.

Hala Tuju Masa Depan

Selain bidang-bidang keutamaan penyelidikan yang disenaraikan dalam Pelan Strategik FRIM 2004–2013, Lembaga berhasrat untuk melihat FRIM menjadi ikutan dan seterusnya menyahut cabaran-cabaran yang berikut: memberi tumpuan pada peranan hutan sebagai *carbon sink* dalam mengurangkan perubahan cuaca, memainkan peranan utama dalam hutan bandar serta menjalin lebih banyak kerjasama dengan pengurus-pengurus hutan dan pihak industri. Masa depan R&D akan menyaksikan keutamaan pada bioteknologi (ujian klinikal dan pembangunan produk) serta komoditi tumbuh-tumbuhan yang lain. Lembaga turut ingin berkongsi harapan untuk melihat FRIM bukan sahaja memainkan peranan sebagai institusi pembelajaran pada masa terdekat, tetapi juga selaku badan pensijilan dalam tiga bidang di bawah Skim Akreditasi Badan Pensijilan, Jabatan Standard Malaysia, iaitu Pensijilan Produk Rantaian Jagaan Kayu serta Pensijilan Hasil dan Hasil Sampingan Hutan dan Pensijilan Unit Pengurusan Hutan. Untuk merealisasikan harapan tersebut, Lembaga telah meluluskan sejumlah dana.

MFRDB terus menyokong usaha untuk meminda Akta MFRDB 319 kepada Akta FRIM seperti yang

for the Programme and Division Director positions. Each cycle, lasting three years, aims to give qualified individuals an opportunity to develop their R&D as well as management capabilities. To further encourage FRIM researchers to excel, disseminate and commercialize their research findings, monetary incentives and certificates will be presented to those who are conferred invention and innovation awards as well as those who succeed in publishing papers in high-impact factor journals.

In the physical sense, positive development can be noted in FRIM with the completion of the Tropical Forest Biodiversity Centre, which also houses one of the most vast herbarium collections in Malaysia with over 300 000 specimens. This new centre can accommodate up to 600 000 specimens for the next five to ten years.

Future Direction

Other than priority research areas listed in the FRIM Strategic Plan 2004–2013, the Board would like to see FRIM as a trend-setter and take up the following challenges: focus on the role of forests as a carbon sink in mitigating climate change, play a bigger role in urban forestry and participate in greater collaboration with forest managers and the industry. Future R&D endeavours will also see more focus in biotechnology (clinical testing and product development) and other plant commodities. The Board furthermore shares in the hope that FRIM will not only play the role of a learning institution in the near future, but also as a certifying body in three areas under the Certifying Body Accreditation Scheme, Standards Department Malaysia, namely Timber Chain-of-Custody Product Certification, Forest Product and By-Product Certification and Forest Management Unit Certification. With regard to this, the Board has approved a significant amount of funds to enable the realization of this hope.

The MFRDB continues to support the aspiration to amend the MFRDB Act 319 to FRIM Act as was first proposed in 2006. This would consequently recognize FRIM as a legal entity, which would allow greater flexibility and opportunities to determine her direction, intellectual property rights and commercialization among other issues. Plans for the re-organization of FRIM have been drawn up and approved by the Board to reflect changes in R&D and management strategies in recent years. These will be forwarded to the Ministry of Natural Resources and Environment (NRE) and the Public Services Department for approval.

Directorship

It is a great honour to have had Datuk Dr Abdul Razak Mohd. Ali as a Board member. He had loyally served FRIM as Director General for 12 years and has greatly

dicadangkan buat kali pertama pada tahun 2006. Pindaan ini akan mengiktiraf FRIM sebagai sebuah entiti undang-undang yang akan mewujudkan fleksibiliti dan peluang yang lebih besar, antara lain, untuk menentukan hala tuju, hak harta intelek, dan komersialisasi. Rancangan pengorganisasian semula FRIM telah disiapkan dan diluluskan oleh Lembaga untuk menggambarkan perubahan dalam strategi R&D dan pengurusan. Pelan ini akan dihantar ke NRE dan Jabatan Perkhidmatan Awam untuk kelulusan.

Pengarah

Lembaga sangat bertuah dan berbangga dengan Datuk Dr Abdul Razak Mohd. Ali selaku ahli Lembaga. Beliau telah berkhidmat sebagai Ketua Pengarah FRIM selama 12 tahun dan telah memberi sumbangan besar terhadap kejayaan yang dikecapi oleh FRIM kini. Lembaga ingin merakamkan setinggi-tinggi penghargaan ke atas dedikasi beliau dan semoga beliau sihat sejahtera. Lembaga turut mengalu-alukan Dato' Dr Abd. Latif Mohmod yang menggantikan tempat Datuk Dr Abdul Razak; di samping ucapan tahniah di atas pengurniaan pingat Johan Setia Mahkota (JSM) pada Disember 2008. Lembaga juga turut mengalu-alukan ahli-ahlinya yang baharu.

Penghargaan

Selaku Pengerusi Lembaga, saya ingin menyampaikan setinggi-tinggi penghargaan kepada Y.B. Datuk Douglas Uggah Embas, Menteri NRE yang memberikan penghormatan kepada saya bersama-sama ahli Lembaga yang lain, untuk membawa FRIM ke arah kemajuan.

Bagi pihak Lembaga, pengurusan dan kakitangan, saya ingin menyampaikan setinggi-tinggi penghargaan kepada semua pihak yang berkepentingan di atas segala sokongan, keyakinan, kepercayaan dan sumbangan kepada kejayaan serta pertumbuhan FRIM.

Kepada pihak pengurusan dan warga kerja FRIM, terima kasih di atas kesetiaan, iltizam dan kumpulan kerja dengan pihak Lembaga yang menyumbang kepada kejayaan yang dicapai ini. Saya juga ingin mengambil kesempatan ini untuk mengucapkan tahniah kepada Dato' Dr Abdul Rashid Ab. Malik dan Dr Abdul Rahim Nik di atas pelantikan sebagai Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan) dan Timbalan Ketua Pengarah (Operasi). Semoga kepimpinan baharu ini akan membawa kejayaan dan kecemerlangan yang berterusan.

Akhir sekali, setinggi-tinggi penghargaan kepada ahli-ahli Lembaga yang telah memberikan sokongan yang tidak berbelah bahagi bagi menjamin kecemerlangan FRIM yang berterusan.

contributed to the success and good name to which FRIM currently enjoys. The Board would like to record its deep appreciation for his dedication and wishes him well. In his place is Dato' Dr Abd. Latif Mohmod, whom the Board warmly welcomes and also congratulate for being conferred the title Johan Setia Mahkota (JSM) in December 2008. The Board would also like to welcome new members and hope that they will give their full support to the Board.

Acknowledgement

As Chairman of the Board, I wish to express my sincere appreciation to Y.B. Datuk Douglas Uggah Embas, Minister of NRE, for giving me the honour together with the Board members, this leadership opportunity to steer FRIM towards greater heights.

On behalf of the Board, management and staff, I would like to extend our deepest appreciation to all our valued stakeholders for their continuous support, confidence, trust and contributions to the success and growth of FRIM.

To the management and staff goes my sincere gratitude for your loyalty, commitment and team work with the Board enabling the achievements mentioned above. I would also like to take this opportunity to congratulate both Dato' Dr Abdul Rashid Ab. Malik and Dr Abdul Rahim Nik on their appointment as Deputy Director General for Research and Development and Deputy Director General for Operation, respectively. May this new leadership bring fresh changes and continuous excellence to FRIM.

Lastly, I extend my deepest appreciation to my fellow Board members for their unwavering support towards the success of FRIM.



DATUK SUBOH MOHD. YASSIN

PJN, DPSJ, KMN, PIS

Pengerusi MFRDB/ MFRDB Chairman



**Lembaga Penyelidikan
dan Pembangunan
Perhutanan Malaysia**

*Malaysian Forestry
Research and
Development Board*

Ahli Lembaga MFRDB sehingga 30 September 2009 MFRDB Board Members until 30 September 2009



PENGERUSI CHAIRMAN

Datuk Suboh Mohd. Yassin
PJN, DPSJ, KMN, PIS

AHLI AND AHLI SILIH GANTI MEMBERS AND ALTERNATE MEMBERS

Kementerian Sumber Asli dan Alam Sekitar Malaysia
Ministry of Natural Resources and Environment Malaysia

En. Letchumanan Ramatha
(Sehingga/until 31 Ogos 2008)

En. Azhar Noraini
(Dari/from 1 September 2008)

En. Chin Shih Loon
(Siliah Ganti/Alternate Member)
(Sehingga/Until 31 Ogos 2008)

Penasihat Alam Sekitar Negeri Sarawak
Environmental Advisor of Sarawak

Dato' Dr James Dawos Mamit, PSBS

Kementerian Kewangan
Ministry of Finance

En. Zuraidi Husain
(Dari/from 1 Julai 2008)

Pn Adena Ahmad
(Siliah Ganti/Alternate Member)
(Dari/from 1 Julai 2008)

En. Azlan Abdul Rashid
(Siliah Ganti/Alternate Member)
(Sehingga/until 30 Jun 2008)

Jabatan Perhutanan Semenanjung Malaysia
Forestry Department of Peninsular Malaysia

Dato' Seri Azahar Muda
SPMP, DPMP, PMP, BSK, AMN, AMP

Dato' Dahlan Taha, DPSK, BSK
(Siliah Ganti/Alternate Member)
(Sehingga/Until 30 Jun 2008)

Dr Hj. Abdul Rahman Hj. Abdul Rahim
(Siliah Ganti/Alternate Member)
(Dari/From 1 Julai 2008)

AHLI DAN AHLI SILIH GANTI MEMBERS AND ALTERNATE MEMBERS

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industry Board

Dato' Mohd. Nazuri Hashim Shah, DSNS, JSM, DSM,
AMN, BSK, PMC

Tuan Hj. Osman Hj. Kassim
(Siliah Ganti/Alternate Member)

Persatuan Pekilang Panel Malaysia
Malaysian Panel-products Manufacturer's Association

Dato' Sheikh Othman Sheikh Abdul Rahman, DIMP, JP

En. Choong Kian Kee
(Siliah Ganti/Alternate Member)

Persatuan Industri Kayu-kayan Malaysia
Malaysian Wood Industries Association

En. Ng Kay Yip

En. Pon Chia Hwee
(Siliah Ganti/Alternate Member)

Persatuan Pengusaha Kayu-kayan dan Perabot Bumiputera Malaysia
Association of Malaysian Bumiputera Timber and Furniture Entrepreneurs

Tuan Hj. Ir Wahid Jaafar
(Dari/from 1 Februari 2008)

Tuan Hj. Hanafie Yusoff
(Siliah Ganti/Alternate Member)
(Dari/from 1 Februari 2008)

Lembaga Getah Malaysia
Malaysian Rubber Board

Dr Chan Heun Yin, JSM

Ahli Lembaga MFRDB sehingga 30 September 2009 **MFRDB Board Members** until 30 September 2009

AHLI DAN AHLI SILIH GANTI MEMBERS AND ALTERNATE MEMBERS

Pusat Pembangunan Negeri Selangor
Selangor State Development Centre

En. Abdul Ghani Salleh, SMS, AMS, PPT

Yayasan Sabah
Sabah Foundation

En. Mohd. Daud Tampokong

Jabatan Perhutanan Sarawak
Sarawak Forestry Department

Datu Hj. Len Talif Salleh

Nicholas Andrew Lissem
(Silih Ganti/Alternate Member)

AHLI AND AHLI SILIH GANTI MEMBERS AND ALTERNATE MEMBERS

Pejabat Setiausaha Kerajaan Negeri Selangor
Selangor State Secretary

Dato' Noordin Sulaiman, SIS, DPMS

Pn Elya Marini Darmin
(Silih Ganti/Alternate Member)

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

Datuk Dr Abdul Razak Mohd. Ali
PJN, DIMP, JMN, FMIC
(Sehingga/until 25 April 2008)

Dato' Dr Abd. Latif Mohmod
DIMP, JSM, KMN, AMN
(Dari/from 26 April 2008)



Dari kiri ke kanan / From left to right

Prof. Dato' Dr. Mohamed Isa Abd. Majid, Dato' Seri Azahar Muda, Dato' Noordin Sulaiman, Dr. Chan Heun Yin, YB Dato' Dr. James Dawos Mamit, Datuk Suboh Mohd Yassin (Pengerusi / *Chairman*), Dato' Dr. Abd. Latif Mohmod, Dato' Sheikh Othman Sheikh Abdul Rahman, Tn. Haji Ir. Wahid Jafer, En. Zuraiddi Husain, En. Azhar Noraini, Y.Bhg. Dato' Mohd Nazuri Hashim Shah & En. Mohd Daud Tampokong

Tiada dalam gambar / Not in picture

Y.Bhg. Datu Hj. Len Talif Salleh, En. Ng Kay Yip & En. Abdul Ghani Salleh

Lokasi / Location: *Taman Etnobotani*

Jawatankuasa Kewangan dan Perjawatan (JKKP) sehingga 30 September 2009

Finance and Establishment Committee until 30 September 2009



PENGERUSI CHAIRMAN

Datuk Suboh Mohd. Yassin
PJN, DPSJ, KMN, PIS

AHLI DAN AHLI SILIH GANTI MEMBERS AND ALTERNATE MEMBERS

Kementerian Sumber Asli dan Alam Sekitar Malaysia
Ministry of Natural Resources and Environment Malaysia

En. Letchumanan Ramatha
(Hingga/Until 31 Ogos 2008)

En. Azhar Noraini
(Dari/From 1 September 2008)

En. Chin Shih Loon
(Siliah Ganti/Alternate Member)
(Hingga/Until 31 Ogos 2008)

Kementerian Kewangan Malaysia
Ministry of Finance Malaysia

En. Zuraidi Husain
(Dari/From 1 Julai 2008)

Pn Adena Ahmad
(Siliah Ganti/Alternate Member)
(Dari/From 1 Julai 2008)

En. Azlan Abdul Rashid
(Siliah Ganti/Alternate Member)
(Hingga/Until 30 Jun 2008)

Jabatan Perhutanan Semenanjung Malaysia
Forestry Department of Peninsular Malaysia

Dato' Seri Azahar Muda
SPMP, DPMP, PMP, BSK, AMN, AMP

Dato' Dahlan Taha
DPSK, BSK
(Siliah Ganti/Alternate Member)
(Hingga/Until 30 Jun 2008)

AHLI DAN AHLI SILIH GANTI MEMBERS AND ALTERNATE MEMBERS

Lembaga Getah Malaysia
Malaysian Rubber Board

Dr Chan Heun Yin, JSM

Persatuan Industri Kayu-Kayan Malaysia
Malaysian Wood Industries Association

En. Ng Kay Yip

En. Pon Chia Hwee
(Siliah Ganti/Alternate Member)

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

Datuk Dr Abdul Razak Mohd. Ali
PJN, DIMP, JMN, FMIC
(Hingga/Until 25 April 2008)

Dato' Dr Abd. Latif Mohmod
DIMP, JSM, KMN, AMN
(Dari/From 26 April 2008)

Jawatankuasa Audit sehingga 30 September 2009 **Audit Committee** until 30 September 2009

Pengerusi **Chairman**

Kementerian Sumber Asli dan Alam Sekitar Malaysia
Ministry of Natural Resources and Environment Malaysia

En. Letchumanan Ramatha
(Hingga/Until 31 Ogos 2008)

En. Azhar Noraini
(Dari/From 1 September 2008)

En. Chin Shih Loon
(Silih Ganti/Alternate Member)
(Hingga/Until 31 Ogos 2008)

AHLI DAN AHLI SILIH GANTI **MEMBERS AND ALTERNATE MEMBERS**

Kementerian Kewangan Malaysia
Ministry of Finance Malaysia

En. Zuraidi Husain
(Dari/From 1 Julai 2008)

Pn Adena Ahmad
(Silih Ganti/Alternate Member)
(Dari/From 1 Julai 2008)

En. Azlan Abdul Rashid
(Silih Ganti/Alternate Member)
(Hingga/Until 30 Jun 2008)

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industry Board

Dato' Mohd. Nazuri Hashim Shah
DSNS, JSM, DSM, AMN, BSK, PMC

Tuan Hj. Osman Hj. Kassim
(Silih Ganti/Alternate Member)

AHLI DAN AHLI SILIH GANTI **MEMBERS AND ALTERNATE MEMBERS**

Persatuan Pekilang Panel Malaysia
Malaysian Panel-Products Manufacturer's Association

Dato' Sheikh Othman Sheikh Abdul Rahman
DIMP, JP

En. Chong Kian Kee
(Silih Ganti/Alternate Member)

Pejabat Pembangunan Negeri Selangor
Selangor State Development Office

En. Abdul Ghani Salleh
SMS, AMS, PPT



**Institut Penyelidikan
Perhutanan Malaysia**

*Forest Research
Institute Malaysia*

Laporan Ketua Pengarah Director General's Report

Saya ingin mengambil kesempatan ini untuk merakamkan ucapan setinggi-tinggi terima kasih kepada Datuk Dr Abdul Razak Mohd. Ali yang telah berkhidmat selaku Ketua Pengarah FRIM sejak bulan Disember 1995. Bersempena dengan persaraan beliau, sebuah denai alam sepanjang 400 m yang dinamakan "Razak Walk" telah dirasmikan pada 14 Januari di Taman Botani Kepong. Tumbuh-tumbuhan yang terdapat di denai itu adalah dari pelbagai habitat yang berbeza, termasuklah satu spesies baharu, durian Razak (*Durio razakii*). Durian ini dinamakan sempena nama mantan Ketua Pengarah FRIM yang telah menunjukkan daya kepimpinan yang tinggi, tunjuk ajar serta dorongan ke arah membangunkan FRIM selaku sebuah pusat kecemerlangan penyelidikan dalam bidang biodiversiti dan pemuliharaan sumber tumbuh-tumbuhan hutan di Malaysia serta negara-negara jiran serantau.

Pada tahun 2008, beberapa orang pegawai FRIM telah dianugerahi pingat kebesaran. Dato' Dr Abdul Rashid Ab. Malik (Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)) dianugerahi Darjah Indera Mahkota Pahang (DIMP), Pn Wan Rahmah Wan A. Raof (Kesatria Mangku Negara, KMN), Dr Woon Weng Chuen dan Dr Ahmad Zuhaidi Yahya (Ahli Mangku Negara, AMN), Dr Ab. Rasip Ab. Ghani (Ahli Mahkota Perak, AMP), dan En. Khairuddin Kamaruddin (Pingat Pekerti Terpilih, PPT).

Pegawai-pegawai FRIM terus memenangi pelbagai anugerah saintifik baik di peringkat kebangsaan mahupun antarabangsa. Kesemua penyertaan FRIM, terdiri daripada satu produk dan tujuh inovasi yang menyertai Ekspo Sains, Teknologi dan Inovasi, yang berlangsung di Kuala Lumpur dari 9–11 Mei berjaya merangkul anugerah. Pingat emas produk inovatif dirangkul oleh JOYSTYN (*Mangosteen Whole Fruit Antioxidant Juice Standardized Extract and Products*), dan POPS Lumber™ (*Parallel Oil Palm Veneer Lumber*). Tiga inovasi memenangi pingat perak dan tiga reka cipta memenangi pingat gangsa pada ekspo tersebut. POPS Lumber™ turut memenangi anugerah emas di Pertandingan Inovasi dan Reka Cipta di Geneva, yang berlangsung dari 2–6 April. Kumpulan Dr Wan Tarmeze Wan Ariffin, En. Khairul Awang, Dr Marzalina Mansor, En. Abd. Hamid Salleh dan En. Abdul Rahim Ahmad, turut memenangi Anugerah Penghargaan Juri dan Pereka Cipta WIPO terbaik pada pertandingan ini. Sempena Ekspo Teknologi Malaysia (MTE) yang diadakan dari 21–23 Februari, POPS Lumber™ dan *Natural Herbal-Hased Essential Oil Product with Potential Adulticidal Effects* telah dianugerahi pingat perak.



*I would like to take this opportunity to thank my predecessor, Datuk Dr Abdul Razak Mohd. Ali, who served as Director General of FRIM since December 1995. To honour his official retirement, a paved understorey plant display trail (400 m long) called Razak Walk was launched on 14 January at the Kepong Botanic Garden. The plants showcased there were collected from many different habitats including a new species, Razak's durian (*Durio razakii*). It was named after him to honour his leadership, guidance and encouragement in developing FRIM as a centre of excellence for studies in biodiversity and conservation of forest plant resources in Malaysia and its neighbouring regions.*

In 2008, several FRIM officers were conferred honorary awards. Dato' Dr Abdul Rashid Ab. Malik (Deputy Director General FRIM (Research and Development)) was conferred Darjah Indera Mahkota Pahang (DIMP), Pn Wan Rahmah Wan A. Raof (Kesatria Mangku Negara, KMN), Dr Woon Weng Chuen and Dr Ahmad Zuhaidi Yahya (Ahli Mangku Negara, AMN), Dr Ab. Rasip Ab. Ghani (Ahli Mahkota Perak, AMP), and Mr Khairuddin Kamaruddin (Pingat Pekerti Terpilih, PPT).

*FRIM officers continued to receive national and international scientific awards during the year. One product and seven innovations submitted by FRIM won awards during the Science, Technology and Innovation Exposition (ITEX) held in Kuala Lumpur from 9–11 May. The gold innovative product medal went to JOYSTYN (*Mangosteen Whole Fruit Antioxidant Juice Standardized Extract & Products*), and POPS Lumber™ (*Parallel Oil Palm Veneer Lumber*). Three innovations won silver medals and three other inventions won the bronze ITEX awards. The POPS Lumber™ also won a gold award at the International Invention*

Sementara itu, sembilan belas pendedahan reka cipta untuk pemfailan paten dan dua harta intelek telah diperoleh pada 2008.

Pada Ekspo Produk Semula Jadi Asia Pasifik (NATPRO) yang diadakan di Kuala Lumpur pada 27–29 Mac, gerai pameran FRIM berjaya membolot anugerah emas bagi kategori sektor awam. Gerai pameran FRIM juga memenangi anugerah merit sempena Festival Taman dan Landskap Antarabangsa Malaysia (LAMAN) yang berlangsung dari 19–27 Julai.

Makmal Genetik dan Makmal Kultur Tisu pula diiktiraf berstatus BioNexus. Kini FRIM adalah antara anggota program BioNexus Partners di bawah Malaysia BiotechCorp. Menyedari keperluan untuk menjalin kerjasama dengan sektor perhutanan dan keluaran hutan serta menjayakan komersialisasi produk penyelidikan yang berpotensi, FRIM telah menandatangani sebanyak 11 memorandum persefahaman dan 14 perjanjian dengan pelbagai institusi penyelidikan, agensi kerajaan dan syarikat swasta di dalam dan di luar negara. Antaranya ialah Singapore Botanic Garden; Malaysian Nature Society & Shell Malaysia Bhd; Malaysian Technology Development Corporation Sdn Bhd; Malaysian Biotechnology Corporation Sdn Bhd; Nimura Genetics Solutions (M) Sdn Bhd; Kementerian Kemajuan Luar Bandar dan Wilayah; Japan International Research Center for Agricultural Sciences (JIRCAS); dan Lembaga Kemajuan Pertanian Muda (MADA). FRIM menjalankan 34 khidmat perundingan yang bernilai RM1.2 juta, dengan sektor swasta sebagai pelanggan utama.

Bagi memastikan peningkatan keupayaan yang berterusan, para pegawai FRIM sentiasa diberi galakan untuk melanjutkan pengajian lepas ijazah baik di universiti tempatan mahupun di luar negara. Tiga orang kakitangan FRIM berjaya menamatkan pengajian di peringkat ijazah kedoktoran pada tahun 2008 iaitu Dr Ho Wai Mun (Seoul National University), Dr Mohd Khairun Anwar Uyup (UPM) dan Dr Vimala Subramaniam (UM). En. Mohd. Zamshari Abd. Rahman menamatkan Ijazah Sarjana Pengurusan Perniagaan (MBA) di UIAM.

Hari Anugerah FRIM telah diadakan buat julung-julung kalinya di Taman Botani Kepong pada 23 Oktober. Antara acara penting termasuklah penyampaian Anugerah Ketua Pengarah serta Anugerah Saintis Terbaik, Anugerah Pekerja Terbaik, Anugerah Khidmat Cemerlang (Individu dan Kumpulan), Anugerah Khidmat Setia, Anugerah Penerbitan Terbaik, Anugerah Khidmat Masyarakat, Anugerah Saintis Terbaik dan Anugerah Tesis Terbaik.

and Innovation Competition in Geneva, held from 2–6 April. Dr Wan Tarmeze Wan Ariffin, Mr Khairul Awang, Dr Marzalina Mansor, Mr Abd. Hamid Salleh and Mr Abdul Rahim Ahmad as a group won the Juror's Congratulation and the WIPO Best Inventor at this competition. At the Malaysia Technology Expo (MTE) held from 21–23 February, POPS Lumber™ and a natural herbal-based essential oil product with potential adulticidal effects were awarded silver medals. Nineteen invention disclosures for patent registration and two intellectual property creations were obtained in 2008.

At the Asia Pacific Natural Products Expo (NATPRO) held in Kuala Lumpur from 27–29 March, FRIM exhibition booth received the gold award for the Public Sector Category. FRIM exhibition booth also won the merit award at the Malaysia International Landscape and Garden Festival (LAMAN), held from 19–27 July.

The Genetic and Tissue Culture Laboratories were accredited BioNexus Laboratory Status, and currently FRIM is a member of the BioNexus Partners (BNP) programme initiated by the Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp). Recognizing the need to work closely with the forestry and forest products sectors, as well as to assist commercialization of our potential research products, FRIM signed a total of 11 MoU and 14 Agreements with various national and international research institutes, government agencies, and companies in 2008. To name a few: Singapore Botanic Gardens; Malaysian Nature Society & Shell Malaysia Bhd; Malaysian Technology Development Corporation Sdn Bhd.; Malaysian Biotechnology Corporation Sdn Bhd; Nimura Genetics Solutions (M) Sdn Bhd; Kementerian Kemajuan Luar Bandar dan Wilayah; Japan International Research Center for Agricultural Sciences (JIRCAS); and Muda Agricultural Development Authority (MADA). FRIM conducted 34 consultancies worth RM1.2 million, with the private sector being her major client.

In ensuring continuous capacity development, researchers and administrative staff are encouraged to pursue their academic degrees either locally or overseas. Three FRIM officers completed their Ph.D. degrees in 2008: Dr Ho Wai Mun (Seoul National University), Dr Mohd Khairun Anwar Uyup (UPM) and Dr Vimala Subramaniam (UM). Mr Mohd. Zamshari Abd. Rahman completed his MBA degree at UIAM.

The FRIM Awards Day was held at the Kepong Botanic Garden for the first time on 23 October. Events that followed included the presentation of the FRIM Director General's award and other awards which included best employee, excellent service (individual and group), long service, outstanding publication, community service, best research scientist and best thesis for the year.

Pada tahun 2008 FRIM telah menganjurkan pelbagai aktiviti pemindahan teknologi dan maklumat penyelidikan termasuklah seminar, kursus dan bengkel kepada pihak-pihak yang berkepentingan. Antaranya ialah Seminar Rotan dan Buluh dari 25–26 Mac dan Seminar Tumbuhan Ubatan dan Beraroma dari 21–22 Oktober. Seminar Rotan dan Buluh dianjurkan dengan kerjasama Kementerian Sumber Asli dan Alam Sekitar (NRE) dan *Asia Pacific Association of Forestry Research Institutions* (APAFRI). Seminar telah dirasmikan oleh Y. B. Datuk Douglas Uggah Embas, yang merupakan tugas rasmi pertama beliau selaku Menteri NRE.

Pemindahan teknologi terus diberi keutamaan. Forum Pemindahan Teknologi yang julung-julung kali dianjurkan oleh FRIM dari 25–26 November telah dirasmikan oleh Datuk Suboh Mohd. Yassin, Ketua Setiausaha NRE. Forum selama dua hari ini menjadi landasan kepada saintis FRIM untuk bertemu dan berinteraksi dengan pihak-pihak yang berkepentingan. Forum ini telah disertai oleh 211 pihak yang berkepentingan dari 151 agensi kerajaan dan syarikat swasta. Sempena forum tersebut, para penyelidik FRIM telah membentangkan lebih daripada 15 projek dengan penemuan-penemuan penyelidikan yang berpotensi untuk dikomersialkan. Antaranya ialah projek sumber bioteknologi, gentian asli, bioasai, rumusan produk dan kawalseliaan mutu, teknologi pengekstrakan, bahan-bahan termaju, perhutanan dan hasil hutan serta landskap dan perhutanan bandar. Di samping itu, dialog, sesi bertemu pelanggan dan pameran yang menonjolkan aktiviti-aktiviti R&D turut diadakan.

Sementara itu, FRIM juga turut menganjurkan program-program yang dapat meningkatkan kesedaran awam. Antaranya ialah program untuk kanak-kanak sekolah, iaitu "Jom Jaga Alam" yang diadakan sempena sambutan Hari Perhutanan Sedunia pada 22 Mac; hari bebas nikotin pada hari Khamis pertama setiap bulan sempena sambutan Hari Kemerdekaan pada 22 Ogos; dan empat program kesihatan sempena Bulan Pemakanan Malaysia dari 16–29 April. FRIM turut terlibat dalam Projek Pengetahuan Tradisi di bawah RMK-9 dengan menyediakan pangkalan data digital tentang pengetahuan tradisi Orang Asli yang berkaitan dengan tumbuhan ubatan dan beraroma. Projek ini membuka lembaran baharu dalam sejarah Malaysia yang menggunakan ilmu pengetahuan tradisi Orang Asli untuk penggunaan tumbuhan ubatan dan beraroma secara lestari.

Penyelidik FRIM telah menerbitkan sejumlah 226 penerbitan manakala 25 judul diterbitkan oleh FRIM, sementara enam judul buku terlaris telah diulang cetak. Antara judul yang diterbitkan oleh FRIM ialah *Malaysian Herbal Monograph Volume 2* dan *Natural History Museum*

FRIM organized 38 events, consisting of seminars, courses and workshops, as means of transferring information and technology to her stakeholders. Of her 38 events, the more significant were the Rattan and Bamboo Seminar, held from 25–26 March, and the Medicinal and Aromatic Plants Seminar, held from 21–22 October. The Rattan and Bamboo Seminar was jointly organized with the Ministry of Natural Resources and Environment (NRE) and the Asia Pacific Association of Forestry Research Institutions (APAFRI). It was officiated by Y. B. Datuk Douglas Uggah Embas, which marked his first official duty as the Minister of NRE.

Technology transfer continues to be an important focus of the institute. Organized by FRIM and officiated by Datuk Suboh Mohd. Yassin, Secretary General of the Ministry of NRE, the first Technology Transfer Forum was held from 25–26 November. This two-day forum served as a platform for FRIM scientists to meet and interact with her stakeholders and was attended by 211 representatives from 151 private and government agencies and institutions. At the forum, more than 15 projects covering a wide spectrum of findings with potential for commercialization were presented by FRIM researchers. The projects included bioresources, natural fibres, bioassays, product formulation and quality control, extraction technology, advanced materials, forestry and forest products as well as landscape and urban forestry. Dialogue, 'clinic sessions' and an exhibition highlighting FRIM R&D activities were also held throughout the two-day forum.

FRIM events for the year also covered promotional programmes related to public awareness. Among the awareness events meant for the public, including school children, were "Jom Jaga Alam", conducted in conjunction with the World Forestry Day on 22 March; "Nicotine-free on the first Thursday of each month", launched in conjunction with the National Day celebration on 22 August; and four health programmes, conducted in conjunction with the Nutrition Month Malaysia between 16 and 29 April. FRIM is also involved in the Traditional Knowledge Project under the Ninth Malaysia Plan to establish a digital database on traditional knowledge related to medicinal and aromatic plants of the indigenous people. This project opens a new chapter in Malaysian history where indigenous people will be consulted to tap on their traditional knowledge on medicinal and aromatic plants for sustainable utilization.

*There were a total of 226 publications of which 25 were published titles by FRIM, while six book titles were reprinted due to popular demand. Among the titles of publication are *Malaysian Herbal Monograph Volume 2* and *Natural History Museum Malaysia—Planning and Development*. Another noteworthy achievement was the increased impact factor of the FRIM Journal of Tropical Forest Science (JTFS) from 0.167 to 0.287. FRIM secured*

Malaysia-Planning and Development. Selain itu, FRIM sungguh berbangga dengan faktor impak bagi jurnal terbitan FRIM, *Journal of Tropical Forest Science* (JTFS) telah meningkat daripada 0.167 kepada 0.287. FRIM berjaya memperoleh dana penyelidikan berjumlah RM10.8 juta bagi lapan projek penyelidikan dari Kementerian Sains, Teknologi dan Inovasi (MOSTI), Tabung Pembangunan Industri Kayu-Kayan Malaysia (TPIKM), Petroliaam Nasional (PETRONAS), *International Tropical Timber Organization* (ITTO) dan *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES).

Kerajaan Negeri Selangor yang menyedari akan nilai sejarah serta keunikan lokasi FRIM telah bersetuju dengan hasrat untuk menjadikan FRIM sebagai sebuah Warisan Kebangsaan di bawah Akta Warisan Kebangsaan 2005. Dengan usaha ke arah pengisytiharan tersebut, FRIM akan terus meningkatkan reputasi dan sumbangannya sebagai sebuah warisan negara yang penting.

Sebagai sebuah institusi penyelidikan dan pembangunan awam, kita perlulah terus melangkah ke arah merealisasikan mandat yang diberikan. Kita mestilah berbangga dengan FRIM, dan berbangga menjadi warga kerja FRIM. Kita mempunyai tanggungjawab secara kolektif untuk menjayakan mandat tersebut. Kita perlu bersedia untuk mendengar dan menerima apa jua kritikan, jika kita ingin terus maju. Tiada sesiapa pun yang akan berjaya tanpa menghadapi cabaran atau menempuh kegagalan. Kita mungkin gagal pada hari ini, tapi akan mencapai kejayaan pada masa akan datang. Terlalu banyak puji-pujian boleh menyebabkan kita diulit keselesaan dan ini boleh menyekat kemajuan. Kita hendaklah menumpukan sepenuh perhatian ketika menjalankan tugas bagi membolehkan kita menggapai kecemerlangan. Kita hendaklah juga mengamalkan sikap "Cepat dan Tepat". Justeru, carilah jalan yang membolehkan kita bekerja dengan cepat dan berkesan kerana permintaan dan harapan sentiasa berubah. Warga FRIM seharusnya sentiasa bersedia untuk memajukan diri dan meningkatkan budaya kerja yang tidak membazirkan masa.

Kesimpulannya, saya ingin menyatakan bahawa tahun 2008, seperti tahun-tahun terdahulu, merupakan tahun kecemerlangan FRIM. Bagi mengekalkan statusnya sebagai sebuah pusat kecemerlangan dalam penyelidikan perhutanan tropika, FRIM perlu terus maju dan cemerlang pada tahun 2009 dan seterusnya. Semangat berkerja bersama-sama akan membantu kita untuk mencapai prestasi yang lebih memberangsangkan.

a total funding of RM10.8 million for eight projects from the Ministry of Science, Technology and Innovation (MOSTI), Tabung Pembangunan Industri Kayu-Kayan Malaysia (TPIKM), Petroliaam Nasional (PETRONAS), the International Tropical Timber Organization (ITTO) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

In realizing the historical significance and unique location of FRIM campus, the Selangor State Government in November 2008 has agreed to the designation and registration of FRIM as a National Heritage under the National Heritage Act 2005. With such an effort, FRIM can enhance her reputation and contributions as a significant national heritage and as a renowned R&D institution.

As one of the government R&D institutions, we must strive to realize the mandate entrusted to us, to develop and enhance forestry practices and to support forest industries through technologies and processes which ensure sustainable use of forest resources for the well-being of current and future generations. We must be proud of FRIM, and as FRIM staff together we have a collective responsibility to achieve our objectives. We need to adopt an "efficient and precise" working attitude. We need to think of ways to perform our tasks quickly and efficiently in response to the changing demands and expectations. As such, FRIM staff should always be prepared to go the extra mile and improve our work culture without wasting too much time.

To conclude, I wish to state that 2008 has been another great year for all at FRIM. To maintain its status as a centre of excellence for tropical forestry research, it is crucial that FRIM continues to grow and excel in 2009 and beyond. The spirit of working together will enable us to achieve a higher level of performance.



DATU' DR ABD. LATIF MOHMOD
(DIMP, JSM, KMN, AMN)
KETUA PENGARAH
DIRECTOR GENERAL
FRIM

PENGURUSAN TERTINGGI SENIOR MANAGEMENT

Pengerusi Chairman

Datuk Dr Abdul Razak Mohd. Ali
PJN, DIMP, JMN, FMIC
Ketua Pengarah/Director General
(Hingga/Until 25 April 2008)

Dato' Dr Abd. Latif Mohmod
DIMP, JSM, KMN, AMN
Ketua Pengarah/Director General
(Dari/From 26 April 2008)

AHLI / MEMBERS

Dato' Dr Abdul Rashid Hj. Ab. Malik, DIMP
Timbalan Ketua Pengarah
(Penyelidikan dan Pembangunan)
Deputy Director General (Research and Development)

Dr Abdul Rahim Nik, KMN, AMN
Timbalan Ketua Pengarah (Operasi)
Deputy Director General (Operations)

Dr Mohd. Nor Mohd. Yusoff, KMN
Pengarah Bahagian Keluaran Hutan
Director Forest Products Division

Dr Marzalina Mansor
Pengarah Bahagian Bioteknologi Hutan
Director Forest Biotechnology Division

Dr Shamsudin Ibrahim, AMN
Pengarah Bahagian Perhutanan
Director Forestry Division

Pn Wan Rahmah Wan A. Raof, KMN
Pengarah Bahagian Pengurusan Sumber Manusia
Director Human Resource Management Division

Dr Norini Haron, AMN
Pengarah Bahagian Pengurusan Penyelidikan dan Ekonomi
Director Research Management and Economic Division

En. Mohd. Zamshari Abd. Rahman
Pengarah Bahagian Kewangan, Perniagaan dan
Teknologi Maklumat
Director Finance, Business and Information Technology
Division

En. Mohd Dzaki Jusoh
Pengarah Bahagian Pentadbiran dan Penyelenggaraan
Director Administration and Maintenance Division

AHLI JEMPUTAN / INVITED MEMBERS

Pn Norhayati Nordin
Ketua Unit Komunikasi Korporat
Head Corporate Communication Unit

Cik Nor Azura Ahmad Murad
Pegawai Undang-Undang
Legal Officer

PENGARAH PROGRAM PROGRAMME DIRECTORS

Dr Saw Leng Guan
Pengarah Program Pusat Biodiversiti Hutan Tropika
Director Tropical Forest Biodiversity Centre Programme

Dr Rahim Sudin, AMN, DSM
Pengarah Program Kimia dan Perlindungan Kayu
Director Wood Chemistry and Protection Programme

Dr Rasadah Mat Ali, AMP
Pengarah Program Tumbuhan Ubatan
Director Medicinal Plants Programme

Dr Noor Azlin Yahya
Pengarah Program Ekopelancongan dan Hutan Bandar
Director Ecotourism and Urban Forestry Programme

Dr Tan Yu Eng
Pengarah Program Pemprosesan dan Teknologi Kayu
Director Wood Processing and Technology Programme

Dr Ismail Harun
Pengarah Program Hutan Asli
Director Natural Forest Programme

Dr Ahmad Zuhaidi Yahya, AMN
Pengarah Program Hutan Ladang
Director Forest Plantations Programme

Dr Norwati Muhammad
Pengarah Program Bioteknologi dan Farmaseutikal
Director Biotechnology and Pharmaceutical Programme



Dari kiri ke kanan / From left to right

Dr Abdul Rahim Nik, Dato' Dr Abd. Latif Mohmod, Dato' Dr Abdul Rashid Ab. Malik



Duduk dari kiri ke kanan/Seated from left to right:

Dr Mohd. Nor Mohd. Yusoff, Dr Baskaran Krishnapillay, Dr Shamsudin Ibrahim, Dr Abdul Rahim Nik, Pn Wan Rahmah Wan A.Raof, Dr Marzalina Mansor, Dr Rahim Sudin

Berdiri dari kiri ke kanan/Standing from left to right:

Dr Ahmad Zuhaidi Yahya, Dr Nor Azlin Yahya, Dr Rasadah Mat Ali, Dato' Dr Abd. Latif Mohmod, Datuk Dr Abdul Razak Mohd. Ali, Dato' Dr Abdul Rashid Ab. Malik, Dr Tan Yu Eng, En. Mohd. Zamshari Abdul Rahman, Dr Norini Haron

Tiada dalam gambar/Not in picture:

Puan Norhayati Nordin, Cik Nor Azura Ahmad Murad

VISI / VISION

Menjadikan FRIM sebuah institusi penyelidikan hutan tropika yang bertaraf dunia

To make FRIM a world-class tropical forest research institute

MISI / MISSION

Mencapai kecemerlangan dalam penyelidikan saintifik, pembangunan dan perkhidmatan sektor perhutanan

To achieve excellence in scientific research, development and forestry services

OBJEKTIF / OBJECTIVES

Objektif umum FRIM adalah untuk:

- Menjana pengetahuan saintifik bagi pemahaman, pengurusan dan penggunaan sumber hutan
- Mencapai kecemerlangan dalam penyelidikan dan pembangunan dengan penggunaan alat saintifik terkini
- Mengkaji kepelbagaian biologi bagi menghasilkan produk berguna melalui penyelidikan dan pembangunan yang intensif
- Memajukan teknologi berkaitan bagi memenuhi keperluan industri perhutanan
- Mempakejkan hasil penyelidikan dan pembangunan untuk disebar kepada pelanggan
- Mengkomersialkan hasil penyelidikan dan pembangunan melalui pemindahan teknologi kepada pihak yang berminat
- Menyediakan perkhidmatan cemerlang untuk memenuhi kepuasan pelanggan
- Mewujudkan kerjasama strategik dengan agensi tempatan dan antarabangsa
- Meningkatkan kesedaran awam terhadap kepentingan alam sekitar dan pemuliharaan kepelbagaian biologi hutan

General objectives of FRIM are to:

- *Generate scientific knowledge for the understanding, management, conservation and use of forest resources*
- *Achieve excellence in research and development through the use of the latest scientific equipment*
- *Study biodiversity to produce useful products through intensive research and development*
- *Develop related technology to fulfill the needs of the forestry industry*
- *Package research and development findings for dissemination to clients*
- *Commercialize research and development findings through technology transfer to all interested parties*
- *Provide excellent service to fulfill client needs*
- *Create strategic cooperation with local and international agencies*
- *Raise public awareness regarding the importance of the environment and the conservation of forest biodiversity*



OBJEKTIF / OBJECTIVES

Objektif operasi FRIM adalah untuk:

- Menyediakan program pembangunan sumber manusia bagi melahirkan golongan saintis yang berwibawa dan kompeten
- Menyediakan suasana kerja yang kondusif bagi menggalakkan cetusan idea di kalangan saintis dan perhubungan lebih rapat dengan pelanggan
- Menyebarkan hasil teknologi, penyelidikan serta memberi perkhidmatan nasihat dan teknikal yang tepat dan profesional
- Menyediakan penyelesaian praktikal kepada masalah berkaitan pengurusan dan penggunaan sumber dan hasil hutan
- Menyediakan kemudahan dan memberi perkhidmatan profesional dalam meningkatkan kesedaran awam terhadap alam sekitar

Operational objectives of FRIM are to:

- *Provide human resource development programmes to produce a class of authoritative and competent scientists*
- *Provide a work environment that is conducive to encourage creative thinking among scientists and a close relationship with clients*
- *Disseminate the technological and research products as well as giving accurate and professional advice and technical services*
- *Provide practical solutions to problems involving management and usage of forest resources and products*
- *Provide facilities and professional services in order to raise environmental awareness.*

FUNGSI / FUNCTIONS

Fungsi utama FRIM adalah untuk:

- Merancang dan melaksanakan penyelidikan bagi pembangunan sektor perhutanan dan pemuliharaan sumber hutan
- Memperoleh dan menyebarkan maklumat hasil penyelidikan bagi meningkatkan pengurusan hutan dan penggunaan hasil hutan
- Mengadakan hubungan kerjasama penyelidikan dan pembangunan perhutanan dengan badan-badan dalam dan luar malaysia

The main functions of FRIM are to:

- *Plan and implement research for the development of the forestry sector and conservation of forest resources*
- *Obtain and disseminate research information to enhance forest management and the use of forest products*
- *Establish joint research and joint forest development with other bodies within and outside Malaysia*

PIAGAM PELANGGAN / CLIENTS' CHARTER

Kami berjanji untuk berusaha membangun dan menggalakkan penggunaan sumber dan hasil hutan secara berkekalan melalui penyelidikan, pembangunan dan penggunaannya. Bagi tujuan ini, kami memberi jaminan seperti berikut:-

- Memastikan penyelidikan yang dilaksanakan adalah relevan dan memberi impak kepada industri perhutanan dan yang berkaitan serta menjurus kepada penjana pengetahuan, pembangunan proses, teknologi dan produk baharu berpandukan kehendak pasaran
- Memastikan semua hasil penyelidikan mengandungi maklumat yang tepat dan disebar secara berkesan melalui penerbitan, seminar, dialog dan media
- Mengkomersial penemuan baharu melalui pemindahan teknologi dan kerjasama dengan industri

We pledge to develop and enhance the utilization of forest resources and products on a sustainable basis through research, development and application. For this purpose, we ensure that:

- *The implementation of research is relevant to give impact to the forest and any related industries in knowledge generation, process development, technology and new products based on market needs*
- *All research results comprise precise information and are disseminated effectively through publications, conferences, dialogues and the media*
- *New findings are commercialized through technology transfer and collaboration with the industries*

DASAR KUALITI / QUALITY POLICY

FRIM komited dalam menyediakan perkhidmatan penyelidikan dan perkhidmatan sokongan dengan cekap dan berkesan bagi memenuhi keperluan pelanggannya. Ini dilaksanakan berasaskan Piawaian MS ISO 9001:2000. FRIM akan melaksanakan penambahbaikan berterusan bagi meningkatkan keberkesanan sistem berkaitan.

FRIM is committed to providing effective research and related supporting services to fulfill her clients' needs. This is carried out in accordance with MS ISO 9001:2000 Standards. FRIM will carry out continuous improvements to enhance the effectiveness of related systems.

SLOGAN KUALITI / QUALITY SLOGAN

“Kualiti teras kecemerlangan, Inovasi kunci keunggulan”

“Quality is the pillar for excellence, Innovation is the key to preeminence”



Carta Organisasi FRIM

FRIM Organizational Chart





Pejabat Ketua Pengarah

1. **Pn Amrah Toha**
Pembantu Tadbir (Kesetiausahaan) Gred N22
2. **Cik Zulifah Omar**
Pembantu Tadbir Rendah Gred N11
3. **Cik Noor Hafizan Mohd Sharif**
Pembantu Tadbir Rendah Gred N11

Sekretariat APAFRI

1. **Dr Sim Heok Choh**
Pegawai Penyelidik Gred Utama 'C' VU7 (K)
2. **Pn Nor Azni Jaafar**
Pembantu Tadbir Rendah Gred N14

Unit Audit Dalam
En. Mustapha Kamil Abdullah
Juruaudit Gred W44

Unit Komunikasi Korporat
Pn Norhayati Nordin
Pegawai Penyelidik Gred Q52

Unit Pengurusan
Jaminan Kualiti
Pn Salamah Selamat
Pegawai Penyelidik Gred Q54

Unit Undang-Undang
Cik Nor Azura Ahmad Murad
Pegawai Undang-Undang
Gred L41

Timbalan Ketua Pengarah

(Operasi)

Dr Abdul Rahim Nik
Pegawai Penyelidik Gred Utama 'B' VU6

Taman Botani Kepong
En. Adnan Mohammad
Pegawai Penyelidik Gred Q52

Pengarah Bahagian Pentadbiran
dan Penyelenggaraan
En. Mohd Dzaki Jusoh
Pegawai Tadbir Gred N54

Cawangan Pentadbiran
En. Mohd Zamri Zangi
Pegawai Tadbir Gred N41

Cawangan Penyelenggaraan
En. Jamal Razak
Pembantu Teknik Gred J38

Pengarah Bahagian Pengurusan
Sumber Manusia
Pn Wan Rahmah Wan A. Raof
Pegawai Penyelidik
Gred Khas 'C' VK7

Cawangan Perkhidmatan &
Perjawatan
En. Mohd Asmawee Ismail
Pegawai Tadbir Gred N41

Cawangan Kompetensi &
Peperiksaan
Pn Azuarni Abdul Adzis
Pegawai Tadbir Gred N41

Cawangan Latihan
Pn Liza Ismail
Pegawai Penyelidik Gred Q44

Cawangan Perkhidmatan
Korporat
Pn Norain Mohd. Arif
Pustakawan Gred S41

Pengarah Bahagian Kewangan,
Perniagaan dan Teknologi
Maklumat
En. Mohd Zamshari Abd Rahman
Akauntan Gred W54

Cawangan Kewangan & Akaun
En. Mohd. Redzuan Hassan
Akauntan Gred W52

Cawangan Perniagaan
En. Azman Hassan
Pegawai Penyelidik Gred Q52

Cawangan Teknologi Maklumat
En. Wan Zahiri Wan Yaacob
Pegawai Penyelidik Gred Q52

Aktiviti Utama R&D

R&D Highlights

R&D Hulan

Produk kesihatan, perabot kayu dan bakul rotan yang menarik, landskap yang memberangsangkan dan persekitaran yang segar adalah antara produk dan perkhidmatan alam sekitar yang dapat diperolehi dari khazanah hutan dan sumber asli kita. Menyedari bahawa sumber asli ini tidak akan kekal selamanya, FRIM sentiasa berusaha untuk menggalak dan membuat penambahbaikan amalan pengurusan sumber asli yang mampan melalui R&D. R&D hulan merupakan asas dan intipati kepada aplikasi penyelidikan dan pemprosesan produk. Justeru, FRIM terus memberi fokus pada R&D dalam aspek ini serta memenuhi keperluan pasaran terkini. Projek ini merangkumi penerokaan dan peningkatan pertumbuhan spesies-spesies tumbuhan yang penting, simulasi risiko hakisan tanah dan pertumbuhan pokok, penilaian kewangan sumber kayu-kayan serta pemuliharaan dan pengurusan kepelbagaian biologi dan sumber hutan yang mampan. Dua projek penting dalam R&D hulan peringkat nasional yang diterajui oleh FRIM diketengahkan di sini.

Projek Hutan Paya Gambut

Projek Hutan Paya Gambut (HPG) telah pun melalui peringkat Penilaian Terakhir dengan jayanya (Final Evaluation-FE), yang dikendalikan oleh beberapa jururunding bebas yang dilantik sendiri oleh UNDP-GEF pada bulan November. Dalam sesi penilaian yang telah diadakan pada 28 November di FRIM, didapati bahawa secara keseluruhannya pengurusan projek telah mencapai tahap yang memuaskan. Laporan awal FE antaranya telah memperakui bahawa pelbagai kejayaan telah dicapai dan beberapa perkara telah dapat dipelajari dalam mengendalikan projek. Laporan juga mengesyorkan beberapa perkara yang harus diambil tindakan oleh agensi-agensi pelaksana negeri dan wilayah bagi memastikan usaha-usaha pemuliharaan biodiversiti HPG terus dibuat secara lestari. Berikut adalah antara pencapaian yang telah dikenal pasti:

- Pelan pengurusan lapangan yang dirancang dengan baik: Pelan Pengurusan Bersepadu (IMPs) yang lebih menjurus kepada pengurusan di lapangan telah dihasilkan secara penyertaan ramai yang disertai oleh beberapa kumpulan teras terdiri daripada pihak-pihak yang berkepentingan, dan menggunakan pendekatan yang bersifat landskap. Pendekatan ini membolehkan setiap komponen ekologi, sosio-ekonomi, penggunaan ruangan dan sebagainya diambil kira. IMPs yang telah dihasilkan

Upstream R&D

Health-care products, exquisite wooden furniture, artistic rattan baskets, inspiring landscapes, and fresh atmosphere are some of the products and environmental services offered by our forests. Recognizing that these natural resources are not infinite, FRIM has always striven to promote and improve sustainable management practices of our natural resources through R&D. Upstream R&D is the foundation and essence of applied research and production processes. As such, FRIM continues to focus on R&D projects on these areas as well as those that meet current market demands. These projects cover areas of exploration and growth enhancement of important plant species, simulations for soil erosion risks and tree growth, financial evaluation of timber resources, as well as conservation and sustainable management of biodiversity and forest resources. The following paragraphs highlight two very significant on-going national projects spearheaded by FRIM in response to the needs of upstream R&D in the forestry sector.

Peat Swamp Forest Project

The Peat Swamp Forest (PSF) Project has successfully undergone its Final Evaluation (FE), conducted by three independent consultants appointed by the UNDP-GEF, in November 2008. At a meeting held at FRIM on 28 November, the FE team found that the overall management of the project has been satisfactory. The preliminary FE report acknowledged the Project's various achievements and highlighted some of the lessons learnt, as well as recommendations for follow-up by the federal and state implementing agencies for the sustainability of the PSF biodiversity conservation effort. The following are some of the recognized achievements:

- *Well-formulated site management plans: The site-specific Integrated Management Plans (IMPs) were developed in a participatory manner using core teams comprising the relevant stakeholders, using a landscape approach which ensured all relevant components (ecological, socio-economic, spatial, etc.) were considered. The IMPs are generally clear and sound, following a logical sequence and they provide substantial and relevant background information on the assets of and threats to the sites, as well as a range of concrete strategies and actions to address the threats.*
- *Data Collection and Monitoring Programme: The site-specific Ecological Monitoring System has been established for the Loagan Bunut National Park, Sarawak; Klias Forest Reserve, Sabah; and the South-East Pahang Peat Swamp Forest (SEPPSF), Pahang. The Multi-disciplinary Assessments and other additional surveys concluded the detailed monitoring programmes have been adequately documented in the respective IMPs.*

secara umumnya adalah terang dan jelas mengikut urutan yang bertepatan dan ia juga menyediakan maklumat-maklumat asas yang penting serta relevan terhadap sumber dan ancaman yang terdapat di lapangan. Pelan ini juga menyediakan beberapa strategi yang kukuh berserta tindakan yang perlu diambil terhadap semua ancaman yang dijangkakan.

- Pengumpulan Data dan Program Pemantauan: Sistem Pemantauan Ekologi (EMS) telah dibangunkan untuk Taman Negara Loagan Bunut, Sarawak; Hutan Simpan Klias, Sabah; dan Hutan Paya Gambut (HPG) Pahang Tenggara, Pahang. Penilaian Pelbagai Disiplin dan pengukuran-pengukuran tambahan yang lain telah diambil kira dan program-program pemantauan yang terperinci juga telah digariskan dan didokumentasi di dalam EMS tersebut.
- Jalinan antara agensi di peringkat negeri: Pasukan teras bagi pelan pengurusan yang terdiri daripada wakil-wakil dari pihak berkepentingan tertentu bagi pembangunan IMP tersebut telah ditubuhkan dengan jayanya. Negeri Sarawak dan Pahang telah pun menubuhkan Wetlands Management Committee (WMC), sementara bagi Negeri Sabah, WMC masih dalam proses penubuhan. Pendekatan yang diambil oleh Projek HPG untuk memperkukuh jalinan antara agensi telah mencapai kejayaan di samping terhasilnya beberapa faedah tambahan seperti pelaksanaan aktiviti pembangunan kapasiti.
- Peningkatan kesedaran kepada pihak berkepentingan terhadap pemeliharaan HPG: Pelbagai kempen kesedaran dan aktiviti berkaitan telah dikendalikan oleh Projek di peringkat negeri, negara dan antarabangsa. Di samping itu, Projek juga telah berjaya menghasilkan penerbitan-penerbitan yang berkaitan dengan HPG yang berkualiti.
- Menambah baik kapasiti dalam institusi dan sumber manusia: Penilaian terhadap keperluan latihan telah dijalankan di setiap negeri di peringkat awal Projek dan pelbagai latihan telah diberikan, yang mengutarakan pelbagai tema yang berkait langsung dengan kegunaan dan pemeliharaan HPG. Latihan-latihan juga dilaksanakan dalam beberapa peringkat yang menumpukan pada pihak-pihak berkepentingan, terdiri daripada jabatan-jabatan perhutanan, industri swasta dan juga masyarakat setempat.

Laporan Akhir Projek telah dicetak, antara lain menyenaraikan beberapa kesimpulan yang dapat dibuat daripada pelaksanaan Projek HPG tersebut selama tujuh tahun. Laporan ini akan diagihkan kepada semua Ahli Jawatankuasa Pemandu Negara dan juga agensi-agensi dalam negeri yang berkaitan.

- *Inter-agency networking at the state level: The establishment of the management plan core teams, comprising representatives from relevant stakeholders, for the development of the IMPs has been successful. Sarawak already has a State Wetlands Management Committee (WMC), the Pahang WMC has been established recently while the Sabah WMC is being set up. The Project's approach to enhancing inter-agency networking is considered successful, with additional benefits provided such as capacity-building activities.*
- *Enhanced stakeholder awareness of PSF conservation: A wide range of awareness raising campaigns and activities were conducted by the Project at the state, national and international levels. The Project yielded an impressive number of publications of good quality and sound layout.*
- *Enhanced institutional and human capacities: Training needs assessments were carried out in each state during the early stages of the Project and a wide range of training courses were given, addressing the various relevant themes directly related to PSF conservation and use. Training was also given at various levels, focusing on various stakeholder groups, ranging from forest departments, private industries, and local communities.*



Laporan Akhir Projek yang telah dicetak

The printed Project's Terminal Report

The major activities undertaken by the PSF Project in 2008 included:

- *The International Symposium on Peat Swamp Forests, themed "Towards Enhancement of Knowledge-based Decision-making in Conservation and Management of Natural Resources", 11–12 March in Kuala Lumpur. The aim was to facilitate information exchange and cross fertilization of ideas on multidisciplinary aspects of PSF and wetlands conservation and management; and to share project experience, lessons learnt and challenges in the PSF and wetland management in Malaysia and other similar areas. It was attended by 200 participants comprising local and foreign scientists, academicians, decision-makers, planners and representatives of key federal and state governments, NGOs, as well as the private sector particularly the oil palm plantation sector. A total of 24 papers were presented and of this, 14 papers were related to PSF Project findings and experience.*

Aktiviti-aktiviti utama yang dijalankan oleh Projek HPG dalam tahun 2008 termasuk:

- International Symposium on Peat Swamp Forests, bertemakan "Towards Enhancement of Knowledge-based Decision-making in Conservation and Management of Natural Resources", telah diadakan pada 11–12 Mac di Kuala Lumpur. Tujuan utama simposium dijalankan adalah bagi membolehkan pertukaran maklumat dan idea dalam pelbagai aspek melibatkan pengurusan dan pemuliharaan HPG dan juga hutan paya yang lain; dan untuk menggalakkan perkongsian pengalaman, pengajaran yang diperoleh, serta cabaran-cabaran dalam pengurusan HPG di Malaysia dan di kawasan-kawasan lain. Ia telah dihadiri oleh seramai 200 peserta dari golongan saintis tempatan dan luar negara, ahli-ahli akademik, pegawai-pegawai atasan, pegawai perancang, wakil-wakil daripada pihak kerajaan, badan-badan bukan kerajaan, dan juga dari sektor swasta khususnya dalam perusahaan kelapa sawit. Sejumlah 24 kertas kerja telah dibentangkan dan 14 daripadanya ialah hasil penemuan projek PSF ini sendiri.
- Program peringkat akhir Jelajah Rancangan Pengurusan Konsultatif dijalankan untuk membolehkan pengalaman dalam membangunkan IMP bagi negeri Pahang, Sabah dan Sarawak dikongsi bersama. Ia telah berlangsung pada 27 Mac di Johor Bahru, dan digerakkan dengan usaha sama Jabatan Perhutanan Semenanjung Malaysia (JPSM), Jabatan Perhutanan Negeri Pahang dan Johor. Sekitar 100 orang peserta dari jabatan-jabatan perhutanan Selangor, Johor, Negeri Sembilan dan Melaka telah menghadiri program yang dirasmikan oleh Ketua Pengarah JPSM, Dato' Seri Azahar Muda.
- Upacara Penyerahan Rasmi IMP bagi HPG Pahang Tenggara kepada Kerajaan Negeri Pahang telah berlangsung pada 4 Ogos, bersempena dengan pelancaran Ekspedisi Saintifik ke Cameron Highlands oleh Menteri Besar Pahang.
- Skim *Voluntary Carbon Offset* yang telah dimulakan oleh NRE dengan bantuan Projek HPG, dan melibatkan Sistem Penerbangan Malaysia (MAS), telah dibentangkan kepada WMC Pahang dalam mesyuarat pertamanya pada 23 September. Cadangan skim tersebut juga telah dibentangkan kepada Majlis Mesyuarat Kerajaan Negeri Pahang dalam bulan November dan mendapat sokongan serta persetujuan bahawa HPG Pahang Tenggara dijadikan sebagai kawasan kajian bagi skim tersebut.
- Projek HPG ini juga telah menerbitkan empat lagi penerbitan—Leaf Special Edition, July–December; Birds and Bats of Loagan Bunut National Park,

- *The final Roadshow on Consultative Management Planning to share the Project's experience in developing the IMPs for Pahang, Sabah and Sarawak was co-organised with the Forestry Department Peninsular Malaysia (JPSM) and Johor and Pahang Forestry Departments (FDs) in Johor Baru on 27 March. Some 100 participants from the forestry and other relevant departments of Selangor, Johor, Negeri Sembilan and Malacca attended the half-day programme officiated by the FDPM Director General Dato' Seri Azahar Muda.*
- *The Official Hand-over of the IMP of the SEPPSF to the Pahang State Government took place on 4 August, in conjunction with the launching of the Scientific Expedition to Cameron Highlands by the Pahang Chief Minister.*
- *The Voluntary Carbon Offset Scheme, initiated by the NRE Ministry with the help of the PSF Project, involving Malaysian Airlines (MAS), was presented to the Pahang WMC during its first meeting held on 23 September. The scheme was presented to the State Executive Council (Exco) in November for endorsement, and it was agreed that the SEPPSF would be the study site for the scheme.*
- *The PSF Project produced four more publications—Leaf Special Edition, July–December; Birds and Bats of Loagan Bunut National Park, Sarawak; Orchids of Peat Swamp Forests in Peninsular Malaysia.*

The PSF Project Support Unit office closed in December; and the various publications, reports and other information materials were sent to the FRIM library, with some to be placed in a PSF Reference Centre, being established by FRIM as recommended by the Project.

Successful Mangrove Planting for Coastal Rehabilitation Through Innovative Planting Techniques

*Following the probing phase of mangrove planting in Bukit Batu Puteh, Kuala Perlis, and Kg Pulau Sayak and Kg Sg. Yu, Kuala Muda, Kedah, in 2007, planting of mangrove seedlings in Sg. Hj. Dorani, Sg. Besar, Selangor, was initiated in 2008 to test the effectiveness of different planting techniques including the use of Geotube. Four techniques were engaged in planting approximately 3000 mangrove seedlings; Comp-pillow, Comp-mat, Bamboo Encasement Method (BEM) and conventional (control). Results so far demonstrate that *Rhizophora mucronata* (bakau kurap), *Rhizophora apiculata* (bakau minyak) and *Avicennia alba* (api-api) seedlings planted using Comp-pillow, Comp-mat and BEM give higher average rates of survival and tree height growth compared with those planted conventionally. Geotube fixtures to break strong waves and protect the seedlings also greatly reduced seedling mortality compared with the unprotected test plot in Kg Sg. Yu, Kuala Muda, Kedah in 2007 whereby all planted seedlings were destroyed by waves within a month. Although research is still in its early stage, the potential for innovative planting of mangrove species in coastal areas is already clearly demonstrated.*

Sarawak; Orchids of Peat Swamp Forests in Peninsular Malaysia; dan Pengusahasilan Berimpak Rendah untuk Hutan Paya Gambut Tropika, Pahang Tenggara, Malaysia.

Pejabat Unit Sokongan Projek HPG telah ditutup pada Disember, manakala kesemua penerbitan, laporan, dan maklumat serta bahan yang telah digunakan dalam Projek diserahkan kepada perpustakaan FRIM, dan selaras dengan saranan pengurusan Projek sebahagiannya ditempatkan di Pusat Rujukan HPG yang sedang dibangunkan di FRIM.

Teknik Penanaman Inovatif Menjayakan Penanaman Pemulihan Kawasan Bakau Di Persisiran Pantai

Lanjutan daripada percubaan penanaman spesies bakau di pantai Bukit Batu Puteh, Kuala Perlis dan di pantai Kg Pulau Sayak dan Kg Sg. Yu, Kuala Muda, Kedah pada tahun 2007, ujian keberkesanan teknik penanaman telah dijalankan di Sg Hj. Dorani, Sg. Besar, Selangor pada awal tahun 2008 menggunakan teknik yang berbeza dan pemasangan *Geotube*. Lebih kurang 3000 anak benih spesies bakau telah ditanam menggunakan empat jenis teknik penanaman untuk perbandingan keberkesanan iaitu *Comp-pillow*, *Comp-mat*, *Bamboo Encasement Method* (BEM) dan penanaman secara konvensional (kawalan). Keputusan pemantauan setakat ini menunjukkan bahawa kesemua spesies yang ditanam iaitu *Rhizophora mucronata* (bakau kurap), *Rhizophora apiculata* (bakau minyak) dan *Avicennia alba* (api-api) menggunakan teknik *Comp-pillow*, *Comp-mat* dan BEM secara puratanya mempunyai peratus kemandirian dan pertumbuhan ketinggian pokok yang lebih tinggi berbanding spesies bakau yang ditanam menggunakan kaedah konvensional. Pemasangan *Geotube* untuk melindungi anak benih yang ditanam daripada ombak laut telah mengurangkan kematian anak benih berbanding dengan plot percubaan penanaman tanpa pemasangan *Geotube* di Kg Sg. Yu, Kuala Muda, Kedah pada tahun 2007 menyaksikan kesemua anak benih yang ditanam hanyut dibawa ombak dalam masa sebulan sahaja. Walaupun kajian ini masih di peringkat awal, potensi penanaman inovatif spesies bakau untuk pemulihan kawasan bakau di persisiran pantai sudah jelas kelihatan.

Pengurusan Pokok Tua, Besar dan Berbahaya di Kuala Lumpur

Hasrat untuk Kuala Lumpur menjadi bandar raya taman tidak akan tercapai hanya dengan aktiviti penanaman pokok sahaja. Sebaliknya, pihak Dewan Bandaraya Kuala Lumpur (DBKL) perlu menjamin



Comp-pillow



Comp-mat



Konvensional

Teknik-teknik penanaman inovatif spesies bakau di kawasan bakau di persisiran pantai Sg Hj. Dorani, Sg Besar, Selangor
Innovative planting techniques of mangrove species in the coastal mangroves of Sg Hj. Dorani, Sg Besar, Selangor

Management of Old, Big and Hazardous Tree in Kuala Lumpur

The aspiration of transforming Kuala Lumpur into a Garden City would not be achieved by just engaging with tree planting activities. The Kuala Lumpur City Hall (DBKL) has to assure that trees planted in parks or along streets are maintained for the safety of the public although it is understood that to accurately determine when a tree fails (such as uprooting and branch breakage) is difficult because of the complex relationship between trees and the environment. Therefore, knowledge of tree species,

pokok-pokok yang ditanam sama ada di taman atau di sepanjang jalan diselenggara dengan baik dan selamat kepada orang ramai. Meskipun demikian, untuk meramal kegagalan atau ancaman pokok seperti kejadian pokok tumbang, dahan sekah atau patah dengan tepat sangat sukar dilakukan disebabkan oleh interaksi yang kompleks antara pokok dan persekitarannya. Oleh itu, pengetahuan tentang setiap spesies pokok, keadaan tapak dan punca kecacatan adalah mustahak semasa menilai status bahaya pokok. Mengenal pokok berbahaya dan mengambil tindakan yang sesuai dapat menyelamatkan harta dan nyawa. Selain itu, dengan bertambahnya kesedaran hak individu di bawah peruntukan perundangan, kini terdapat trend individu mengambil tindakan undang-undang jika berlaku kemalangan disebabkan oleh kegagalan struktur pokok yang ditanam.

Bagi maksud ini, satu inventori pokok telah dijalankan di sepanjang lima jalan utama iaitu Jalan Kuching, Jalan Ampang, Jalan Sultan Ismail, Jalan Cheras dan Jalan Raja Laut. Aktiviti seperti inventori, penilaian tahap bahaya pokok dan pemetaan pokok-pokok besar, tua dan berbahaya telah dijalankan. Hasilnya, satu sistem inventori dibangunkan bagi pihak DBKL untuk memantau dan mengambil tindakan penyelenggaraan ke atas pokok-pokok yang bermasalah dan berbahaya. Dengan adanya sistem ini, diharap pihak DBKL dapat menjalankan aktiviti pengurusan pokok dengan lebih sistematik berserta pemeriksaan kesihatan pokok secara berjadual dan menyeluruh untuk mengurangkan impak kerosakan harta benda atau kecederaan kepada pengguna. Seiring dengan itu, matlamat mewujudkan 'negara taman' yang ceria, cantik dan selamat dapat dicapai.

Kajian ini ialah hasil permintaan pihak DBKL kepada FRIM untuk menjalankan inventori pokok bagi Kuala Lumpur. Projek ini dibiayai oleh DBKL melalui perjanjian persefahaman (MOU) antara FRIM-DBKL.

Sistem Pemantauan Kesihatan Pokok

Pengurusan pokok yang berkesan memerlukan maklumat yang tepat tentang keadaan kesihatan pokok dan aktiviti penyelenggaraan yang diperlukan. Aktiviti pemantauan pokok yang terancang berserta dengan data yang terkini membawa kepada program pengurusan pokok secara sistematik. Sistem pemantauan kesihatan pokok dapat dibangunkan dengan adanya aktiviti pemeriksaan di lapangan dengan penggunaan teknologi komputer. Inovasi sebegini menjadi keperluan terutamanya kepada pihak kerajaan tempatan untuk menjalankan penilaian dan pemantauan pokok di bandar secara cepat dan pantas.

site condition and structural defects is pertinent in tree risk assessment. Identifying hazardous trees and taking proper corrective actions would be able to protect public properties and life.

With this, an inventory was conducted along Jalan Kuching, Jalan Ampang, Jalan Sultan Ismail, Jalan Cheras and Jalan Raja Laut. Activities such as inventory, risk assessment and mapping of big, old and hazardous trees were conducted. A system was developed for DBKL based on all these activities with the purpose of tree monitoring and maintenance. It is hoped that with the developed system, DBKL would be able to conduct tree management in a more systematic manner together with tree health appraisal as a whole which would be able to reduce the damage to public properties and life. The goal to develop a cheerful and a safe Garden City can thus be realized.

This study was undertaken as the result of a request made by the Kuala Lumpur City Hall (DBKL) to FRIM to conduct tree inventory for Kuala Lumpur. It was funded by DBKL through an MOU between FRIM and DBKL.

Tree Appraisal System

Effective tree management requires accurate information about the health condition of trees and their maintenance needs. Well-planned tree monitoring activities backed by up-to-date data lead to a systematic tree management programme. Ground inspection combined with the usage of available computer technology results in the development of a computerized tree appraisal system. Such innovation is very much in demand, especially by municipal councils and local authorities as it provides rapid assessment and monitoring of urban trees. It will also assist them greatly in meeting the requirement of living asset management.

Tree appraisal system is a tree health monitoring system, whereby one assesses a tree based on a set of criteria. Upon keying in the information, the system will do an analysis and give the status of the assessed tree. It will also provide first approach actions to be taken. The system is computerized and can work both on and off line. In addition, it can also be used with a PDA. It is a simple and easy tracking system of tree health. It is an on-line database application to track and manage a tree's health score and provide vital reports of the tree with features such as:

- Standalone Mode (Single PC Environment)
- Client Server Mode (Multiple PC Environment)
- PDA enabled (Direct Data Transfer from PDA)
- User Management (User ID Administration)
- Reporting Facilities (Customized Reports)
- Tree Birth Certificates Management (Tree Database)
- Tree Scoring (via Data Entry or PDA download)

Sistem ini juga sudah pasti dapat membantu mereka untuk memenuhi keperluan bagi tatacara pengurusan aset hidup.

Sistem pemantauan kesihatan pokok merupakan sistem penilaian pokok berdasarkan satu set kriteria. Dengan memasukkan maklumat pokok, sistem tersebut akan menganalisis dan memberi status pokok yang dinilai. Sistem ini boleh digunakan secara online dan off line. Tambahan pula, sistem ini juga dapat digunakan dengan Pembantu Peribadi Digital (PDA). Sistem ini mudah untuk mengesan keadaan kesihatan pokok, dan merupakan satu pangkalan data dalam talian untuk mengesan dan mengurus tahap kesihatan pokok dan menyediakan laporan berdasarkan ciri-ciri yang berikut:

- Standalone Mode (Single PC Environment)
- Client Server Mode (Multiple PC Environment)
- Penggunaan PDA (Pemindahan data secara terus dari PDA)
- Pengurusan Pengguna (Pentadbiran Pengenalan Pengguna)
- Kemudahan membuat laporan (Bentuk laporan seperti yang dikehendaki)
- Pengurusan Sijil Pendaftaran Pokok (Pangkalan data pokok)
- Memberi Nilai Skor bagi Pokok (Melalui kemasukan data dan muat turun dari PDA)

Kelebihan sistem ini termasuklah:

- Pangkalan data berpusat bagi kesemua pokok berserta maklumat dan nilai skor terkini
- Capaian yang mudah terhadap data statistik mengikut lokasi, pengenalan pokok, nilai skor dan sebagainya
- Tarikh dan masa adalah berdasarkan tarikh dan masa data dimasukkan dan laporan dihasilkan
- Fungsi yang berpandukan login pengguna bagi tujuan keselamatan
- Capaian yang mudah terhadap nilai skor terdahulu bagi tujuan rujukan, pemantauan dan penyiasaan.

The benefits of this system include:

- central database of all trees and their details and latest scores;
- easy retrieval of statistical data, sorted by location, tree identification, date, score, etc.;
- date and time based on data entry and report generation;
- function based on user login capabilities for security and who can do what features;
- simple and easy tracking of past scores for reference, monitoring and investigation;

No.	Tree ID	Location	Common Name	Botanical Name	Family Name	Score	Remarks
1	RC001	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
2	RC002	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
3	RC003	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
4	RC004	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
5	RC005	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
6	RC006	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
7	RC007	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
8	RC008	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
9	RC009	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
10	RC010	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
11	RC011	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
12	RC012	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
13	RC013	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
14	RC014	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
15	RC015	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
16	RC016	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
17	RC017	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
18	RC018	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
19	RC019	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy
20	RC020	TAMAN SELAMAT	SILVER ACACIA	Acacia robusta	LEGUMINOSAE	1	Tree is healthy

Pemuliharaan Biodiversiti Melalui Penambahbaikan Pengurusan Hutan

Projek Conservation of Biodiversity (CBioD) ialah projek lima tahun (2007–2012) yang sedang dilaksanakan oleh FRIM di bawah naungan Kementerian Sumber Asli dan Alam Sekitar. Tujuan utama projek ini adalah untuk menambah baik alat dan kaedah protokol pengusahaan perhutanan dengan memberi keutamaan terhadap pemuliharaan biodiversiti. Projek ini dibiayai oleh *Global Environmental Facility* (GEF) melalui *United Nations Development Programme* (UNDP) Malaysia bersama-sama *International Tropical Timber Organization* (ITTO). Sumbangan kerajaan Malaysia dalam projek ini merupakan sumbangan yang terbesar lantas menunjukkan komitmen yang tinggi dalam isu pemuliharaan biodiversiti. Projek CBioD ini berkerjasama rapat dengan agensi-agensi lain termasuk Jabatan Perhutanan Semenanjung Malaysia dan pejabat-pejabat hutan negeri, Jabatan Pengairan dan Saliran serta Perbadanan Kemajuan Negeri Perak melalui Perak ITC, syarikat perkayuan iaitu lokasi tapak kajian projek. Sebilangan besar para penyelidik FRIM serta dari dalam dan luar negara turut terlibat dalam projek ini.

Setakat ini, penilaian biodiversiti sebelum dan selepas tebangan sedang giat dijalankan di konsesi PITA di Grik, Perak. Pada waktu yang sama, tatacara tebangan yang ditambah baik untuk memelihara struktur hutan dan pembukaan silara bagi meminimumkan impak terhadap biodiversiti juga sedang diuji di tempat yang sama. Projek ini juga sedang menilai tahap kemandirian biodiversiti di enam kawasan hutan terlindung serta kawasan hutan yang telah dibalok yang bersebelahan. Beberapa kajian ekonomi telah dirancang untuk tahun berikutnya termasuk survei yang merangkumi 1200 isi rumah untuk menentukan nilai pasif biodiversiti dan kawasan hijau serta kajian hidrologi dan penggunaan tanah untuk menentukan nilai perkhidmatan dan hasil dari biodiversiti. Integrasi data ekologi dan ekonomi akan digunakan dalam penghasilan alat dan kaedah yang dapat membantu pengurus-pengurus hutan dalam membuat keputusan pengurusan hutan yang menitikberatkan biodiversiti. Projek ini juga akan mengusahakan supaya alat dan kaedah ini dapat diulang untuk kegunaan negara-negara tropika yang lain. Maka melalui projek inovatif ini, sekali lagi Malaysia akan menonjol di mata dunia kerana mengamalkan gabungan pembangunan dan pemuliharaan biodiversiti dalam industri perhutanan.

Conservation of Biodiversity through Improved Forest Management

The Conservation of Biodiversity (CBioD) Project is a five-year project (2007–2012) executed by the Ministry of Natural Resources and Environment (NRE) and implemented by FRIM. This Project, which aims to create improved tools and methods for current harvesting protocols, gives priority to conserving biodiversity in production landscapes. The Project is funded by the Global Environmental Facility (GEF) through the United Nations Development Programme (UNDP) and co-funded by the International Tropical Timber Organization (ITTO). The Government of Malaysia provides the largest portion of funding (in kind and cash) to the Project, directly showcasing the government's commitment to conservation of biodiversity. The CBioD Project also works closely with stakeholder agencies such as the Forestry Department of Peninsular Malaysia, State Forestry Officers, Department of Irrigation and Drainage and the Perak State Economic and Development Corporation through the Perak ITC, a timber concession where the Project pilot site is located. An encouraging number of local FRIM researchers and international researchers and experts are engaged in this Project.

Currently, biodiversity assessment for both pre-felling and post-felling is being conducted in Block 5 of the PITA concession area. An improved harvesting regime is also being experimented in the same plot, to work towards maintaining canopy coverage and vertical structure of the forest to ensure the biodiversity survival rate is increased in production landscapes. The team is also assessing how biodiversity is surviving in protected areas and adjacent logged forests in six sites across Peninsular Malaysia. A number of economic studies will be conducted in the following year, including a survey of 1200 households to determine the passive value of biodiversity and green landscapes and a study of hydrology and land use to determine the value of goods related to biodiversity. The integration of the ecology and economic data will then be converted to tools and methods created to help forest planners in making better decisions pertaining to delineating production landscape with priorities given to biodiversity. The CBioD Project will be working towards replicating tools and methods created by the Project in other tropical countries. Through this revolutionary Project, Malaysia is yet again projected to be a showcase country where development and conservation work hand-in-hand, and becoming a pioneer in biodiversity conservation within production landscapes.



Hutan Simpan Temengor, Grik, Perak —kawasan kajian utama projek CBioD
Temengor Forest Reserve—the pilot study site of the CBioD project



Lawatan projek CBioD oleh Datuk Nicol David, UNDP Goodwill Ambassador
Visit by Datuk Nicol David as UNDP Goodwill Ambassador to the CBioD project

Komitmen Malaysia Terhadap Konvensyen Kepelbagaian Biologi: Pelaksanaan Projek Pengetahuan Tradisi

Malaysia merupakan ahli Konvensyen Kepelbagaian Biologi (CBD) sejak 1992. Objektifnya adalah untuk memulihara dan menjaga kepelbagaian biologi, menggunakannya secara seimbang, dan perkongsian faedah secara saksama daripada penggunaan sumber-sumber genetik. Salah satu aspek penting dalam CBD adalah untuk menjaga kepentingan komuniti tempatan terutamanya komuniti Orang Asli. Komitmen Malaysia kepada CBD jelas dilihat melalui penubuhan Polisi Kepelbagaian Biologi Kebangsaan 1998 dan pembangunan bioteknologi dalam produk kesihatan di bawah rancangan pembangunan lima tahun.

Untuk merealisasikan komitmen tersebut dan memastikan komuniti mendapat faedah daripada pemeliharaan dan pembangunan sumber-sumber biologi, kerajaan Malaysia telah melaksanakan satu projek Pangkalan Data Pengetahuan Tradisi di bawah Rancangan Malaysia ke-9 (2006–2010). Untuk tujuan tersebut, sebanyak RM600 000 telah diperuntukkan untuk; (a) mewujudkan pangkalan data pengetahuan tradisi berkaitan tumbuhan ubatan dan beraroma oleh Orang Asli, (b) menggunakan pendekatan saintifik dalam melindungi dan menggunakan pengetahuan tradisi berkaitan tumbuhan ubatan dan beraroma secara seimbang, (c) mencadangkan mekanisme perkongsian faedah tentang penggunaan pengetahuan tradisi berkaitan pemuliharaan dan penggunaan secara mampan, (d) mewujudkan kerjasama dan penglibatan antara penyelidik dan komuniti Orang



Demonstrasi kaedah pensampelan biodiversiti di dalam konsesi hutan
Biodiversity sampling demonstration in the forest concession



Lawatan jabatan-jabatan hutan negeri ke tapak kajian di Grik, Perak
Visit by state forestry departments to the project site in Grik, Perak

Implementing Malaysia's Commitment to CBD: The Traditional Knowledge Project

Malaysia has been a party to the Convention on Biological Diversity (CBD) since 1992. The objectives of CBD are to pursue the conservation of biological diversity; the sustainable use of its components, and a fair and equitable sharing of benefits arising from the utilization of genetic resources. An important aspect of the CBD is to ensure the interests of the local communities, particularly the indigenous peoples, are taken care of. The commitment to the CBD is best seen in the establishment of the National Policy on Biological Diversity 1998 and in the biotechnology development for better healthcare products under five-year national development plans.

To ensure that the indigenous communities benefit from the conservation and development of biological resources, the Malaysian Government has implemented a project on the database of traditional knowledge under the Ninth Malaysia Plan (2006-2010). A total of RM600 000 was granted for this purpose: (a) to establish a database on forest traditional knowledge (TK) relating to medicinal and aromatic plants of the Orang Asli; (b) to apply scientific methodology in sustainable conservation and utilization of forest TK relating to medicinal and aromatic plants of the Orang Asli; (c) to propose a benefit-sharing mechanism on the use of forest TK related to biodiversity conservation and sustainable utilization; (d) to create a partnership and involvement between researchers and the Orang Asli community (in providing new tools, scientific and non-scientific, and capacity building) for the creation of a database on medicinal and aromatic plants of the Orang Asli (in print and digital format) with full acknowledgement and participation of the

Asli (dalam penyediaan kaedah baharu, saintifik dan bukan-saintifik, dan pembangunan kapasiti) untuk mewujudkan pangkalan data berkaitan tumbuhan ubatan dan beraroma Orang Asli (dalam format digital dan bercetak) dengan penghargaan dan penglibatan sumbangan daripada komuniti, dan (e) membentuk strategi kebangsaan dan pelan tindakan Projek Pengetahuan Tradisi. Projek ini dilihat dapat membuka jalan ke arah kerjasama antara kerajaan Malaysia dan komuniti Orang Asli.

Komuniti Semelai (Tasik Bera, Pahang), Temiar dan Jahai (Temengor, Perak) merupakan antara 18 sub-etnik Orang Asli di Semenanjung Malaysia yang dipilih dalam pelaksanaan projek ini.

Sehingga kini, aktiviti yang telah dijalankan ialah:

- Perbincangan bulanan bersama-sama kakitangan JHEOA dan juga ketua komuniti di Rancangan Pengumpulan Semula (RPS) Iskandar, Bera, Pahang.
- Mengadakan dua bengkel kesedaran pengetahuan tradisi di RPS Iskandar dan dihadiri oleh peserta yang terdiri daripada ketua komuniti, golongan lelaki, wanita, dan para belia orang asli kaum Semelai pada bulan April, serta Temiar dan Jahai pada bulan Jun.
- Menjalankan dua kaji selidik isi rumah tentang pengetahuan masyarakat tempatan terhadap penggunaan tumbuhan ubatan dan beraroma (dibantu oleh enam orang enumerator mahasiswa/ mahasiswi dari kalangan orang Asli) dengan sampel sebanyak 184 isi rumah bagi kaum Semelai pada bulan Mei dan 187 isi rumah kaum Temiar dan Jahai pada bulan Julai.
- Pada bulan Jun, memberi pendedahan kepada guru-guru dan para pelajar dari sekolah rendah tentang kepentingan pengetahuan tradisi yang berkaitan dengan tumbuhan ubatan dan beraroma.
- Pada 2 Julai, lawatan seramai 28 orang penduduk RPS Iskandar (termasuk ketua, pengamal perubatan tradisi, golongan wanita dan para belia) ke FRIM bertujuan memahami pelaksanaan projek secara keseluruhan dan seterusnya mengetahui aktiviti R&D yang dijalankan di FRIM.

Pelaksanaan projek kerajaan berkaitan pengetahuan tradisi ini dijangka dapat membuka lembaran baru dalam sejarah Malaysia apabila komuniti Orang Asli memberikan persetujuan untuk menggunakan sumber pengetahuan tradisi mereka berkaitan tumbuhan ubatan dan beraroma secara seimbang.

contributing communities; and (e) to formulate a national strategy and action plan on TK. The project paves the way for a new form of collaboration between the Malaysian Government and the indigenous communities in Malaysia.

Three of the 18 sub-ethnic groups of the Orang Asli in Peninsular Malaysia namely the Semelai community (Tasek Bera, Pahang), Temiar and Jahai communities (Temengor, Perak), were chosen as the target groups for project implementation.

To date, the project implemented the following activities:

- *A series of monthly discussions were held with the local leaders and Jabatan Hal Ehwal Orang Asli (JHEOA) staff at the Iskandar Regroupment Scheme (IRS).*
- *Two awareness workshops on traditional knowledge, attended by local leaders, women and youths, were held in the regroupment schemes in April and June for the Semelai, and Temiar and Jahai, respectively.*
- *Two household surveys on local knowledge and use of medicinal and aromatic plants were conducted (with the assistance of six aboriginal undergraduate enumerators) on 184 and 187 households for the Semelai, and the Temiar and Jahai, in May and July respectively.*
- *In June, local primary school students and teachers in the IRS were briefed on the importance of TK related to medicinal and aromatic plants.*
- *On 2 July, a total of 28 villagers (including traditional leaders, medicine men, women and youths) of the Semelai community visited FRIM to have a better understanding of the project as well as FRIM R&D activities.*

The implementation of this government project on TK is expected to open a new chapter in the Malaysian history where the Orang Asli are consulted and their prior informed consent are obtained to source their TK on medicinal and aromatic plants for sustainable utilization.



Pameran oleh agensi RAMSAR
Exhibition by RAMSAR agency



Lawatan komuniti Semelai ke FRIM
Semelai Community visited FRIM



PERASMIAN DENAI RAZAK DI KBG

Denai Razak atau Razak Walk ialah sebuah denai dalam Taman Botani Kepong (KBG) sempena nama Datuk Dr Abdul Razak Mohd. Ali, mantan Ketua Pengarah FRIM. Denai ini mula dibina pada Mac 2006. Penanaman mengaya dengan pelbagai spesies herba bermula pada bulan November 2006. Aktiviti penanaman ini diteruskan sepanjang 2007 dan 2008. Pembangunan Denai Razak bertujuan untuk mempamer pokok-pokok bawah naungan di lantai hutan seperti kaum halia hutan, palma, orkid, paku-pakis, kaum keladi, pohon renek dan tumbuhan herba yang merupakan strata tumbuhan di bawah silara pokok-pokok utama iaitu *Schima wallichii* (gegatal). Denai ini sepanjang 400 m telah dirasmikan oleh Ketua Pengarah FRIM pada 14 Januari. Denai Razak ini dibina daripada konkrit dan direka bentuk bagi membolehkan orang kurang upaya melawati denai ini. Di Denai Razak juga terdapat spesies baru durian hutan yang ditemui beberapa tahun yang lepas dan kini diberi nama sempena Ketua Pengarah iaitu *Durio razakii*. Ia merupakan sejenis pokok durian yang buahnya berwarna merah, berbuah pada pangkal atau batang pokok dan mempunyai isi nipis yang tidak sesuai untuk dimakan. Antara tarikan utama di Denai Razak ialah koleksi kaum halia, pokok palma khususnya spesies yang telah dinamakan sempena nama orang kenamaan, pegawai atau saintis yang pernah berkhidmat di FRIM seperti *Areca tunku*, *Licuala whitmorei*, *Licuala kamarudinii*, *Licuala khoonmengii*, *Licuala sallehana*, *Licuala thoana*, dan *Licuala ruthiae*. Di sini juga ditanam spesies dari kaum halia iaitu *Globba corneri* yang dihasilkan melalui teknik kultur tisu FRIM. Sehingga kini sebanyak 354 spesies tumbuhan telah ditanam di kawasan ini.

OFFICIATION OF RAZAK WALK AT KBG

The Razak Walk, named in honour of the former FRIM Director General, Datuk Dr Abdul Razak Mohd Ali, is a nature trail within the Kepong Botanic Garden (KBG). It was first established in March 2006 and enrichment planting of a variety of herbaceous plants was conducted in November 2006, which continued until 2008. The aim of this trail is to display understorey plants such as wild ginger, palms, orchids, ferns, aroids, shrubs and herbal plants, which normally grows below the main canopy of large trees like the *Schima wallichii* (gegatal). This 400 m trail was officiated by the then Director General of FRIM on 14 January 2008. The trail was designed and built using concrete to enable even the disabled visitors to enjoy the trail. Also on this trail is a new species of wild durian, which was discovered only several years back, named *Durio razakii*, after the former DG of FRIM. It is red in colour and the tree bears fruit on its trunk, but having thin layers of flesh, it is not edible. Other attractions of the Razak Trail is the collection of gingers and palms named after renowned people as well as researchers who have served with FRIM, such as *Areca tunku*, *Licuala whitmorei*, *Licuala kamarudinii*, *Licuala khoonmengii*, *Licuala sallehana*, *Licuala thoana*, and *Licuala ruthiae*. A type of ginger, *Globba corneri*, grown from tissue culture can also be found here. Until today, a total of 354 plant species have been planted.

Aktiviti Utama R&D

R&D Highlights

R&D Hiliran

Bioteknologi merupakan satu kaedah yang penting dalam menangani isu-isu berkaitan perhutanan termasuk penghasilan bahan tanaman yang ditambah baik untuk perladangan hutan, forensik perhutanan, tumbuhan ubatan dan penemuan ubatan. Penyelidikan genomik khususnya dalam pengecaman gen dan kejuruteraan genetik bertujuan untuk menghasilkan pokok-pokok penting yang mempunyai nilai ekonomi tinggi agar mempunyai ciri-ciri yang dikehendaki seiring dengan keperluan perladangan hutan. Kajian sedang dijalankan untuk mengenal pasti gen yang mengawal pembentukan bunga dalam *Tectona grandis* (jati) bagi menghasilkan pokok yang mempunyai ciri yang dikehendaki. Selain itu, teknologi penanda molekul telah digunakan untuk membangunkan pangkalan data profil DNA terutama bagi spesies yang sering dikaitkan dengan isu pembalakan haram. Mikrosatelit telah dibuktikan sebagai penanda DNA yang paling sesuai untuk membangunkan pangkalan data tersebut bagi spesies balak yang penting seperti *Neobalanocarpus heimii* (cengal). Penyelidikan juga telah dijalankan untuk mengenal pasti tumbuhan hutan hujan tropika yang berpotensi sebagai sumber penghasilan sebatian bagi drug baharu. Terkini, penekanan diberikan kepada pembangunan agen terapeutik berasaskan tumbuhan yang berpotensi untuk menentang barah, mikrob, bebas radikal dan antiradang. FRIM turut membantu industri ubatan tradisional tempatan menerusi pembangunan teknik-teknik terbaharu dan produk herba bermutu tinggi.

Projek ITTO-PD 192/03 Rev.3(M): Sistem Maklumat Komprehensif untuk Kelestarian Industri Perabot Kayu di Malaysia

Industri perabot kayu merupakan antara penyumbang utama dalam struktur eksport ekonomi negara. Salah satu faktor penting yang memacu pembangunan industri perabot kayu ialah pelaksanaan Pelan Induk Perindustrian 1 (IMP1) dan Pelan Induk Perindustrian 2 (IMP2) yang telah menggalakkan pertumbuhan industri ini dengan jumlah eksport perabot kayu meningkat daripada RM58.8 juta pada tahun 1988 kepada RM6.4 bilion pada tahun 2007. Pencapaian industri yang memberangsangkan ini juga berkait rapat dengan penawaran bahan mentah yang mencukupi, kos buruh yang rendah dan permintaan di pasaran antarabangsa. Pada masa kini, pencapaian industri perabot kayu tempatan bergantung pada keupayaan mereka menghadapi senario perubahan pasaran global. Keperluan dan kehendak pasaran

Down-Stream R&D

Biotechnology is an important tool in addressing forestry-related issues including production of improved planting materials for forest plantation, forensic forestry, medicinal plants and drugs discovery. Genomics research, particularly on gene identification and genetic engineering, is aimed at producing plants of economically important species with desired characteristics for the forest plantation establishment. Research is being carried out to identify genes controlling early flowering in Tectona grandis (teak) to produce plants with improved vegetative growth and of desirable form. In addition to genomics, molecular marker technology is being utilized to develop a database of DNA profiles of species related to issues of illegal timber harvesting. Microsatellite has been proven as the most suitable DNA marker for database development of important timber species such as Neobalanocarpus heimii (cengal). Research is also being conducted to tap the potential of the vast diversity of plants in the tropical rainforest as a source of novel compounds for new drugs. Currently, emphasis is being given to develop potential plant-based therapeutic agents against cancer, microbes, free radicals and inflammation. FRIM is also committed to assisting local and traditional medicine industries through the development of modern techniques and high-quality herbal products.

Project ITTO-PD 192/03 Rev.3(M): A Comprehensive Information System for Sustainability of the Wooden Furniture Industry in Malaysia

The wooden furniture industry (WFI) is one of the major contributors to the Malaysian economy. Tracing the development of the WFI, one cannot help but realize that the implementation of Industrial Master Plan 1 (IMP1) and Industrial Master Plan 2 (IMP2) indeed stimulated the growth of this industry's export values substantially—from RM58.8 million in 1998 to RM6.4 billion in 2007. The excellent performance of the WFI in the past is closely related to the abundant supply of rubberwood, low labour cost and increasing demand in the international market. Today, the performance of the local WFI depends on how the industry adapts itself to the changing scenarios of the global market. Preferences and market requirements change, as do other matters relating to trade. More challenging trade issues are expected to confront sellers as the world pursues full globalization. Besides that, two other major requirements from buyers are certification and labelling.

berubah-ubah, begitulah juga perubahan lain berkaitan perdagangan. Industri ini dijangka akan berhadapan dengan isu perdagangan yang lebih mencabar dengan persaingan yang bersifat globalisasi. Selain itu, cabaran lain yang perlu dihadapi oleh industri ialah dua keperluan utama daripada pembeli iaitu pensijilan dan pelabelan.

Menyedari kepentingan industri perabot kayu dalam menjana hasil pertukaran mata wang asing dan bagi memastikan industri ini terus mempertahankan peranan dan pencapaiannya, FRIM telah mengambil inisiatif dengan mengemukakan kertas cadangan kepada ITTO untuk mendapatkan peruntukan. Pada pertengahan bulan Ogos 2006, sebuah projek kecil yang bertajuk '*A Comprehensive Information System for Sustainability of the Wooden Furniture Industry in Malaysia*' telah diluluskan dan menerima peruntukan dari pihak ITTO sebanyak US\$121 072 bagi tempoh dua tahun. Objektif utama projek ini adalah untuk (a) membangunkan sistem maklumat berkaitan penawaran dan permintaan kayu getah di Malaysia dan (b) menjalankan kajian mendalam berkaitan produktiviti, kos pengeluaran bagi beberapa produk terpilih, kandungan input utama, dan polisi untuk pembangunan lestari industri perabot kayu. Sistem maklumat ini juga diharap dapat membantu penggubal dasar dalam merangka polisi yang berkaitan dengan perkembangan industri dan pada masa yang sama membantu pengeluar perabot kayu merancang perkembangan industri.

Kumpulan penyelidik telah berjaya mencapai kesemua objektif projek dengan bantuan pelbagai agensi iaitu Kementerian Industri Perladangan dan Komoditi (KPPK), Jabatan Perhutanan Semenanjung Malaysia (JPSM), Lembaga Industri Kayu Malaysia (MTIB), Jabatan Perhutanan Sabah (SFD), Perbadanan Kemajuan Industri Kayu Sarawak (PUSAKA) dan Persatuan Pengusaha Perabot Malaysia (MFEA), *Malaysian Furniture Industry Council* (MFIC), *Sarawak Timber Association* (STA) dan *Sabah Timber Industries Association* (STIA), yang merupakan ahli jawatankuasa teknikal projek (PTC). Mesyuarat PTC telah dipengerusikan oleh En. Letchumanan Ramatha, Setiausaha Bahagian, Bahagian Pembangunan Perhutanan, Kementerian Sumber Asli dan Alam Sekitar, dan Tn Hj. Amha Buang, Penolong Pengarah, *Market Intelligence and Information*, ITTO bertanggungjawab memantau aktiviti projek.

Realizing the importance of the WFI in generating foreign exchange earnings and sustaining its role and performance, FRIM took the initiative to submit a project proposal to ITTO for funding. In mid-August 2006, a small project entitled "A Comprehensive Information System for Sustainability of the Wooden Furniture Industry in Malaysia" was approved by ITTO, with total funding amounting to US\$121 072 for two years. The project was aimed at (i) developing an information system regarding the supply of and demand for rubberwood in Malaysia and (ii) considering in depth productivity, cost of production of selected products, primary input content and policies for sustainability of the WFI. Such a comprehensive information system is expected to provide policy makers with better information for future development of the industry, and at the same time, assist wooden furniture manufacturers in better planning of industrial expansion.

With cooperation from various agencies including the Ministry of Primary Industries and Commodities (MPIC), FDP, MTIB, Sarawak Timber Industry Development Corporation (STIDC), Sabah Forest Department (SFD), Malaysia Furniture Entrepreneurs Association (MFEA), Malaysian Furniture Industry Council (MFIC), Sabah Timber Association (STA), Malaysian Furniture Industry Council (MFIC), and Sarawak Timber Industries Association (STIA), which are represented in the Project Technical Committee (PTC), the research team successfully achieved all the objectives. The PTC meeting was chaired by Mr Letchumanan Ramatha, Under Secretary, Forestry Development Division, NRE, whereas project activities were monitored by Mr Amha Buang, Assistant Director, Market Intelligence and Information, ITTO.

Major outputs from the project were as follows:

- *Technical report on the current and future supply of and demand for rubberwood in Malaysia—This report provides an estimation of the supply of and demand for rubberwood logs based on a dual approach, namely conventional (qualitative) and econometric (quantitative) modelling.*
- *Technical report on the WFI's productivity, cost of production for selected products, primary input content and policies for sustainability—This report analyses the performance of the industry from the perspective of production and marketing, human resources, machinery and equipment, productivity and cost of production of selected products. Analyses of primary input content based on the input-output table 2000 published by the Department of Statistics also were also conducted.*
- *A Handbook of the Rubberwood Resource Information System (RRIS)*

Hasil utama projek ialah:

- *Technical report on the current and future supply for and demand of rubberwood in Malaysia*—Laporan ini mengandungi anggaran penawaran dan permintaan kayu getah berdasarkan dua pendekatan iaitu konvensional dan model ekonometrik.
- *Technical report on wooden furniture industry productivity, cost of production for certain selected products, primary input content, and policies for sustainability*—Laporan ini menganalisis pencapaian industri dari perspektif pengeluaran dan pemasaran, sumber manusia, mesin dan peralatan, produktiviti dan kos pengeluaran untuk beberapa produk terpilih. Selain itu, laporan ini juga mengandungi analisis kandungan input utama yang berdasarkan jadual input-output 2000 yang dikeluarkan oleh Jabatan Statistik.
- *A Handbook of the Rubberwood Resource Information System (RRIS)*
- *A Handbook of the Wooden Furniture Information System (WFIS)*
- *A Handbook of the Comprehensive Information System (CIS)*

Dua hasil lain projek ini ialah:

- *Selected Statistics of the Wooden Furniture Industry, Malaysia (2008)*
- *Directory of Wooden Furniture Manufacturers, Malaysia (2008)*

- *A Handbook of the Wooden Furniture Information System (WFIS)*
- *A Handbook of the Comprehensive Information System (CIS)*

Two additional outputs for the project were:

- *Selected Statistics of the Wooden Furniture Industry, Malaysia (2008)*
- *Directory of Wooden Furniture Manufacturers, Malaysia (2008)*



Dua lagi penerbitan daripada project ITTO-PD 192/03 Rev.3(M)
Two other publications as additional outputs from the project ITTO-PD 192/03 Rev.3(M)



Lima penerbitan daripada project ITTO-PD 192/03 Rev.3(M)
Five publications from the project ITTO-PD 192/03 Rev.3(M)

Perkembangan Produk yang Bernilai Tambah Tinggi ke Pasaran Eropah – Lamtec Malaysia®

Industri perhutanan kini sedang menghadapi cabaran kenaikan kos bahan mentah dan tenaga kerja serta keperluan tambahan untuk memastikan kelestarian hutan Malaysia. Justeru, terdapat keperluan untuk meningkatkan nilai tambah produk yang telah mendorong kepada pembangunan Lamtec Malaysia® untuk pasaran Eropah. Produk ini ialah kayu tingkap berlaminasi dan lamscant yang bernilai tinggi untuk

Development of a High Value-added Product to the European Market – Lamtec Malaysia®

The forestry industry is currently facing the challenges of increased raw material prices and labour costs and additional requirements to ensure sustainability of the Malaysian forests. Hence, there is a need to value-add our timber products. This has given rise to the development of Lamtec Malaysia® for the European market recently. The product (lamscant) is a high-end laminated window scantling, lamscant, for housing construction, in Germany

industri pembinaan di Jerman khususnya, dan Eropah amnya. Ini merupakan projek kerjasama—FRIM terlibat dengan kajian ke atas keperluan teknikal; MTIB, aspek jaminan kualiti; MTC, keperluan dan maklumat pasaran, dan MWIA memantau pengeluaran. Projek ini telah dibiayai oleh “Tabung Pembangunan Industri Kayu-Kayan Malaysia” yang diurus oleh Kementerian Industri Perlindungan dan Komoditi.

Dua jenis kayu tempatan telah diperkenalkan untuk pasaran Jerman iaitu; bintangor dan kasai. Keperluan ini merupakan syarat awal sebelum sesuatu jenis kayu digunakan dengan rasmi sebagai kayu berlaminasi untuk tingkap—lamscant, bagi pasaran Jerman. Keperluan lain termasuklah pematuhan terhadap ujian lekatan yang ketat mengikut arahan produk yang berkenaan, sifat-sifat bahan dan pemprosesan di samping penggunaan kayu yang diperoleh secara sah dan disahkan oleh pihak Malaysian Timber Certification Council (MTCC).

Lamtec Malaysia® telah berjaya didaftarkan di Eropah dan Malaysia, dan telah dilancarkan di Jerman dan Itali. Di Jerman ia diterima baik dan diakui sebagai jenama yang berkualiti tinggi dan menguasai pasaran lamscant tersebut. Untuk memastikan kualiti, produk ini juga melalui proses pengiktirafan oleh pihak ift (Institute for Windows Technology), Rosenheim, Jerman, sebuah badan berkuasa yang diakui seluruh dunia untuk pengesahan produk tingkap. FRIM telah dilantik sebagai pengawas serta pusat ujian bagi ift setelah pemeriksaan awal dilakukan di Kepong pada Jun 2006. Hasil kejayaan pelancaran projek ini, eksport lamscant Malaysia telah meningkat daripada RM4 juta pada tahun 2004 kepada RM16 juta pada tahun 2007.

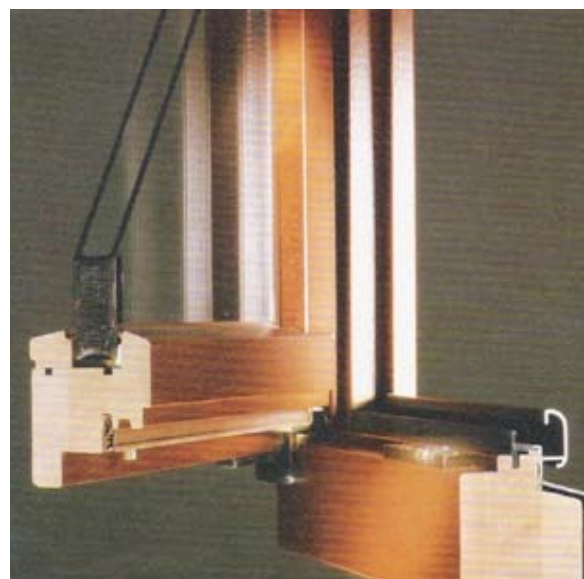


Tingkap contoh diperbuat daripada Lamtec Malaysia®
Sample window made using Lamtec Malaysia®

particularly and Europe in general. This project is a joint effort where FRIM is responsible for the technical requirements; the Malaysian Timber Industry Board (MTIB) for quality assurance, Malaysian Timber Council (MTC) for market intelligence, and Malaysian Wood Industry Association (MWIA) for the production of lamscant. The project is funded by “Tabung Pembangunan Industri Kayu-Kayan Malaysia” under the Ministry of Plantation Industries and Commodities.

Two timber species, bintangor and kasai, were introduced and listed to the German market. The latter is required before any new timber species can be officially used for laminated window scantling in the German market. Other requirements include conformance with the stringent bonding tests in accordance to relevant product directive, material and working properties as well as the use of legally sourced materials as certified by the Malaysian Timber Certification Council (MTCC).

Lamtec Malaysia® was successfully registered in Europe and Malaysia. It was subsequently launched in Germany and Italy. This brand name is well received and recognized as a high-end quality brand that has carved its own niche in the German wooden window scantling market. To ensure better consistency in production quality, the product also went through necessary product certification by ift (Institute for Windows Technology), Rosenheim, Germany, an internationally recognized governing authority in the certification of window products. FRIM has also been appointed as the surveillance and testing body for ift after an initial inspection at Kepong in June 2006. The project has led to a sharp increase in the export of the Malaysian lamscant from about RM4 million in 2004 to RM16 million in 2007.



Produk akhir – Bingkai tingkap berlaminasi
End product – laminated window scantling

Pemencilan Gen dari Tisu Pembungaan Jati (*Tectona grandis*)

Jati mempunyai masalah berbunga awal apabila ditanam secara ladang. Pokok tersebut telah dilaporkan berbunga seawal tiga tahun selepas ditanam. Fenomena ini boleh menyebabkan penghasilan balak yang pendek akibat pembentukan cabang selepas jambak bunga gugur. Proses pembungaan juga mengurangkan tumbesaran vegetatif berikutan penggunaan tenaga semasa proses pembungaan. Kemampuan menghasilkan pokok jati yang diubah genetiknya supaya tidak berbunga akan meningkatkan tumbesaran vegetatif serta bentuk pokok yang diinginkan. Bahan tanaman yang bersifat sedemikian akan mendapat permintaan yang tinggi daripada pengusaha perladangan jati. Jati yang dimandulkan juga penting untuk memastikan genetik jati yang telah diubahsuai ini tidak terlepas ke populasi di sekitarnya.

Kajian untuk mengenal pasti dan mencirikan gen yang terlibat pada peringkat awal pembungaan jati telah pun bermula di Unit Genetik. Gen-gen yang terlibat pada peringkat awal pembungaan jati telah dipencilkan menggunakan kaedah PCR- hibridisasi subtraktif. Daripada 94 klon yang dianalisis, 22% ialah klon novel atau menyamai protein putatif daripada beberapa spesies yang tidak diketahui fungsinya. Sementara klon-klon lain sama ada terlibat dalam pembahagian sel, transduksi signal atau transkripsi. Berdasarkan persamaan jujukan dengan gen yang telah diketahui terlibat dengan pembentukan bunga, gen yang paling berpotensi ialah *Tectona grandis*- Hipokotil Diperpanjang Lewat (Tg-LHY). cDNA lengkap Tg-LHY mempunyai 2948 'base pair' (bp) dan berpotensi mengkod 768 asid amino. Persamaan yang ketara antara gen ini dan gen LHY daripada beberapa spesies lain dari segi jujukan asid amino dan pengeksresan gen menunjukkan penglibatan sistem 'circadian clock' dalam pembentukan bunga jati. Sistem 'circadian clock' ialah jaringan penerima signal yang rumit, yang membenarkan sesuatu organisma untuk menyelaraskan aktiviti fisiologi di dalam sel mengikut perubahan di persekitarannya. Penglibatan sistem 'circadian clock' dalam pembentukan bunga jati telah ditunjukkan dengan transformasi gen Tg-LHY ke dalam pokok model iaitu *Arabidopsis*. Dalam kajian ini, lebih ekspresan gen Tg-LHY akan memperlambat pembentukan bunga. Analisis hubungan kait antara pusingan reproduktif jati dan keadaan cuaca di tempat penyelidikan mendapati suhu berkemungkinan menjadi petunjuk persekitaran yang diterima oleh sistem 'circadian clock' jati, memandangkan suhu didapati tinggi selama tiga

The Isolation of Genes from Teak (*Tectona grandis*) Flowering Tissues

Teak has the problem of early flowering when planted in plantations. The tree has been reported to flower as early as three years after planting. This phenomenon leads to a shorter clear bole of the tree owing to forking formation after the inflorescences die back. Flowering also reduces the vegetative growth because of energy utilization. The ability to produce genetically engineered teak with delayed flowering can improve the vegetative growth and a desirable tree form. Planting materials with such novel characteristics would be highly demanded for the establishment of teak plantation. The plant reproductive sterility is also important in genetically modified trees to avoid transgene from escaping into the existing population.

A study to identify and characterize genes involved in early flowering of teak has been initiated by the Genetic Unit. Genes involved in the early development of flowering in teak have been isolated using Polymerase Chain Reaction (PCR) subtractive hybridization method. Out of 94 clones analysed, 22% were novel or had homology to putative proteins from other species with unknown functions. The other 78% were involved in cell division, signal transduction or transcription. Based on the similarity of sequences to known genes involved in flower development, the most promising gene is *Tectona grandis* Late Elongated Hypocotyls (Tg-LHY). The full-length complementary Deoxyribonucleic Acid (cDNA) of Tg-LHY was 2948 base pair (bp) and potentially encoded for 768 amino acids. The high similarity of this gene to LHY gene from other species in its acid amino sequence and the gene expression indicates the involvement of a circadian clock system in teak flower development. The circadian clock system is a complex signalling network that allows organisms to adjust their cellular and physiological activities to the anticipation of periodic changes in the environment. The involvement of the circadian clock system in teak flower development has been shown in the transformation of Tg-LHY gene into *Arabidopsis* genome. In this study, an over-expression of Tg-LHY gene in *Arabidopsis* has delayed the flowering. Analysis of the correlation between the reproductive cycle of teak and weather conditions indicates that temperature might be a potential environmental cue detected by the teak circadian clock system, as the temperature was higher three months prior to the flowering season. However, further studies are needed to ascertain these findings.

In addition, potential genes that are specific to flowering have to be isolated. Based on the circadian clock system of flower development in teak, the potential candidate genes are *CONSTANT*, *GIGANTEA* and *FT*. All these genes are integrated genes of the circadian clock and the flower development pathway.

bulan sebelum jati berbunga. Walau bagaimanapun, kajian selanjutnya perlu dibuat untuk membuktikan kebenaran jangkaan ini.

Di samping itu, gen berpotensi yang khusus untuk proses pembungaan perlu dipencilkan. Berdasarkan penemuan sistem 'circadian clock' yang didapati terlibat dalam pembentukan bunga jati, gen khusus yang berpotensi ialah CONSTANT, GIGANTEA dan FT. Kesemua gen ini ialah gen yang diekspres selepas 'circadian clock' dalam laluan pembentukan bunga.



Pokok Arabidopsis berumur 28 hari, menunjukkan pokok transgenik oleh gen Tg-LHY di sebelah kiri dan pokok liar di sebelah kanan. Pembentukan bunga pada pokok Arabidopsis transgenik didapati lewat berbanding pokok liar

Twenty-eight-day old of Tg-LHY transgenic Arabidopsis on the left and the wild type on the right. The flower development in transgenic Arabidopsis was delayed compared with the wild type

Forensik Pemprofilan DNA dan Pensijilan Berantai Jagaan Spesies Balak Tropika

Dalam konteks pembalakan haram dan pensijilan berantai jagaan, kandungan unik DNA boleh digunakan sebagai alat untuk mengesan dan memantau kesahihan balak yang dicurigai dari segi undang-undang. Dengan menggunakan cengal (*Neobalanocarpus heimii*) sebagai contoh, pelbagai penanda DNA telah dibangunkan di FRIM untuk forensik pemprofilan DNA dan pensijilan berantai jagaan. Cengal bertaburan luas di Semenanjung Malaysia dan menghasilkan kayu tahan lama yang merupakan antara jenis kayu yang paling keras di dunia. Memandangkan permintaan terhadap kayu cengal adalah tinggi, cengal mudah dilanda masalah pembalakan haram dan spesies ini akan terancam pada masa terdekat.

Sebanyak 30 populasi semula jadi dan 12 penanda mikrosatelit telah digunakan untuk membangunkan pangkalan data pemprofilan DNA cengal. Analisis

Forensic DNA Profiling and Chain of Custody of Tropical Timber Species

*The inbuilt unique properties of DNA within timber could serve as a tracking and monitoring tool to verify the legality of a suspected timber in the context of illegal logging and chain-of custody certification. By using cengal (*Neobalanocarpus heimii*) as an example, various DNA markers were developed in FRIM for forensic DNA profiling and chain of custody certification. Cengal is widely distributed in Peninsular Malaysia and produces a naturally and highly durable heavy hardwood. Owing to the high demand for its valuable timber, cengal is prone to illegal logging activities. This species may become endangered in the near future.*

Thirty natural populations of cengal and 12 microsatellite markers were used to develop the DNA profiling databases. The cluster analyses divided the 30 populations into three genetic clusters, corresponding to three subregions within Peninsular Malaysia. The DNA profiling databases were then characterized at the levels of population, subregion and Peninsular Malaysia. Independence tests within and among loci were violated in all the databases due to significant levels of population differentiation and inbreeding. Thus, the effects of population substructure and inbreeding should be incorporated into the calculation of match probability. The match probabilities estimated using subpopulation and subpopulation-cum-inbreeding models were biased in favour of the defendant. Meanwhile, the match probabilities estimated using product rule were biased in favour of the prosecutor. The conservativeness tests showed that the subregion and Peninsular Malaysia databases were conservative, and with the combined power of discrimination >0.9999999999999999, these databases should be able to provide legal evidence for court proceedings against illegal loggers in Peninsular Malaysia.

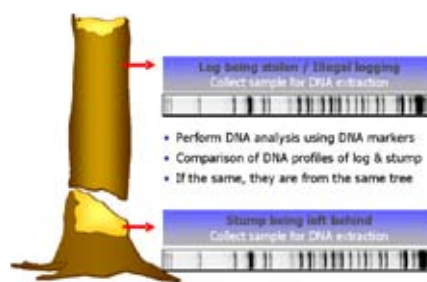
In the case of chain-of-custody certification, two comparative databases (population and subregion) and haplotype distribution maps in Peninsular Malaysia were generated for authenticity testing based on five non-coding regions of chloroplast DNA: trnL intron, trnS-trnG spacer, trnG intron, trnK intron and psbK-trnS spacer. In the population database, 31 haplotypes were defined from 15 polymorphic sites whereas in the subregional database, 15 haplotypes were defined from five polymorphic sites. Statistical test based on presence/absence of haplotype was used to test whether a seizure timber confirms to a given geographical origin. Overall, the observed types I and II errors resulting from the simulation in both the subregion and population databases showed good concordance with the predicted 5% threshold. This also means that the comparative databases can be used to trace the geographical origin of a seizure log to subregion and forest reserve.

kelompok membahagikan 30 populasi kepada tiga kelompok genetik, selaras dengan tiga sub-kawasan di Semenanjung Malaysia. Pangkalan data pemprofilan DNA dicirikan pada peringkat populasi, sub-kawasan dan Semenanjung Malaysia. Ujian kebebasan lokus menunjukkan kesemua pangkalan data tidak memenuhi syarat disebabkan oleh kewujudan struktur populasi dan pembaikbiakan seketurunan. Oleh itu, penganggaran kebarangkalian sepadan perlu diperbetul dengan kesan penstrukturan populasi dan pembaikbiakan seketurunan. Pengiraan kebarangkalian sepadan menggunakan model-model sub-populasi dan sub-populasi-biak dalam berprasangka memihak kepada defendan manakala menggunakan peraturan keluaran berprasangka memihak kepada pendakwa. Ujian pencirian konservatif menunjukkan pangkalan data sub-kawasan dan Semenanjung Malaysia adalah konservatif dan dengan kuasa diskriminasi >0.999999999999999 , kedua-dua pangkalan data ini dapat memberi bukti undang-undang dalam prosiding mahkamah terhadap pembalok haram di Semenanjung Malaysia.

Untuk persijilan berantai jagaan, dua pangkalan data perbandingan (populasi dan sub-kawasan) dan peta taburan haplotip Semenanjung Malaysia telah dihasilkan untuk ujian kebenaran berdasarkan lima kawasan DNA kloroplas: trnL, trnS-trnG, trnG, trnK dan psbK-trnS. Pangkalan data populasi merangkumi 31 haplotip daripada 15 kawasan polimorfik manakala pangkalan data sub-kawasan terdiri daripada 15 haplotip daripada lima kawasan polimorfik. Ujian statistik berdasarkan kehadiran/ketiadaan haplotip telah digunakan untuk menguji sama ada balok yang dicurigai dapat disahkan kepada kawasan asal ia dibalok. Secara keseluruhan, ralat jenis I dan II hasil simulasi pangkalan sub-kawasan dan populasi menunjukkan keputusan yang baik dengan 5% tahap ramalan. Ini bermakna kedua-dua pangkalan data perbandingan ini boleh digunakan untuk mengesan asal-usul balok yang dicurigai sehingga ke sub-kawasan dan hutan simpan.

Pembangunan pangkalan data komprehensif cengal untuk pemprofilan DNA dan persijilan berantai jagaan dilaporkan buat kali pertama untuk spesies pokok tropika. Kaedah yang dibangunkan boleh digunakan untuk kajian seumpama spesies kayu balok lain yang penting di Malaysia, contohnya merbau dan ramin. Dengan kewujudan pangkalan data DNA ini, kapasiti pegawai Jabatan Perhutanan dalam menangani masalah pembalokan haram dan isu persijilan berantai jagaan akan dipertingkatkan. Ini secara tidak langsung akan memastikan keberkesanan pemuliharaan dan penggunaan secara lestari sumber hutan di Malaysia.

The comprehensive DNA profiling and chain-of-custody databases developed for cengal are the first reported by FRIM for a tropical tree species. This methodology should be able to serve as a model for the studies of other important timber species in Malaysia such as ramin and merbau. The availability of DNA profiling and geographical traceability databases for the majority of important timber species in Malaysia would enhance the capacity of the Forestry Department officials to curb the problem of illegal logging activities, and issues related to chain-of-custody certification. This will indirectly ensure the conservation and sustainable utilization of forest resources in Malaysia.

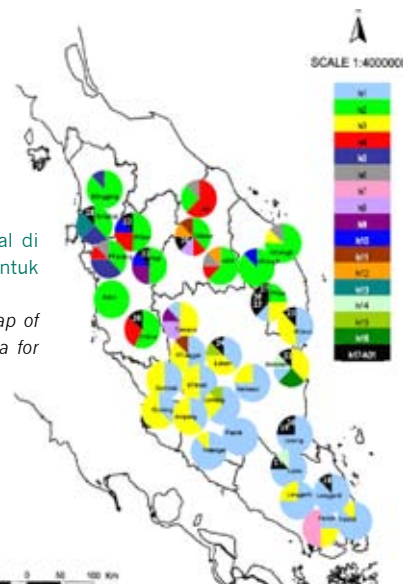


Bukti pemprofilan DNA dengan pembandingan profil DNA balok dan tunggul untuk aplikasi forensik

DNA profiling evidence by comparing DNA profiles of log and the stump for forensic application



Cengal terbesar ditemui di Hutan Simpan Pasir Raja, Terengganu
The biggest cengal in Malaysia found at Pasir Raja Reserved Forest, Terengganu



Peta taburan haplotip cengal di Semenanjung Malaysia untuk persijilan berantai jagaan
The haplotype distribution map of cengal in Peninsular Malaysia for chain of custody certification

Pencarian Ekstrak Aktif Tumbuhan yang Berpotensi sebagai Agen Menentang Kanser

Pusat Penyelidikan Proteomik kini sedang menjalankan kajian penyaringan antikanser ke atas spesies tumbuhan hutan Malaysia yang berpotensi sebagai agen terapeutik berasaskan tumbuhan. Empat spesies tumbuhan Malaysia telah dipilih berdasarkan kajian etnobotani dan dinilai menggunakan teknik *in vitro* terhadap sel kanser payu dara manusia adenokarsinoma MCF7, sel kanser payu dara manusia duktus karsinoma T47D dan sel-sel ovari manusia adenokarsinoma SK-OV-3 dan Caov3. Berdasarkan kriteria yang dikeluarkan oleh WHO, ekstrak mentah tumbuh-tumbuhan yang dapat membunuh 50% sel-sel tumor pada kepekatan yang kurang daripada 10 µg/ml terhadap kedua-dua sel kanser ini akan diterima sebagai aktif bagi memudahkan proses pemilihan pencarian sebatian novel antikanser. Fraksi etil-asetat satu spesies tumbuhan yang terpilih telah diterima sebagai aktif terhadap sel-sel kanser payu dara dan kanser ovari dengan nilai IC₅₀ 0.3-6.9 µg/ml. Fraksi yang aktif ini difraksi lagi menggunakan Sepbox 2D-250, yang secara automatik memisahkan sampel ekstrak kepada komponen-komponen kimia individu. Sejumlah 40 fraksi telah dipilih daripada ribuan fraksi yang terhasil berdasarkan profil kromatografi yang dijana, dan ditujukan kepada aktiviti antiproliferasi terhadap kedua-dua sel kanser. Satu fraksi yang ketara dengan nilai IC₅₀ 1.5 µg/ml telah dikenal pasti sebagai sebatian pemula kepada kanser payu dara dan dikenali sebagai CO-II.

Hasilnya satu pendedahan reka cipta FRIM telah diperolehi—ID5/07 (2007): CO-II sebagai satu fraksi aktif tumbuhan terpilih terhadap sel kanser payu dara manusia (MCF7 & T47D).



SepiaTech SepBox 2D-250

Sistem Penyediaan dan Penulenan Sampel Bioaktif secara Automasi Menyeluruh. Penyaringan daya pemrosesan tinggi yang efisien, tulen dan lebih daripada 90% kadar perolehan semula menggunakan pengasingan dua dimensi

SepiaTech SepBox 2D-250

Fully Automated Bioactive Sample Preparation and Purification System. High throughput screening with maximum efficiency, purity and more than 90% recovery rate using two dimensional separation

In Search of Active Plant Extracts as Potential Agents Against Cancer

The Centre for Proteomic Research is involved in anticancer screening studies of Malaysian forest plant species for developing plant-based therapeutic agents. Four plant species, selected based on their ethnobotanical information, were evaluated for *in-vitro* anticancer activity in cell assay systems using the human breast adenocarcinoma cell MCF7, human breast ductal carcinoma cell T47D and human ovarian adenocarcinoma (SK-OV-3 and Caov3) cell lines. Based on the criteria set by the World Health Organization (WHO), crude extracts of plants that are able to kill 50% of the tumor cells for both cancer cell lines at a concentration of less than 10 µg/ml are considered as active. This will narrow down the selection process towards the discovery of novel anticancer compound(s). The ethyl acetate fraction of one of the selected species was considered active against the two cell lines with low IC₅₀ values (IC₅₀ 0.3–6.9 µg/ml). The active fraction was further fractionated using Sepbox 2D-250, which automatically separated sample extracts into individual chemical components. A total of 40 fractions were further selected from thousands of fractions based on their chromatographic profiles, and assayed for antiproliferative activity against both cancer cell lines. One significant fraction with IC₅₀ 1.5 µg/ml was determined as a lead compound for breast cancer therapy, known as CO-II. From the results, an invention disclosure was submitted—FRIM ID 5/07 (2007): CO-II as an active fraction from one of the selected species against human breast cancer cell lines (MCF7 and T47D).



Kajian *in-vitro* yang dinilai menggunakan asai SRB untuk mengenal pasti CO-II sebagai sebatian pemula bagi menentang kanser payu dara

In-vitro study using SRB Assay to detect CO-II as lead compound against breast cancer

Pembangunan Sistem CATS-Bank di Makmal Teknologi Biji Benih

Computer Aided Tree Seed Bank Management System (CATS-Bank) yang dibangunkan oleh sekumpulan saintis di bawah Program Bioteknologi dan Farmaseutikal dan Cawangan Teknologi Maklumat. Sistem ini bertujuan untuk membantu Makmal Teknologi Biji Benih (MTBB) FRIM dalam pengurusan data kajian biji benih yang telah dimulakan seawal tahun 1985. Ia juga merupakan sebahagian daripada projek dalam penubuhan bank biji benih. Sistem yang telah dibangunkan ini digunakan secara aktif oleh personel-personel di MTBB untuk mendaftar biji benih yang dikutip, memasuk serta menganalisis

Development of CATS-Bank System in the Seed Technology Laboratory

Computer-Aided Tree Seed Bank (CATS-Bank) is a computer-based system developed by the Biotechnology and Pharmaceutical Programme together with the Information Technology Branch. This system facilitates the Seed Technology Laboratory in managing seed testing data that have been collected since 1985. It is also one of the main research components engaged in the establishment of a tree seed bank in FRIM. Among the features included in this user-friendly system are seed registration, seed data input and analysis of data, where the data are displayed graphically. In addition, the data displayed can be accessed by researchers from other units



data-data kajian kualiti biji benih. Hasil keputusan analisis tersebut dipaparkan dalam bentuk visual mesra pengguna yang boleh diakses oleh saintis yang memerlukan maklumat biji benih yang berkaitan. Sistem ini membolehkan pengurusan data kajian biji benih yang bermula daripada kutipan sehinggalah keputusan analisis diperoleh, dapat diuruskan dengan lebih teratur dan berkesan.

if they require information on seed quality. CATS-Bank allows data on seed research and seed handling to be managed systematically and effectively.

Pembangunan Sistem Pemerahan Sap dari Batang Kelapa Sawit bagi Penghasilan Bioetanol

Batang kelapa sawit (OPT) merupakan salah satu sumber biojisim diperbaharu yang dihasilkan daripada industri minyak sawit di Malaysia. OPT didapati apabila pokok kelapa sawit ditebang semasa program penanaman semula atau untuk tujuan pembangunan. OPT mengandungi gula mirip tebu di dalam air perahannya (sap). Sap dihasilkan melalui proses pemerahan menggunakan mesin-mesin yang dicipta khas. Objektif utama projek FRIM-JIRCAS adalah untuk membangunkan sistem pemerahan sap daripada batang kelapa sawit yang akan diproses menjadi bioetanol melalui proses penapaian. Kandungan gula di dalam sap OPT berpotensi untuk dijadikan bioetanol. Bioetanol boleh dicampur dengan petrol pada kadar tertentu yang boleh menjimatkan penggunaan bahan bakar fosil.



Program Penanaman Semula Kelapa Sawit
Oil Palm Replanting Program



Persediaan penghantaran balak ke Jepun
Preparation of log shipment to Japan

Purata keluasan tanaman sawit yang berpotensi untuk ditebang pada tahun 2007–2031 ialah sebanyak 54 000 ha bersamaan 7.29 juta pokok sawit (135 pokok/ha). Kawasan yang mempunyai dirian pokok sawit berumur 25 tahun ke atas paling luas terdapat di sebelah timur dan selatan Semenanjung Malaysia merangkumi negeri Johor, Pahang, Melaka, Terengganu dan Kelantan.

Sebanyak lebih kurang 200 liter sap boleh diperah daripada satu batang sawit yang mengandungi 8.5% kandungan gula. Data yang diperoleh membolehkan unjuran purata gula tahunan yang boleh dijana daripada batang pokok sawit yang tua (25 tahun) iaitu sebanyak 124 000 tan gula bersamaan 66.7 juta liter bioetanol setahun selama 25 tahun akan datang.

Development of a Sap-Squeezing System for Oil Palm Trunk for Production of Bioethanol

The oil palm trunk (OPT) is one of the renewable biomass generated from the oil palm plantation in Malaysia. OPTs are available during replanting programme or when the plantation is cleared for other development. The OPT is almost similar to sugarcane and its sap contains sugars. The sap can be extracted through a squeezing process using specially fabricated machines. The main objective of FRIM-JIRCAS project is to develop the sap-squeezing system for OPT where the collected sap will be converted into liquid biofuel, i.e. bioethanol, through the fermentation process. The sugars available in the OPT sap have the potential to be converted into bioethanol. The bioethanol can be blended with petrol at a certain ratio where its application leads to improvement in fossil fuel combustion.

The average area available annually for felling from year 2007–2031 is 54 000 ha consisting of 7.29 million trees (135 trees/ha). The largest area was found to be in the eastern and southern region of Peninsular Malaysia being in the states of Johor, Pahang, Melaka, Terengganu and Kelantan.

About 200 litres of sap could be extracted from one oil palm trunk containing about 8.5% sugar. These data allow estimation of sap available annually for the production of bioethanol from old (25 years old) standing trees available annually. Based on the data, the estimated average amount of sugars available annually is about 124 000 tons which is equivalent to the production of 66.7 million liters of bioethanol annually for the next 25 years.



Pemerahan sap menggunakan teknik tekanan sejuk
Sap squeezing technique via cold pressing



Pemerahan sap menggunakan teknik tekanan torak
Sap squeezing technique via roller pressing

POPS Lumber™ – Kayu Terjurutera dari Batang Kelapa Sawit

Reka cipta yang dinamakan POPS Lumber™ (Parallel Oil Palm Strand Lumber) ialah kayu terjurutera yang dihasilkan daripada veneir batang kelapa sawit yang diracik, digam, disusun selari dan dikapit. POPS Lumber™ dibangunkan oleh sekumpulan penyelidik FRIM yang diketuai oleh Dr Wan Tarmeze Wan Ariffin itu boleh dijadikan sebagai bahan mentah alternatif kepada industri pembuatan produk kayu berpanduan fakta bahawa secara purata lebih daripada 10 juta pokok kelapa sawit akan ditebang setiap tahun. Sifat fizikal, mekanikal dan ketahanan POPS Lumber™ boleh diolah menurut penggunaan akhir bahan tersebut, antara lain, untuk bahan binaan rumah, landskap kejur dan perabot. Usaha mengkomersialkan bahan binaan yang mesra alam ini telahpun bermula apabila syarikat Signature POPS Sdn. Bhd. menandatangani perjanjian dengan FRIM bagi tujuan tersebut. POPS Lumber™ telah didaftarkan bagi permohonan paten (PI 20080859).



Dr Wan Tarmeze menerima anugerah pada Pameran Reka Cipta Geneva kali ke-36

Dr Wan Tarmeze receiving the awards at the 36th Geneva Invention Exhibition

POPS Lumber™ – Engineered Lumber From Oil Palm Trunk

The POPS Lumber™ (Parallel Oil Palm Veneer Lumber) is an engineered lumber made of oil palm veneers which have been clipped, resinated, parallelly laid-up and compressed. It was invented by a group of FRIM scientists led by Dr Wan Tarmeze Wan Ariffin. POPS Lumber™ can become an alternative raw material for the wood-based industry taking into account that on average, there are more than 10 million oil palm trees felled annually. The physical, mechanical and durability properties of POPS Lumber™ can be tailored to various end-uses such as building materials for houses, hard landscaping and furniture. The effort to commercialize this environmental-friendly building material has started with Signature POPS Sdn Bhd signing an agreement with FRIM. POPS Lumber™ has been registered for product patent application (PI 20080859).

Inducement of Gaharu for Commercial Production Through Patented Technology

Agarwood or gaharu (*Aquilaria*) is one of the world's most expensive non-timber forest products fetching prices up to RM16 000 per kg for different grades. Malaysia is one of the range states still exporting natural gaharu. However, the natural populations of gaharu producing species, mainly *Aquilaria* species, are facing immense harvesting pressures. To address the issues of sustainable supply and to ease the harvesting pressure and threat to the natural populations of *Aquilaria* species, cultivation is the obvious alternative.

Viet Nam, through the Tropical Rainforest Project, has developed and patented the inducement technique using the CAKit on *Aquilaria crassna*. This technology has been tried successfully in Thailand, Nepal and Papua New Guinea. FRIM has received many queries on the CAKit. Consequently, FRIM initiated a project proposal to seek funding from MOSTI through the application of TechnoFund under the Agrobiotechnology Institute. The project to look into the effectiveness of this technique on Malaysian karas (*Aquilaria malaccensis*) was approved in late 2006. FRIM as the leading agency works in close collaboration with the Sabah Forestry Department, Sarawak Forestry Department (through the Sarawak Forestry Corporation) and Nuclear Malaysia Agency (ANM). It is a three-year project and its findings will indicate the effectiveness of the technique.

The project activities include inviting the consultant scientists of CAKit from the University of Minnesota, United States of America, to set up three demonstration

Pengaruh Gaharu untuk Komersialisasi Melalui Teknologi yang Dipatenkan

Gaharu (*Aquilaria*) atau 'agarwood' merupakan salah satu daripada sumber hutan bukan kayu yang termahal di dunia dan harga kayu gaharu daripada pelbagai jenis gred boleh mencapai nilai sehingga RM16 000 sekilogram. Malaysia merupakan salah sebuah negara pengeluar yang masih mengeksport kayu gaharu asli. Walau bagaimanapun populasi dan taburan spesies *Aquilaria* semakin berkurangan di dalam hutan dan kini menghadapi tekanan dari luar negara untuk mengurangkan penebangan pokok karas dari hutan hujan tropika. Bagi mengatasi isu ini dan mengurangkan pengutipan kayu gaharu secara berleluasa dari hutan, perladangan karas merupakan satu pilihan yang terbaik.

Menerusi Projek Hutan Hujan Tropika, negara Viet Nam telah menghasil dan mempatenkan teknik pengaruhan menggunakan CAKit terhadap pokok *Aquilaria crassna*. Teknologi ini telah berjaya diuji di Thailand, Nepal dan Papua New Guinea. FRIM turut menerima banyak pertanyaan tentang teknik CAKit ini. Justeru, FRIM telah mengambil inisiatif untuk memohon dana penyelidikan daripada MOSTI melalui TechnoFund di bawah Institut Agrobioteknologi untuk mencuba teknik ini ke atas pokok karas (*A. malaccensis*) di Malaysia. Projek ini telah diluluskan pada penghujung tahun 2006 dan FRIM sebagai agensi pelaksana telah berkerjasama dengan Jabatan Perhutanan Sabah, Jabatan Perhutanan Sarawak melalui Perbadanan Perhutanan Sarawak dan Agensi Nuklear Malaysia (ANM). Penemuan daripada projek penyelidikan tiga tahun ini diharapkan dapat memberi gambaran yang jelas terhadap keberkesanan teknologi ini.

Aktiviti projek termasuklah mengundang saintis pakar runding CAKit dari Universiti Minnessota, Amerika Syarikat, untuk menjalankan demonstrasi percubaan di tiga lokasi iaitu satu di Sabah dan dua di Semenanjung Malaysia (FRIM dan ANM). Pokok-pokok karas yang diinokulat akan dinilai untuk melihat keberkesanan teknologi berpaten ini.

Dijangkakan penemuan daripada projek ini dapat membantu perladangan gaharu secara lestari dan penghasilan gaharu yang berkualiti. Dalam masa yang sama, penemuan-penemuan ini dapat mencipta peluang-peluang baharu bagi industri dan perdagangan gaharu.

sites, one in Sabah and two in Peninsular Malaysia (FRIM and ANM). The production of gaharu in the treated trees will be evaluated to determine the effectiveness of this patented technology.

The findings from this project are expected to assist the establishment of karas plantations in a sustainable manner and production of good quality gaharu. At the same time, the findings would also help create new opportunities for a gaharu-related industry and trade.



CAKit mengandungi tiub PVC dan sebotol kapsul
CAKit comprises PVC tubes and a bottle of capsules



Dato' Dr Abdul Rashid bersama-sama Profesor Blanchette sedang menginokulat pokok
Dato' Dr Abdul Rashid inoculating a tree together with Professor Blanchette



Tiub PVC yang dimasukkan secara berlingkar ke dalam batang pokok karas yang dirawat
PVC tubes spirally inserted in a treated karas tree

Pemindahan Teknologi

Technology Transfer

FRIM terus menumpukan usaha dalam pemindahan teknologi. Selaras dengan objektif institut, maklumat tentang pengurusan dan pembangunan perhutanan, hasil hutan dan penggunaannya terus disebarkan kepada pelanggan melalui kursus, seminar, bengkel, persidangan, simposium dan pameran. Aktiviti pemindahan teknologi ini dianjurkan oleh FRIM ataupun anjuran secara kerjasama dengan agensi lain termasuklah organisasi dalam dan luar negara. Pada tahun 2008 Bahagian Pengurusan Sumber Manusia melalui program Latihan Awam yang dikendalikan oleh Cawangan Latihan telah berjaya menyumbang pendapatan kepada FRIM sebanyak RM825 000. Janaan pendapatan ini merupakan suatu pencapaian yang membanggakan sekaligus menunjukkan latihan yang dijalankan adalah berkualiti dan mendapat sambutan di kalangan agensi/jabatan kerajaan.

FRIM continues to focus its efforts in technology transfer. In line with the objectives of the institute, information regarding the management and development of forestry, forest products and their utilization was disseminated through training courses, seminars, workshops, conferences, symposia and exhibitions. Many of these activities were either organized solely by FRIM or jointly with other collaborative agencies—national and international organizations. A total of RM825 000 nett income was received through Public Training activities organized by the Training Branch of the Human Resource Management Division. The income generated from these activities was not only a proud achievement but also showed recognition by other government agencies for quality training courses offered.

KURSUS LATIHAN

TRAINING COURSES

BIL./ NO.	TAJUK / TITLE	TARIKH / DATE
1	Latihan Perisian Reka Bentuk dan Penggunaan Mesin CNC—Unit Reka Bentuk dan Bengkel Kerja Kayu	28 Januari – 1 Februari
2	Kursus Pengecaman Kayu untuk Kakitangan FRIM	12–15 Februari
3	Kursus Pengecaman Pokok dan Daun	3–13 Mac
4	Kursus Induksi Umum	8–13 Mac, 18–27 Mac, 5–10 April, 15–24 April, 12–17 Mei, 20–29 Mei, 14–19 Jun, 27 Julai – 1 Ogos, 2–7 Ogos, 7–12 Ogos
5	Kursus Tapak Semaian Komersial	24 – 28 Mac
6	Kursus Pengecaman Kayu untuk industri	25 – 27 Mac
7	Kursus Motivasi: Dimensi Diri	26 Mac
8	Kursus Statistik	3 – 4 April
9	Kursus Teknologi Herba (Asas)	7 – 11 April
10	Kursus Landskap & Penyelenggaraan Pokok (KKLW)	7 – 12 April
11	Kursus Survei Hutan	14 – 17 April
12	Kursus Landskap & Penyelenggaraan Pokok FRIM	21 – 25 April
13	Kursus Kecemerlangan Penyampaian Kaunter dan Telefon	22 – 24 April
14	Kursus Mensurasi & Pengurusan Hutan	22 – 25 April
15	Kursus Teknologi Herba	24 – 28 April
16	Kursus Induksi Khusus	29 April – 1 Mei
17	Kursus Pembangunan Produk Herba	12 – 14 Mei
18	Kursus PTK	12 – 19 Mei
19	Kursus Lamscant	20 – 23 Mei
20	Kursus Tapak Semaian Komersial-Sabah	23 – 28 Mei
21	Kursus Adobe PageMaker	26–28 Mei

**KURSUS LATIHAN
TRAINING COURSES**

BIL./ NO.	TAJUK / TITLE	TARIKH / DATE
22	Kursus Survei 2	9–12 Jun
23	Kursus Pengurusan Kacip Fatimah untuk Pharamaniaga	9–13 Jun
24	<i>Hands-on Training Course on Identification of Macrofungi</i>	10–13 Jun
25	Kursus Landskap & Penyelenggaraan Pokok -Sabah	12–19 Jun
26	Kursus Tapak Semaian	17–19 Jun
27	Kursus Pengsijilan Arboris	16–27 Jun
28	Kursus Adobe PageMaker	23–25 Jun
29	Kursus Penulisan Surat Rasmi dan Memo Berkualiti	23–25 Jun
30	Kursus Transformasi Budaya Kerja Cemerlang, Motivasi & Kerja Berpasukan	7–9 Julai
31	<i>International Training Course: Forest Biodiversity- Conservation and Management of Forest Genetic Resources, for Managers and Field Officers</i>	7–11 Julai
32	Kursus Pembangunan Produk Herba	19–21 Ogos
33	Kursus Interpretasi Jurupandu Alam	12–18 Oktober
34	Kursus Landskap Kejur	18–21 November
35	Kursus Reka Bentuk Perabot (AutoCad)	22–24 Disember

**SEMINAR, BENGKEL, SIMPOSIUM DAN PERSIDANGAN
SEMINARS, WORKSHOP, SYMPOSIUM AND CONFERENCES**

BIL./ NO.	TAJUK / TITLE	TARIKH / DATE
1	<i>Project Evaluation Meeting (MOSTI Projects)</i>	21–22 Januari, 9–11 May, 14–16 November
2	The International Symposium on Peat Swamp Forests	11–12 Mac
2	Bengkel Penerapan Alam Sekitar	21–23 Mac
3	<i>Rattan and Bamboo Seminar 2008: "Towards A Better Policy in Enhancing The Rattan & Bamboo Industry in Malaysia"</i>	25–26 Mac
4	<i>Workshop on Intellectual Property Awareness</i>	7–8 April
5	<i>Workshop on Traditional Knowledge Awareness among Indigenous People (Tasik Bera)</i>	15 April
6	<i>Soil Science Conference Malaysia</i>	15–17 April
7	<i>Workshop on Technical Writing for DBP Books</i>	5–7 Mei
8	<i>Workshop on Timber as Construction Material for Malaysian Technical Cooperation Program for ASEAN Countries - FRIM</i>	10 Mei
9	<i>Workshop on Traditional Knowledge Awareness among Indigenous People (Temengor)</i>	10 Jun
10	<i>Workshop on Database Management for Long-Term Ecological Research (LTER) in Malaysia</i>	1–2 Julai
11	<i>Project Evaluation Meeting (Non-MOSTI Projects)</i>	21–22 Julai
12	<i>Workshop on Standard Testing for Wood-based Product among ASEAN Region</i>	24–26 Julai
13	<i>National Workshop on Forest Genetic Resources Conservation and Management</i>	30 Julai
14	<i>Seminar on Capitalizing Forestry and Climate Change</i>	11 Ogos
15	<i>Workshop on Tissue Culture (A Day as a Scientist)</i>	26 Ogos
16	Seminar Tumbuhan Ubat & Beraroma	21–22 Oktober
17	<i>National Conference on Forest Products</i>	29–31 Oktober
18	<i>3rd Seminar on Forest Biotechnology</i>	11–12 November

SEMINAR, BENGKEL DAN PERSIDANGAN
SEMINARS, WORKSHOP AND CONFERENCES

BIL./ NO.	TAJUK / TITLE	TARIKH / DATE
19	<i>Workshop on Proficiency Testing for Wood Preservatives</i>	20 November
20	<i>Chemical Extraction and Structure Elucidation Workshop</i>	2–4 Disember

DIALOG/FORUM
DIALOGUES/FORUM

BIL./ NO.	TAJUK / TITLE	TARIKH / DATE
1	Dialog Bahagian Keluaran Hutan dengan Industri Berasaskan Kayu	20 Februari
2	<i>Technology Transfer Forum</i>	26–27 November

PAMERAN
EXHIBITIONS

BIL./ NO.	NAMA PAMERAN / EXHIBITION	TEMPAT / VENUE	TARIKH / DATE
1	Pameran MTE 2008	PWTC, KL	21–23 Februari
2	Pameran MIFF 2008	PWTC, KL	4–8 Mac
3	Pameran NATPRO 2008	PWTC, KL	27–29 Mac
4	Pameran Puspanita	Puspanitapuri, Putrajaya	31 Mac–3 April
5	Pameran Sempena Lawatan Menteri NRE ke FRIM	Auditorium FRIM	10 April
6	Pameran Herbal Asia 2008	Matrade, KL	8–11 Mei
7	Pameran Itex 2008	KLCC, KL	9–11 Mei
8	Hari Alam Sekitar Sedunia 2008	Zoo Negara	22 Jun
9	Hari Bertemu Pelanggan (NRE)	Pulau Tioman	1–2 Julai
10	Majlis Perasmian Belum Rainforest Resort dan Pulau Banding Rainforest Research Centre (MOU Emkay Land/FRIM)	Pulau Banding, Grik	9 Julai
11	Laman 2008	Taman Tasik Perdana, KL	19–27 Julai
12	Pameran Teknologi sempena Hari Peladang, Penternak dan Nelayan Perlis	Dataran Dato' Sheikh Ahmad, Kangar	24–27 Julai
13	Sempena Simposium Serantau Sekitaran dan Sumber Alam	Hotel Prince	5–6 Ogos
14	Pameran BioMalaysia	Kuala Lumpur Convention Centre	7–9 Oktober
15	Majlis Pelancaran Minggu Alam Sekitar Malaysia Peringkat Kebangsaan 2008	Paya Indah Wetlands, Dengkil,	20 Oktober
16	<i>Seminar on Medicinal Aromatic Plants 2008 "Herbal Globalisation: A New Paradigm for Malaysian Herbal Industry"</i>	Hotel Legend	21 Oktober
17	Hari Bertemu Pelanggan FRIM	Auditorium FRIM	24 Oktober
18	<i>National Conference on Forest Products 2008 (NCFP 2008)</i>	Hotel Legend	30 Oktober
19	Pameran Sempena Hari Kualiti 2008, Kementerian Sumber Asli dan Alam Sekitar	Wisma Sumber Asli, NRE Putrajaya	6 Oktober
20	Pameran Sempena Forum "Technology Transfer"	Auditorium FRIM	26 November

Seminar Rotan dan Buluh 2008

Seminar Rotan dan Buluh 2008 dengan tema “Ke Arah Dasar yang Lebih Baik dalam Memajukan Industri Rotan dan Buluh di Malaysia” anjuran bersama FRIM dan NRE, dengan sokongan serta kerjasama *Asia Pacific Association of Forestry Research Institutions (APAFRI)* telah mendapat sambutan yang amat menggalakkan. Seminar ini telah diadakan pada 25–26 Mac di Kuala Lumpur. Seminar tersebut telah dirasmikan oleh Menteri NRE, Y. B. Datuk Douglas Uggah Embas yang juga merupakan tugas rasmi pertama beliau di Kementerian. Objektif utama seminar tersebut adalah untuk mengenal pasti dan menyebarkan hasil penyelidikan dan pembangunan industri rotan dan buluh kepada agensi-agensi yang berkaitan serta mengenal pasti dasar serta insentif untuk mengatasi cabaran dalam industri berkenaan. Seramai 130 orang peserta yang mewakili agensi kerajaan dan swasta dari dalam dan luar negara dengan pelbagai bidang kepakaran—penyelidikan, industri, polisi dan penguatkuasaan turut hadir untuk meneliti 14 kertas kerja yang telah dibentangkan. Seminar ini bukan sahaja telah mengiktiraf rotan dan buluh sebagai bahan pelbagai guna malah telah melahirkan beberapa kaedah yang inovatif untuk mengatasi halangan-halangan dalam industri berkenaan.



Ucapan perasmian oleh Y. B. Datuk Douglas Uggah Embas
Opening speech by Y. B. Datuk Douglas Uggah Embas

Seminar Tumbuhan Ubatan dan Beraroma

Seminar Tumbuhan Ubatan dan Beraroma 2008 yang bertemakan “Globalisasi Herba: Paradigma Baru untuk Industri Herba Malaysia” diadakan dengan jayanya pada 21–22 Oktober di Kuala Lumpur. Seminar ini dirasmikan oleh Datuk Suboh Mohd. Yassin, Ketua Setiausaha, Kementerian NRE. Seminar ini telah menarik seramai 152 peserta dan sejumlah 87 kertas kerja (sembilan penceramah jemputan, 18 pembentangan lisan dan 60 pembentangan poster) telah dibentangkan semasa seminar. Ucaptama telah disampaikan oleh Prof. Diraja Dr Abdul Latif Ibrahim (UNISEL) manakala Prof. Pei Shengji (Kunming Institute of Botany, China) dijemput sebagai penceramah jemputan luar negara.

Rattan and Bamboo Seminar 2008

The Rattan and Bamboo Seminar 2008, themed “Towards a Better Policy in Enhancing the Rattan and Bamboo Industries in Malaysia”, was jointly organized by FRIM and NRE with support from the Asia Pacific Association of Forestry Research Institutions (APAFRI). The Seminar, which was held on 25–26 March in Kuala Lumpur, was well received by the participants. The seminar was officiated by the NRE Minister, Y. B. Datuk Douglas Uggah Embas, who also happened to be on his first official duty with the NRE. The main objectives of the seminar were to identify and disseminate information about the status of the rattan and bamboo industries, resources and R&D; and to determine challenges, incentives and policies to enhance these industries. The seminar was attended by 130 participants from various local and international government and private agencies, of various fields of expertise—research, industry, policy, law and enforcement. A total of 14 papers were presented. Not only did the seminar highlight the recognition of rattan and bamboo recognized as immensely useful material but it also gave birth to new innovative ways to solve some of the constraints faced by the rattan and bamboo industries.



Penyampaian cenderahati oleh Datuk Suboh Mohd. Yassin kepada Y. B. Datuk Douglas Uggah Embas

Token of appreciation presented by the Honourable Dato' Suboh Mohd. Yassin to Y. B. Datuk Douglas Uggah Embas

Medicinal and Aromatic Plants Seminar (MAPs)

The Medicinal and Aromatic Plants Seminar (MAPs) 2008 themed “Herbal Globalization: A New Paradigm for Malaysian Herbal Industry” was successfully held on 21–22 in Kuala Lumpur. It was officiated by Datuk Suboh Mohd. Yassin, Secretary General, NRE. The seminar attracted 152 participants and 87 papers (nine invited papers, 18 oral presentations and 60 poster presentations) were delivered during the seminar. The keynote address was delivered by Prof. Emeritus Dr Abdul Latif Ibrahim (UNISEL) and Prof. Pei Shengji (Kunming Institute of Botany, China) was invited as the international speaker. There were also nine

Di samping itu, Seminar ini berjaya menarik sebanyak sembilan penyertaan pameran oleh agensi swasta dan kerajaan. Objektif seminar ini adalah untuk:

- Mengetengah, merangsang dan saling berkongsi maklumat tentang penemuan saintifik, teknologi dan aplikasi yang berkaitan dengan tumbuhan ubatan dan beraroma;
- Mewujudkan satu forum perbincangan untuk meneroka, saling bertukar, mengemas kini serta mengemukakan hasil-hasil kajian, penemuan saintifik dan teknologi, teknologi terkini, produk-produk dan perkhidmatan berkaitan dengan penyelidikan tumbuhan ubatan dan beraroma;
- Mengerat perhubungan dan jaringan kerjasama antara individu yang terlibat dengan tumbuhan ubatan dan beraroma.



Datuk Suboh sedang merasmikan MAPs 2008

Datuk Suboh officiating MAPs 2008

Seminar Ketiga Bioteknologi Perhutanan 2008

Seminar Ketiga Bioteknologi Perhutanan 2008 yang bertemakan "Memperkasakan Keupayaan Bioinformatik dalam Bioteknologi Perhutanan" telah diadakan pada 11–12 November. Antara isu-isu yang dikemukakan dalam seminar ini ialah aspek polisi, peluang perniagaan dan pembangunan karier berkaitan bioinformatik serta aplikasi bioinformatik dalam sektor awam dan swasta. Sebanyak 22 kertas kerja telah dibentangkan oleh pengamal utama dalam bidang bioteknologi dan bioinformatik seperti FRIM, Lembaga Minyak Sawit Malaysia (MPOB), MBC, MTDC, MGI, Kementerian Sains, Teknologi dan Inovasi,

booths set up by exhibitors from various private companies and government agencies. The aims of the seminar were:

- *To highlight, stimulate and share scientific and technological findings from research, development and application related to medicinal and aromatic plants;*
- *To provide a forum for discussion, exploration, formulation of strategies and exchange of ideas, experiences, state-of-the-art technologies, products and services;*
- *To strengthen ties and facilitate networking between individuals working on medicinal and aromatic plants.*



Pendaftaran peserta seminar / Registration of participants

The Third Seminar on Forest Biotechnology 2008

The Third Seminar on Forest Biotechnology 2008 themed "Strengthening Bioinformatics Capabilities in Forest Biotechnology" was held on 11–12 November. Among the issues highlighted during the seminar were aspects of policies, business opportunity and career development in bioinformatics, as well as the application of bioinformatics in government and private sectors. Twenty two papers were presented during the seminar by the key players in biotechnology and bioinformatic such as FRIM, MPOB, MBC, MTDC, MGI, MOSTI, MIMOS, USM, UKM, UTM, UPM, UM, INFOVALLEY Group, Synamatix, Asiatic, Cradle Fund, Bionusantara, Franz Inc, Holista Biotech, Genseq and Warisan Asal. Twenty-two posters were presented and three posters chosen as winners. The winners were Miss Sun Wan Fong and Mr Mohd Farid Ahmad from FRIM and Miss Ainul Zura Zulkepli from UTM. The Seminar was attended by 173 participants, comprising university students, researchers and lecturers.



YB Dato' Maznah Mazlan, Timbalan Menteri NRE merasmikan seminar

YB Dato' Maznah Mazlan, Deputy Minister of NRE officiating the seminar

MIMOS, Universiti Sains Malaysia (USM), Universiti Kebangsaan Malaysia (UKM), Universiti Teknologi Malaysia (UTM), Universiti Putra Malaysia (UPM), Universiti Malaya (UM), INFOVALLEY Group, Synamatix, Asiatic, Cradle Fund, Bionusantara, Franz Inc, Holista Biotech, Genseq dan Warisan Asal. Sebanyak 22 poster telah dibentangkan dan tiga poster terbaik telah dipilih sebagai pemenang iaitu Cik Sun Wan Fong dan En. Mohd Farid Ahmad dari FRIM dan Cik Ainul Zura Zulkepli dari UTM. Seminar ini telah dihadiri oleh 173 orang peserta yang terdiri daripada pelajar institusi pengajian tinggi, penyelidik dan pensyarah.

Forum Pemindahan Teknologi

Pada 25 dan 26 November lepas, FRIM buat julung-julung kalinya telah menganjurkan Forum Pemindahan Teknologi untuk pelanggan-pelanggannya. Forum ini bertujuan untuk berkongsi maklumat dengan pelanggan penemuan-penemuan dalam penyelidikan dan pembangunan serta wadah untuk menggalakkan projek usaha sama selain untuk mewar-warkan perkhidmatan-perkhidmatan ujian yang ditawarkan. Sebagai institusi penyelidikan perhutanan tropika terulung di dunia, FRIM komited untuk menjalankan aktiviti penyelidikan dan pembangunan dalam bidang perhutanan, keluaran hutan dan isu-isu yang berkaitan dengan perhutanan.

Forum Pemindahan Teknologi ini dapat digunakan oleh para saintis FRIM sebagai platform untuk bertemu dan menjalin hubungan kerjasama dengan pelanggan berasaskan objektif-objektif berikut:

- Mempamerkan sebahagian daripada hasil R&D dan inovasi FRIM yang matang untuk dikomersialkan.
- Menarik perhatian bakal pelabur yang bersedia untuk membuat pelaburan bagi pembangunan seterusnya, perekaan bentuk produk, aplikasi kejuruteraan dan uji kaji kualiti sebelum diperkenalkan ke pasaran.
- Mempromosi dan mengumumkan perkhidmatan yang boleh ditawarkan oleh FRIM kepada industri.
- Memperkukuh hubungan dengan industri

Sejumlah 211 pihak yang berkepentingan yang mewakili 151 syarikat persendirian dan agensi serta institusi kerajaan telah hadir di sepanjang forum dua hari tersebut selain 120 pegawai dan kakitangan FRIM yang datang memberi sokongan ke forum yang dirasmikan oleh Datuk Suboh Mohd. Yassin, Ketua Setiausaha Kementerian NRE. Lebih daripada 15 projek yang merangkumi pelbagai bidang yang berpotensi untuk dikomersialkan telah dibentangkan oleh penyelidik FRIM. Projek-projek ini termasuk biosumber, gentian semula jadi, bioasai, formulasi

Technology Transfer Forum

FRIM organized a Technology Transfer Forum on 25 and 26 November for her stakeholders and clients for the purposes of sharing her research and development (R&D) findings and encouraging possible joint ventures in product development or enhancement as well as offering services for product quality testing. Being one of the leading tropical forest research institutions in the world, FRIM is committed to carrying R&D in forestry, forest products and other forestry-related fields. Over the years, FRIM has contributed significantly to the development of the forestry and forest-related sectors in the country.

The Technological Transfer Forum will serve as a platform for FRIM scientists to meet and interact with the stakeholders, with the following objectives:

- *to showcase some of FRIM's R&D outputs and innovation which are ready for commercialization;*
- *to attract potential investors prepared to invest significant resources for further development of products, product designs, applications of engineering and quality testing of products prior to commercializing;*
- *to promote and publicize the services FRIM has to offer to industries; and*
- *to strengthen relationship between FRIM and the industries.*

A total of 211 stakeholders representing 151 private and government agencies and institutions attended the two-day forum aside from 120 FRIM officers and staff. The forum was officiated by Datuk Suboh Mohd. Yassin, Secretary General of NRE. At the forum, more than 15 projects covering a wide spectrum of findings with



produk dan kawalan kualiti, teknologi pengekstrakan, bahan termaju, perhutanan dan hasil hutan selain landskap dan hutan bandar. Turut diadakan satu sesi khas tentang 'Sumber Tongkat Ali Secara Berkekalan' pada hari kedua yang dibentangkan oleh pegawai FRIM dan pembentang jemputan disusuli dengan sesi dialog yang dipengerusikan oleh Dato' Dr Abdul Rashid Ab. Malik, Timbalan Ketua Pengarah (Penyelidikan) FRIM. Dua agensi kewangan dari SMIDEC dan MTDC telah memberikan maklumat terperinci tentang program dan jenis bantuan yang ditawarkan oleh agensi-agensi tersebut.

Sesi bertemu pelanggan turut diadakan untuk menggalakkan pelanggan berinteraksi secara langsung dengan penyelidik FRIM akan kemungkinan untuk mengadakan kerjasama, keperluan-keperluan penyelidikan, penyelesaian masalah dan sebagainya. Para pelanggan turut mengambil kesempatan untuk mendapatkan maklumat perkhidmatan-perkhidmatan yang ditawarkan FRIM. Selain itu, pameran aktiviti R&D turut diadakan.

Bengkel Penerapan Pendidikan Alam Sekitar untuk Pembelajaran di Luar Bilik Darjah

Bengkel Penerapan Pendidikan Alam Sekitar untuk Pembelajaran di Luar Bilik Darjah yang dianjurkan oleh Cawangan Pengurusan Rekreasi dan Pendidikan telah dilaksanakan dengan jayanya sepanjang tahun 2008. Seramai 66 orang guru telah mengikuti bengkel berkenaan yang dijalankan melalui tiga sesi berasingan iaitu pada 21–23 Mac, 9–11 Mei dan 14–16 November.

Bermula dari tahun pertama pelaksanaan iaitu pada tahun 2007, Bengkel Penerapan Pendidikan Alam Sekitar untuk Pembelajaran di Luar Bilik Darjah mensasarkan guru Kelab Pecinta Alam (KPA) sebagai peserta. Ini ialah kesinambungan kerjasama antara pihak FRIM, Persatuan Pecinta Alam selaku penaux KPA dan Kementerian Pelajaran Malaysia dalam usaha meningkatkan kefahaman dan kemahiran para guru sebagai pemudah cara dalam melaksanakan pendidikan alam sekitar di peringkat sekolah.

Bengkel berkenaan dilaksanakan di Pusat Pendidikan Alam Semula Jadi FRIM-MNS-SHELL dan dikendalikan oleh kakitangan Cawangan Pengurusan Rekreasi dan Pendidikan serta kakitangan Persatuan Pecinta Alam. Bengkel tersebut mengetengahkan persekitaran FRIM sebagai kawasan pembelajaran luar bilik darjah bagi pendidikan alam sekitar, di samping berkongsi kerian dan faedah yang diperoleh melalui alam sekitar. Aktiviti-aktiviti berasaskan alam seperti aktiviti tanah lembap, kitar semula dan aktiviti taman

potential for commercialization were presented by FRIM researchers. The projects included bioresources, natural fibres, bioassays, product formulation and quality control, extraction technology, advanced materials, forestry and forest products as well as landscape and urban forestry. There was also a special session on Sustainable Supply of Tongkat Ali on the second day presented by both FRIM officers and invited speakers, followed by a dialogue chaired by Dato' Dr Abdul Rashid Ab. Malik, Deputy Director General (Research and Development) FRIM. Two grant managers namely SMIDEC and MTDC, gave a very lively and informative presentation on the grants provided by the respective agencies.

"Clinic sessions" were also held throughout the two-day forum to encourage stakeholders to interact directly with FRIM researchers on a one-to-one basis regarding possible collaboration, research needs, finding solutions, etc. Clients also took the opportunity to learn more about the various services offered by FRIM. In addition, there was an exhibition highlighting FRIM's R&D activities.

Workshop on Integrated of Environmental Education for Outdoor Learning

The Workshop on Integration of Environmental Education for Outdoor Learning, organized by the Recreation Management & Environmental Education Branch, was successfully carried out in 2008. A total of 66 teachers participated in the workshop which was conducted on 21–23 March, 9–11 May and 14–16 November 2008.

Since the beginning of its implementation in 2007, the workshop had targeted teachers of Kelab Pecinta Alam (KPA) as its participants. This is a continuation of the collaboration between FRIM, Malaysian Nature Society (MNS) as a patron to KPA and Ministry of Education in order to increase the understanding and skills of teachers who act as a platform to implement environmental education in schools.

The workshop was carried out at the Nature Education Centre FRIM-MNS-SHELL and conducted by the staff of the FRIM Recreation Management & Environmental Education Branch and the MNS. The workshop promoted FRIM's environment as an outdoor learning area for environmental education besides sharing the excitement and benefit from nature. Nature-based activities undertaken in FRIM such as the wetland, recycling and forest science park activities were some of the hands-on activities offered as reference for implementation of school environmental education programmes. Furthermore, the workshop offered a venue for sharing ideas and experiences on the implementation of environmental education activities in schools.

sains rimba merupakan antara aktiviti amali yang ditawarkan sebagai panduan dalam melaksanakan aktiviti di dalam kawasan sekolah mahupun di kawasan lain yang bersesuaian. Bengkel tersebut turut menjadi ruang perkongsian idea dan pengalaman berkenaan pelaksanaan aktiviti-aktiviti pendidikan alam sekitar di sekolah masing-masing.

Bengkel tersebut dibiayai oleh Projek LEVI: Assess Needs, Benefits and Effectiveness of Environmental Education for Plant Conservation dan Rancangan Malaysia ke-9: Projek Pemantauan dan Keberkesanan Pendidikan Alam Sekitar. Bermula dari 2007 hingga 2008, seramai 152 orang guru telah mengikuti bengkel berkenaan dan bengkel tersebut akan diteruskan sepanjang RMK-9.

The workshop was funded by LEVI Project: Assess Needs, Benefits and Effectiveness of Environmental Education for Plant Conservation and the Ninth Malaysian Plan: Projek Pemantauan dan Keberkesanan Pendidikan Alam Sekitar. From 2007 to 2008, a total of 152 teachers had participated in the workshop and this workshop will be continued throughout the Ninth Malaysian Plan.

Peserta mengenal pasti tumbuhan akuatik ketika aktiviti Tanah Lembap
The participants indentifying the aquatic plants during Wetland activities



Peserta menyediakan bahan pembelajaran bagi aktiviti Taman Sains Rimba
The participants preparing learning stuff on Taman Sains Rimba activity

Dana Penyelidikan dan Pembangunan Funding for Research and Development

FRIM menguruskan sebanyak 55 projek ScienceFund di bawah tajaan Kementerian Sains, Teknologi dan Inovasi (MOSTI) dan Kementerian Pertanian dan Industri Asas Tani (MOA) berjumlah RM9.1 juta. Daripada jumlah ini, tiga projek diluluskan pada tahun 2008 berjumlah RM554 000.

Bahagian Pengurusan Penyelidikan dan Ekonomi telah menganjurkan dua Bengkel Penilaian Projek (PEM) iaitu pada 21–22 Januari dan 21–22 Julai. Bengkel ini dibahagikan kepada dua sesi, iaitu sesi seminar dan sesi viva; dan diadakan bertujuan untuk memantau dan menilai kemajuan kesemua projek penyelidikan di FRIM.

FRIM managed a total of 55 R&D projects funded by Ministry of Science, Technology and Innovation (MOSTI) and Ministry of Agriculture and Agro-Based Industries (MOA) through the ScienceFund, amounting to a total of RM9.1 million. Of these, three projects were approved in 2008, which contributed an amount of RM554 000.

Two Project Evaluation Meeting (PEM) workshops were conducted by the Research Management and Economic Division from 21 to 22 January and from 21 to 22 July. Each workshop comprised two sessions, i.e. seminar and viva. The PEM is organized twice yearly to evaluate the progress of projects.

SCIENCE FUND YANG DILULUSKAN PADA 2008 (MOSTI) SCIENCE FUND APPROVED IN 2008 (MOSTI)

BIL./ NO.	TAJUK PROJEK / PROJECT TITLE	KETUA PROJEK / PROJECT LEADER
1	Potential of Polysaccharides Derived from <i>Leucaena leucocephala</i> as Antidiabetic Candidates	Abd. Rashid Li
2	Resistance-Modifying and Inhibitory Potential of Flavonoids from <i>Chromolaena odorata</i> and its Derivatives Against Multidrug-Resistant <i>Staphylococcus aureus</i> (MRSA) Clinical Isolates	Saiful Azmi Johari
3	Development of Biofungicide for Wood Panel Products Using Secondary Metabolites of White Rot Fungi	Dr Salmiah Ujang

Dua projek TechnoFund yang juga ditaja oleh MOSTI telah diluluskan pada tahun 2008 dan menyumbang sebanyak RM6.6 juta.

Two TechnoFund projects, also funded by MOSTI and approved in 2008, contributed a total of RM6.6 million.

TECHNOFUND (MOSTI)

BIL./ NO.	TAJUK PROJEK / PROJECT TITLE	KETUA PROJEK / PROJECT LEADER
1	Up-Scaling Technologies Tongkat Ali Hairy Root Culture Using Bioreactor Technology for the Production of Bioactive Compounds	Dr Nor Hasnida Hassan
2	Development of Anticholesterol Phytomedicine From <i>Tinospora crispa</i> (Patawali)	Dr Rasadah Mat Ali

Sejumlah RM5 juta dana diperoleh bagi empat projek di bawah *International Tropical Timber Organization* (ITTO).

A total of RM5 million for four on going projects was secured under the International Tropical Timber Organization (ITTO) fund.

DANA ITTO ITTO FUND

BIL./ NO.	TAJUK PROJEK / PROJECT TITLE	KETUA PROJEK / PROJECT LEADER
1	Strengthening National Capacity and Regional Collaboration for Sustainable Use of Forest Genetic Resources in Tropical Asia	Dr Woon Weng Chuen
2	A Comprehensive Information System for Sustainability of the Wooden Furniture Industry in Malaysia	Dr Norini Haron
3	Conservation of Biological Diversity through Sustainable Forest Management Practices	Dr Shamsudin Ibrahim
4	Improving Utilization and Value Adding of Plantation Timbers from Sustainable Sources in Malaysia	Dr Tan Yu Eng

Di bawah dana penyelidikan kerajaan yang dikenali sebagai Tabung Pembangunan Industri Kayu-Kayan Malaysia (TPIKM), FRIM berjaya memperoleh dua pembiayaan berjumlah RM2.3 juta. Manakala PETRONAS pula menyumbang sebanyak RM1.9 juta untuk membiayai projek biofuel. ITTO CITES/Kerajaan Malaysia turut mengagihkan dana kepada projek penyelidikan FRIM berjumlah USD 183 050 (RM640 675).

Under a government fund called Tabung Pembangunan Industri Kayu-Kayan Malaysia (TPIKM), FRIM managed to secure two projects worth a total of RM2.3 million. Meanwhile, PETRONAS funded a RM1.9 million project on biofuel and the ITTO CITES/Government of Malaysia contributed US\$183 050 (RM640 675).

DANA LAIN OTHER FUNDS

BIL./ NO.	TAJUK PROJEK / PROJECT TITLE	KETUA PROJEK / PROJECT LEADER
1	Generation of Spatial Distribution Maps of <i>Gonystylus bancanus</i> (Ramin) Using Hyperspectral Technology and Determination of Sustainable Level of Harvest of Ramin in Production Forests of Peninsular Malaysia—ITTO CITES/ Government of Malaysia Fund	Dr Ismail Harun
2	Development of Second Generation Biofuel from Biomass via Pyrolysis Technique: Pretreatment of EFB—PETRONAS Fund	Dr Wan Asma Ibrahim
3	A Study on Domestic Trade of Timber and Timber Products in Peninsular Malaysia—TPIKM Fund	Dr Norini Haron
4	Kajian Genetik ke Atas Ramin Melawis (<i>Gonystylus bancanus</i>) di Malaysia untuk Penghasilan Maklumat Struktur Genetik Populasi dan Pangkalan Data DNA untuk Mengesan Aktiviti Penyeludupan—TPIKM Fund	Dr Kevin Ng Kit Siong

Sebanyak 20 projek baharu telah diluluskan di bawah Geran Penyelidikan dan Prakomersialisasi berjumlah RM1.4 juta.

Twenty new projects granted under the Research and Pre-Commercialization Grant (GPP) contributed a total of RM1.4 million.

**TABUNG GERAN PENYELIDIKAN DAN PRAKOMERSIALISASI
RESEARCH AND PRE-COMMERCIALIZATION GRANT**

BIL./ NO.	TAJUK PROJEK / PROJECT TITLE	KETUA PROJEK / PROJECT LEADER
1	Encapsulation of Tongkat Ali Somatic Embryos	Rosilah A. Aziz
2	Production of New <i>Acacia</i> Hybrids Vigour through Artificial Hybridization Between Selected <i>Acacia</i> from Selected Mother Trees	Dr Mohd Noor Mahat
3	Antioxidant Evaluation on the Leaf of <i>Persicaria coronarium</i> Towards the Production of Natural Antioxidant Standardized Extract for Product Development	Dr Vimala Subramaniam
4	The Ecology, Yield and Enhancement of the Stem Properties of Small-Sized Rattan, <i>Calamus javensis</i> Blume	Dr Nur Supardi Md. Noor
5	Qualitative Alkaloid Profiling of Tropical Plants from Selected Forest	Dr Abd. Rahman Kassim
6	Assesment of Potential Land Areas and Cost Benefit Analysis of Afforestation/Reforestation Clean Development Mechanism (CDM) Projects in Peninsular Malaysia	Ariff Fahmi Abu Bakar
7	A Comprehensive Assessment of the Carbon Stock and Flux in Selected Plantation Forest, Peninsular Malaysia	Faridah Ahmad Azam
8	Rapid Biodiversity Assessment of Selected Species of Bats in Peninsular Malaysia Using DNA Barcoding Approach	Dr Serafina Christine Fletcher
9	Molecular Phylogeny of <i>Lignosus</i> spp. (Cendawan Susu Harimau) Implications for Taxonomy and Utilization	Thi Bee Kin
10	Development of Potential Anti-Parasitic Drug Candidate: Study of Soil Actinomycetes for Activity Against Neglected Diseases Caused by <i>Trypanosoma brucei</i> Strain BS221	Lili Sahira Husin
11	Synthesis of Flavonoids Compounds with Bioactive Properties	Adiana Mohamed Adib
12	Evaluation of Properties of Kenaf Medium Density (<i>Hibiscus cannabinus</i>) Particleboard Treated with Five Retardants	Izran Kamal
13	Improvement of Field Performance of Natural Five Geotextiles in Controlling Soil Surface Erosion Through a New Design	Dr Wan Asma Ibrahim
14	Chemical and Biological Evaluation of Water-Soluble Polysaccharide Extracts from <i>Morinda citrifolia</i> Fruits as Anti-Diabetic Candidate(s)	Abd Rashid Li
15	Fire Performance of Industrial Design Fire Door and Finger Jointed Door Frame	Khairul Azmi Jabbar
16	Selection of Three Varieties of Superior <i>Labisia pumila</i> (Kacip Fatimah) Genotypes from Natural Populations in Peninsular Malaysia for Developing Base Breeding Populations	Farah Fazwa Md. Ariff
17	Systematic Studies of Selected Taxa of Plants (<i>Erycibe</i> [Convolvulaceae], <i>Chirita</i> , <i>Henckelia</i> Sections <i>Boeopsis</i> , <i>Loxocarpus</i> and <i>Salicini</i> [Gesneriaceae] and <i>Utricularia</i> [Lentibulariaceae]) in Peninsular Malaysia	Chew Ming Yee
18	Terrestrial C and N Stocks in Tree Stands of a Degraded Ecosystem	Dr Ho Wai Mun
19	Volume Timber Recovery, Grade Yield and Wood Properties of 12 Years Old Sesenduk Clone	Khairul Masseat
20	Comparison of Different Plating Techniques for Microbial Enumeration in Herbal Based Products	Norul Aiman Yusoff

Memorandum Persefahaman/perjanjian

Sebanyak 11 Memorandum Persefahaman (MoU) dan 14 Perjanjian telah ditandatangani antara MRFDB dan pelbagai pelanggan dan pihak industri ke arah meningkatkan keupayaan R&D FRIM; serta memenuhi kehendak pasaran dan pelanggan. Antara MoU dan Perjanjian yang ditandatangani adalah dengan *Singapore Botanic Gardens*; *Malaysian Nature Society* dan *Shell Malaysia Bhd*; *Malaysian Technology Development Corporation Sdn Bhd*; *Malaysian Biotechnology Corporation Sdn Bhd*; *Nimura Genetics Solutions (M) Sdn Bhd*; *Kementerian Kemajuan Luar Bandar dan Wilayah*; *Japan International Research Center for Agricultural Sciences (JIRCAS)*; dan *Muda Agricultural Development Authority (MADA)*.

Memorandum of Understanding/Agreement

A total of 11 Memoranda of Understanding (MoUs) and 14 agreements were approved and endorsed by the Board with various stakeholders and industrial parties to further enhance R&D capacities in FRIM and meet market demands as well as the needs of her stakeholders. Among the stakeholders were Singapore Botanic Gardens; Malaysian Nature Society and Shell Malaysia Bhd; Malaysian Technology Development Corporation Sdn Bhd, Malaysian Biotechnology Corporation Sdn Bhd, Nimura Genetics Solutions (M) Sdn Bhd, Kementerian Kemajuan Luar Bandar dan Wilayah, Japan International Research Center for Agricultural Sciences (JIRCAS) and Muda Agricultural Development Authority (MADA).



Ketua Pengarah FRIM di majlis menandatangani MoU antara MFRDB dan Shell- MNS
Director General FRIM at the signing of MoU between the MFRDB dan Shell- MNS

MEMORANDUM PERSEFAHAMAN MEMORANDUM OF UNDERSTANDING

BIL./ NO.	DOKUMEN DOCUMENT	AGENSI AGENCY	TARIKH T/TGN SIGNING DATE
1	Collaboration in Research and Development of a Novel Bioactive Constituent Measurement Assay to Determine I-kb Degradation Using a Cell-Based Luminescence System	Swaasth Inc.	23 Januari
2	R&D Project to Research and Develop the Process to Convert Oil Palm Biomass Waste (Empty Fruit Bunches) to Pulp and Its Co-Products Using the Caustic Soda Technology	Eko Pulp & Paper Sdn. Bhd. & Universiti Putra Malaysia & Malaysian Timber Industry Board	27 Januari
3	Memorandum of Understanding	Singapore Botanic Gardens	26 Februari
4	The Development of the Nature Education Centre	Malaysian Nature Society & SHELL Malaysia Bhd	6 Mac

MEMORANDUM PERSEFAHAMAN
MEMORANDUM OF UNDERSTANDING

BIL./ NO.	NAMA DOKUMEN DOCUMENT	AGENSI AGENCY	TARIKH T/TGN SIGNING DATE
5	Collaboration in the Field of Biomass for Energy	Mensilin Holdings Sdn Bhd	3 April
6	Agreement on FRIM-MTDC Graduates Bioentrepreneur Development ("FMBiosisTM")	Malaysian Technology Development Corporation Sdn. Bhd.	21 Mei
7	The Sustainable Development of the Rainforest Ecosystem at the Belum Temenggor Forest Complex	MKN Group Sdn. Bhd.	9 Julai
8	Development and Production of Value-Added Product(s) from Biomass Derived from Rice Industry Activities	Muda Agricultural Development Authority	9 Oktober
9	The Commercialization of an Integrated Carbonization and Activation Plant for the Production of Charcoal, Activated Carbon and Wood Vinegar (Pyroligneous Acid) from Oil Palm Kernel Shell	AE Carbontech (M) Sdn Bhd	30 Oktober
10	Product Improvement in the Field of Utilization of OPT for Manufacturing Flooring	Polypalm Wood Products Sdn Bhd	30 Oktober
11	To Establish A Working Relationship and Commence Negotiations in the Area of Wood Products Testing and Certification	Mutu Agung Lestari	17 Disember



Dato' Dr Abd. Latif selepas menandatangani MOU dengan MADA
 Dato' Dr Abd. Latif after MOU signing with MADA



Dr Abdul Rahim Nik di Majlis menandatangani perjanjian dengan Bionexus Partners
 Dr Abdul Rahim Nik at the agreement signing ceremony with Bionexus Partners

**PERJANJIAN
AGREEMENT**

BIL./ NO.	NAMA DOKUMEN DOCUMENT	AGENSI AGENCY	TARIKH T/TGN SIGNING DATE
1	Management Development Programme	Ventrax Management Sdn Bhd	1 Januari
2	Effects and Control of Biofueling on Mangrove Seedlings	University Malaya	29 Januari
3	Mangrove and Coastal Vegetation Establishment for Protection and Economic Enhancement	University Malaya	29 Januari
4	Natural Durability of Some Temperate Timber Species – Comparative Studies	Malaysian Timber Council	22 Februari
5	To Provide Services on Establishing Furniture Testing Laboratory at STIDC and Further Training to STIDC Staffs on the Said Laboratory	Sarawak Timber Industry Development Corporation	13 Mac
6	Exploratory Studies on Microbes from the Malaysian Tropical Forest in Relations to Their Potentials in the Development of Downstream Products	Nimura Genetics Solutions (M) Sdn Bhd	17 Mac
7	GIS Tree Mapping and Arbor Tracking System Project	Majlis Bandaraya Shah Alam	10 April
8	Development of an Ethanol Production System using Oil Palm Sap	Japan International Research Center for Agricultural Sciences	1 Mei
9	Pelaksanaan Latihan Kemahiran, Teknologi Makanan dan Teknologi Pertanian	Kementerian Kemajuan Luar Bandar Dan Wilayah	17 Jun
10	Implementation of MAL/04/G31 Project Document, “Conservation of Biological Diversity through Improved Forest Planning Tools”	Duke University	24 Julai
11	Development of <i>Tinospora crispa</i> (Patawali) as a Drug Candidate for Anti-Cholesterol	Ministry of Science, Technology and Innovation, Government of Malaysia	15 Ogos
12	Rancangan Kerjasama Projek Sistem Geoinformasi Perhutanan KPKKT	Kumpulan Pengurusan Kayu Kayan Terengganu	16 September
13	Development and Commercialization Programs on POPS Lumber™	Signature POPS Sdn Bhd	24 Oktober
14	BioNexus Partners Programme Agreement on Shared Facilities	BioNexus Partners (BioTechCorp)	17 Disember

Khidmat Perundingan Consultancy

Pada tahun ini, FRIM mengendalikan sebanyak 34 khidmat perundingan yang bernilai RM1.2 juta kepada kedua-dua sektor awam dan swasta. Daripada jumlah ini, FRIM menerima sebanyak RM362 506 untuk kos pengurusan dan pentadbiran. Hasil penyelidikan FRIM juga berjaya memperoleh 19 pendedahan reka cipta dan dua harta intelek. Senarai khidmat perundingan adalah seperti yang berikut:

During the year, FRIM conducted 34 consultancies worth RM1.2 million. From these consultancy services, FRIM received RM362 506 as management fees. FRIM's new research findings led to 19 invention disclosures and two intellectual property creations. The lists of the consultancy services and invention disclosures are given as follows:

KHIDMAT PERUNDINGAN CONSULTANCY SERVICE

BIL./ NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
1	<i>Assessment of Selangor FMU against MC&I 2002</i>	Dr Lim Hin Fui	SGS (Malaysia) Sdn Bhd
2	<i>Decay Test</i>	Baharudin Kamaruddin	Universiti Sains Malaysia
3	Kerja-Kerja Inventori Pokok bagi Kawasan Kajian Kuala Kubu Bharu	Adnan Mohamad	Jabatan Perancang Bandar & Desa
4	<i>Proposal on Agroforestry Project</i>	Dr Ab. Rasip Ab. Ghani	Vista Edisi Sdn Bhd
5	<i>Landscaping Consultancy Works at Proton Tanjung Malim Sdn Bhd</i>	Adnan Mohamad	Perusahaan Otomobil Nasional Berhad
6	<i>Verification Assessment of Terengganu FMU against MC & I 2002</i>	Dr Lim Hin Fui	SGS (Malaysia) Sdn Bhd
7	Penyediaan Denai Interpretatif	Dr Noor Azlin Yahya	M.K.N Group Sdn Bhd
8	Ujian Ketahanan Kayu Terhadap Anai-Anai	Norhairul Nizam Awang Malek	Maxwell Wood Sdn Bhd
9	<i>Tree Risk Assessment of the Datai and Andaman</i>	Dr Elizabeth Philip	Mr Jamie Case
10	<i>Tree Risk Assessment on Selected Trees at Skytrex Trail in Bukit Cerakah Shah Alam</i>	Dr Elizabeth Philip	Mr Jullien Repellin
11	<i>Termite Field Testing of Wood Preservatives</i>	Dr Laurence G. Kirton	Arch Wood Protection (Malaysia) Sdn Bhd

**KHIDMAT PERUNDINGAN
CONSULTANCY SERVICE**

BIL./ NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
12	Pemeriksaan dan Pengujian ke Atas Papan Lantai, Dek Pemandangan Stesen Kereta Kabel	Dr Salmiah Ujang	Panorama Langkawi Sdn Bhd
13	Penyelenggaraan Sistem Pengurusan Gaji (eSPG) Lembaga Koko	Wan Zahiri Hj. Wan Yaacob	Lembaga Koko Malaysia (LKM)
14	Membaik Pulih Jambatan Kayu Sedia Ada di Pulau Rebak, Langkawi, Kedah	Lim Seng Choon	Rebak Island Marina Bhd.
15	<i>Advisory Services Towards Developing Tissue Culture Propagation Protocol for Menara Murni's Propriety Gaharu – Producing Species</i>	Dr Kodi Isparan Kandasamy	Menara Murni Sdn Bhd
16	Penubuhan Petak Contoh Pemulihan Kawasan Hutan Paya Gambut Selangor	Dr Khali Aziz Hamzah	Jabatan Perhutanan Negeri Selangor
17	<i>Determination of Soil Study and Plant Suitability for Rehabilitation Program at Paya Indah Wetlands, Dengkil, Selangor</i>	Dr Ang Lai Hoe	Jabatan Pengairan dan Saliran Malaysia
18	Pengkatalogan Spesies Herba dan Herbarium di Taman Negara Endau Rompin, Johor	Zainon Abu Samah	Perbadanan Bioteknologi dan Biodiversiti Negeri Johor (J-BIOTECH)
19	<i>Tree Risk Assessment</i>	Sreetheran Maruthaveeran	The Royal Selangor Golf Club
20	Mengesan dan Mencadangkan Tindakan Lanjut bagi Masalah Rekahan Perabot Selepas Pasang Siap	Dr Tan Yu Eng	BL Packaging Pte Ltd
21	<i>Pre-Assessment of Carotino Sdn Bhd's Oil Palm Estates in Pahang Against RSPO Requirement</i>	Dr Lim Hin Fui	SGS (Malaysia) Sdn Bhd
22	Pemindahan Teknologi Penanaman Kacip Fatimah Secara Komersial	Dr Ab. Rasip Ab. Ghani	Syarikat Pharmaniaga Berhad
23	<i>The Method of Controlling Termite Attack on Trees in Skytrex Sdn Bhd Canopy-Walkway System in Bukit Cahaya, Shah Alam</i>	Shawn Cheng	Skytrex Sdn Bhd
24	<i>International Consultant for ITTO Project " Training of Forest Practioners for the Improvement of Forest Industry in Cambodia "</i>	Dr Gan Kee Seng	Forestry Administration
25	Projek Kajian Rancangan Pengurusan Hutan Paya Gambut Pahang	Dr Ismail Harun	Institut Alam Sekitar dan Pembangunan (LESTARI)

**KHIDMAT PERUNDINGAN
CONSULTANCY SERVICE**

BIL./ NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
26	<i>Cosultancy Project on Sesbania for Al-Noor MDF, Pakistan</i>	Dr Mohd. Nor Mohd. Yusuff	Al Noor Sugar Mills Ltd
27	<i>Advisory Services on Mass Production Using Plant Tissue Culture Techniques</i>	Dr Kodi Isparan Kandasamy	Treezilla Sdn Bhd
28	<i>Advisory/Consultancy Services for Setting Up the Lemon Myrtle Tissue Culture Centre for Bayu Ayu Sdn Bhd</i>	Dr Kodi Isparan Kandasamy	Bayu Ayu Sdn Bhd
29	<i>Advisory Services on Trial Experiments & Quality Control Assay (QCA) on Our Rhizagold® Product</i>	Dr Kodi Isparan Kandasamy	BioTrack Technology (M) Sdn Bhd
30	<i>Advisory/Consultancy Services for Evaluating Process Technologies Acquired/Needed To Manufacture Engineered Lumber from Oil Palm Trunk Material</i>	Dr Wan Tarmeze Wan Ariffin	Signature POPS Sdn Bhd
31	Menyediakan Method Statement bagi Pemindahan Pokok Besar di Gurney Drive, Pulau Pinang	Adnan Mohammad	Altinum Pmc Sdn Bhd
32	<i>Tree Risk Assessment</i>	Sreetheran Maruthaveeran	BASF (Malaysia) Sdn Bhd
33	<i>Advisory/Consultancy Services on the Production of Planting Stocks, Plantation Establishment, Management and Inoculation for Commercial Gaharu Production Project</i>	Dr Kodi Isparan Kandasamy	Gaharu Technologies Sdn Bhd
34	Khidmat Perundingan Penghasilan Arang Putih dari Kayu Bakau	Puad Elham	Koperasi Jabatan Hutan Perak Berhad

**PENDEDAHAN REKA CIPTA
INVENTION DISCLOSURE**

BIL./ NO.	NO. IDENTITI ID NO.	REKA CIPTA INNOVATIONS	PEREKA CIPTA INNOVATORS
1	ID 01/2008	<i>Natural Based Essential Oil Product with Potential Adulticidal Effects</i>	Dr Nor Azah Mohamad Ali Zaridah Mohd. Zaki Mailina Jamil Abd. Majid Jalil Saidatul Husni Saidin Abu Said Ahmad
2	ID 02/2008	<i>Antibacterial Compounds from Submerged Cultures of Ganoderma sp.</i>	Dr Getha Krishnasamy Dr Masahiro Hatsu Wong Hoi Jin Dr Lee Su See Mohd. Farid Ahmad Mastura Mohtar

PENDEDAHAN REKA CIPTA
INVENTION DISCLOSURE

BIL./ NO.	NO. IDENTITI ID NO.	REKA CIPTA INNOVATIONS	PEREKA CIPTA INNOVATORS
3	ID 03/2008	<i>Easy for Assay Plate (EfA-Plate®)</i>	Dr Mohd. Ilham Adenan Dr Getha Krishnasamy Mohd Hafidz Hadi Abdullah Mohd Faizulzaki Mohd Yatim Nur Fairuz Mat Yasin Mohd Zairus Rizal Razali Lili Sahira Husin Norhayati Ismail
4	ID 04/2008	<i>Standardised Tinospora Extract (Tinosporex™) with Anti-Hypercholesterolemic Property</i>	Zamree Md Shah Mohd Shahidan Mohamad Arshad Dr Rasadah Mat Ali Dr Zulkhairi Hj. Amom Hasnah Bahari
5	ID 05/2008	<i>Phenolic-Treated Plybamboo (PTP)</i>	Dr Mohd Khairun Anwar Uyup Dr Paridah Md. Tahir Dr Hamdan Husain
6	ID 06/2008	<i>Induction of Hairy Root culture from Tongkat Ali (Eurycoma longifolia Jack) Explants using Agrobacterium Rhizogenes and Cultivation of These Hairy Roots in the Liquid Medium</i>	Dr Nor Hasnida Hassan Dr Ruslan Abdullah
7	ID 07/2008	<i>Oriented Strand Board (OSB) Using Kenaf Bark</i>	Mohamad Jani Saad
8	ID 08/2008	<i>Fiberglass Reinforced Wood Veneer Products</i>	Dr Hamdan Husain Ana Azrena Ramly Dr Mohd Khairun Anwar Uyup Othman Mohd Desa Abd. Hamid Saleh Mohd Yatim Abd. Aziz
9	ID 09/2008	<i>Parallel Oil Palm Scrim Lumber (POPSkrim™)</i>	Dr Wan Tarmeze Wan Ariffin Dr Marzalina Mansor Dato' Dr Abd. Latif Mohmod
10	ID 10/2008	<i>High Temperature Drying System for Rubberwood and Tropical Hardwoods</i>	Choo Kheng Ten Sik Huei Shing Ramzul Iklas Ab Lah
11	ID 11/2008	<i>Production of Tongkat Ali Bioactive Compounds from Hairy Root Culture</i>	Dr Nor Hasnida Hassan Dr Ruslan Abdullah
12	ID 12/2008	<i>Internal Bond Glue Sample Aligner</i>	Mohamad Jani Saad Saimin Basir

**PENDEDAHAN REKA CIPTA
INVENTION DISCLOSURE**

BIL./ NO.	NO. IDENTITI ID NO.	REKA CIPTA INNOVATIONS	PEREKA CIPTA INNOVATORS
13	ID 13/2008	<i>Micropropagation of Tongkat Ali Using Tissue Culture Techniques</i>	Dr Nor Hasnida Hassan Rohani Abdullah
14	ID 14/2008	<i>In Vitro Propagation of Aquilaria hirta (Candan) Using Tissue Culture Techniques</i>	Dr Nor Hasnida Hassan Rohani Abdullah Rozidah Khalid
15	ID 15/2008	<i>Micropropagation Protocols of Mas Cotek (Ficus deltoides)</i>	Dr Nor Hasnida Hassan Rohani Abdullah
16	ID 16/2008	<i>Bamboo-Oil Palm Hybrid Engineered Lumber (B-POPS™)</i>	Dr Wan Tarmeze Wan Ariffin Mohd Tamizi Mustafa Dr Marzalina Mansor Dato' Dr Abd. Latif Mohmod
17	ID 17/2008	<i>In Vitro Propagation of Aquilaria malaccensis (Karas) from Bukit Bujang, FRIM (BJ Clone) Using Tissue Culture Techniques</i>	Dr Nor Hasnida Hassan Rohani Abdullah Rozidah Khalid
18	ID 18/2008	<i>Method of Mixing of The Biological and Fire Retardant Agent in The Kenaf Particleboard to Enhance the Biological and Fire Resistance</i>	Mohd Jani Saad Dr Salmiah Ujang Roszaini Kadir Zaihan Jalaludin Saimin Basir Nordin Puteh Naziffuad Noran
19	ID 19/2008	<i>CrushBam!: Engineered Lumber from Crushed and Dismantled Bamboo Materials</i>	Dr Wan Tarmeze Wan Ariffin Mohd Tamizi Mustafa

**HARTA INTELEK
IP CREATION**

BIL./ NO.	PATEN PATENTS	NO.HI IP NO.
1	<i>Artificial Lumber Block</i>	PI 20080859
2	<i>Engineered Lumber Block</i>	PI 20084309

**PELESEN
LICENSEES**

BIL./ NO.	TEKNOLOGI TECHNOLOGY	PELESEN LICENSEES
1	<i>Tissue Culture Techniques of Selected Forest and Herbal Species</i>	C-Tree International Sdn Bhd
2	<i>Tissue Culture Techniques of Selected Forest and Herbal Species</i>	Terra Garden Biotech (M) Sdn Bhd
3	<i>Tissue Culture Techniques of Selected Forest and Herbal Species</i>	Treezilla Sdn Bhd
4	<i>Tissue Culture Techniques of Selected Forest and Herbal Species</i>	Quota Heights Sdn Bhd

Hal Ehwal Antarabangsa International Affairs

Sebagai salah sebuah institut penyelidikan yang terkenal, kakitangan FRIM terus memainkan peranan penting di arena antarabangsa terutama dalam memberi input teknikal dan perundingan berkaitan dengan perkara-perkara yang menjadi perhatian NRE. Selain itu, FRIM juga menjadi tuan rumah kepada beberapa sekretariat di peringkat nasional dan antarabangsa di samping sebagai ahli yang aktif dalam pertubuhan serantau. Di sepanjang tahun 2008 FRIM telah terlibat dalam beberapa aktiviti seperti yang berikut:

Konvensyen Perdagangan Antarabangsa Spesies Fauna dan Flora Liar yang Terancam (CITES)

Matlamat CITES adalah untuk memastikan perdagangan spesimen haiwan liar dan tumbuhan di peringkat antarabangsa tidak mengancam kemandiriannya. Setiap tahun, dianggarkan perdagangan antarabangsa hidupan liar mencecah sehingga berbilion-bilion dollar dan melibatkan beratus-ratus juta spesimen tumbuhan dan haiwan. Perdagangan ini adalah pelbagai, daripada haiwan dan tumbuhan hidup sehinggalah kepada produk hidupan liar yang terhasil daripada haiwan dan tumbuhan tersebut. Usaha pengawalan perdagangan haiwan dan tumbuhan ini memerlukan kerjasama di peringkat antarabangsa untuk melindungi spesies tertentu daripada penerokaan yang berlebihan. Terdapat pelbagai darjah perlindungan berlainan yang diberikan kepada lebih daripada 30 000 spesies haiwan dan tumbuhan dan ini disenaraikan di dalam tiga Lampiran yang berbeza. Lampiran I melibatkan spesies-spesies terancam yang sedang mengalami kepupusan. Perdagangan spesimen di bawah Lampiran ini hanya dibenarkan di bawah keadaan tertentu sahaja. Lampiran II menyenaraikan spesies yang tidak semestinya mengalami kepupusan tetapi masih memerlukan kawalan bagi mengelakkan usaha yang boleh menjejaskan kemandirian mereka. Lampiran III pula melibatkan spesies yang dilindungi sekurang-kurangnya di satu negara, yang memerlukan pihak selain CITES mengawal perdagangan tersebut.

CITES menetapkan kaedah kawalan tertentu dalam perniagaan antarabangsa bagi spesies-spesies yang terpilih. Kesemua import, eksport dan eksport semula yang melibatkan spesies di bawah perlindungan perlu mendapat pengesahan melalui suatu sistem lesen. Setiap Parti harus melantik satu atau lebih Pihak Berkuasa Pengurusan bagi menguruskan sistem

FRIM scientists continue to play a major role in international arenas, especially in negotiating and giving technical inputs related to matters of interest to NRE. Negotiation processes have been related to various conventions, in which Malaysia is a party and a signatory. In addition, FRIM also has hosted a number of secretariats of both national and international organizations, besides being an active member of regional associations. The following paragraphs are excerpts of selected activities in which FRIM as an institution was involved throughout 2008:

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Annual international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them. The effort to regulate trade requires international cooperation to safeguard certain species from over-exploitation. Today, CITES accords varying degrees of protection to more than 30 000 species of animals and plants, through listings in three Appendices. Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. Appendix II includes species not necessarily threatened with extinction, but whose trade must be controlled in order to avoid utilization incompatible with their survival. Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.

CITES subjects international trade in specimens of selected species to certain controls. All import, export, re-export, and introduction from the sea of species covered by the Convention must be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities to be in charge of administering the licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species.

FRIM is one of the Scientific Authorities identified by NRE, the lead Management Authority. FRIM provides technical support to decision making about species of plants that are subjected to CITES trade controls. FRIM's primary role is to provide scientific evidence in the context of sustainability and to recommend measures that will prevent the loss of species through trade activities.

pelesenan dan satu atau lebih Pihak Berkuasa Saintifik bagi menasihati tentang kesan aktiviti perdagangan tersebut terhadap status spesies.

FRIM merupakan antara Pihak Berkuasa Saintifik yang dilantik oleh Kementerian NRE yang merupakan Pihak Berkuasa Pengurusan Utama. FRIM memberikan bantuan teknikal kepada isu-isu berkaitan dengan polisi dan spesies tumbuhan di bawah kawalan perdagangan CITES. Tugas utama FRIM adalah untuk memberikan bukti saintifik dari sudut kemampunan dan mengesyorkan tindakan yang boleh diambil untuk mengurangkan kehilangan spesies melalui aktiviti perdagangan.

FRIM sedang membantu pihak Kementerian secara aktif dengan memberikan nasihat saintifik dan garis panduan kepada *Conference of the Parties, Plants Committee*, kumpulan-kumpulan kerja dan juga pihak Sekretariat. Pada bulan November, saintis FRIM telah mewakili FRIM dalam bengkel *International Expert Workshop on CITES Non Detriment Findings (NDF)* di Mexico. Pelaksanaan NDF merupakan elemen yang sangat penting dalam CITES iaitu Pihak Berkuasa Saintifik sentiasa diuji dalam menentukan sama ada sesuatu eksport akan membawa keburukan kepada kemandirian spesies tersebut. Oleh yang demikian, tujuan bengkel ini adalah untuk menentukan jenis maklumat dan parameter yang berkaitan untuk dipertimbangkan di bawah NDF.

Persatuan Institusi Penyelidikan Perhutanan Asia Pasifik (APAFRI)

APAFRI merupakan sebuah pertubuhan yang dianggotai oleh institusi-institusi yang mempunyai kepentingan dalam penyelidikan perhutanan, pemuliharaan, pengurusan dan perkara-perkara yang berkaitan dengan perhutanan di rantau Asia Pasifik. Berdaftar sebagai sebuah badan bukan kerajaan di Malaysia, objektif penubuhannya adalah untuk memperkenalkan pertukaran secara usaha sama antara anggota institusi bagi mempertingkatkan kapasiti pendidikan dan penyelidikan perhutanan di rantau ini. Ringkasnya, peranan APAFRI adalah untuk bertindak sebagai pemangkin, pemudah cara dan pusat maklumat bagi aktiviti-aktiviti penyelidikan dan pendidikan di rantau Asia Pasifik.

Keputusan untuk menubuhkan APAFRI telah diputuskan semasa Mesyuarat Ketua Organisasi Penyelidikan Perhutanan Asia Pasifik di Bogor pada 21 Februari 1995. Tujuannya adalah untuk membangunkan mekanisme institusi penyelidikan perhutanan yang terlibat susulan daripada penubuhan *Forestry Research Support Programme for Asia and the Pacific (FORSPA)*. Pejabat Sekretariat pada mulanya

For many years, FRIM has been actively assisting the Ministry by providing scientific advice and guidance to the Conference of the Parties, the Plants Committee, working groups, and the Secretariat. As recently as November 2008, FRIM staff participated in the International Expert Workshop on CITES Non Detriment Findings (NDF) held in Mexico. Conducting an NDF is a crucial element in CITES, whereby Scientific Authorities continually are challenged to determine whether a particular export will be detrimental to the survival of a species. In this regard, the workshop aimed to define which information and parameters are relevant to undertake an NDF.

The Asia Pacific Association of Forestry Research Institutions (APAFRI)

The Asia Pacific Association of Forestry Research Institutions (APAFRI) is an association of institutions with an active interest in forestry research, conservation, management, and other forestry-related matters in the Asia Pacific region. Registered as a non-government organization (NGO) in Malaysia, the objective of APAFRI is to promote collaborative exchange among institutions to enhance and increase the forestry research and education capacity in the Asia Pacific region. In short, the role of APAFRI is to act as a catalyst, facilitator and, information hub for research and training activities in the Asia Pacific region.

A decision to establish APAFRI was made at the meeting of Heads of Forestry Research Organizations in the Asia Pacific in Bogor on 21 February 1995. This is to develop a more self-reliant, sustainable and participatory institutional mechanism as a logical follow-up of the Forestry Research Support Programme for Asia and the Pacific (FORSPA). The Secretariat of the Association was initially based at the Food and Agriculture Organization (FAO) Regional Office in Bangkok, Thailand (1995–1998) and was later moved to the Faculty of Forestry, University Putra Malaysia. APAFRI also was successfully registered as an NGO in Malaysia in 1998. In July 2001, the Secretariat was relocated to FRIM. At the Fourth General Assembly in Kuala Lumpur in June 2006, the present elected Executive Committee was given the mandate to oversee the operations of the association until 2009.

APAFRI has since organized numerous meetings, workshops, seminars, and conferences within the region, in partnership with international, regional, and national forestry agencies. APAFRI together with Biodiversity International (previously known as the International Plant Genetic Resources Institute [IPGRI]) also successfully established a network on genetic resources, the Asia Pacific Forest Genetic Resources Programme (APFORGEN) in Kuala Lumpur in 2003. This is a regional programme with a holistic focus on conservation and management of

berpangkalan di pejabat serantau FAO Bangkok, Thailand dari tahun 1995 hingga 1998, kemudiannya telah dipindahkan ke Fakulti Perhutanan, Universiti Putra Malaysia. APAFRI juga berjaya didaftarkan sebagai Pertubuhan Bukan-Kerajaan di Malaysia pada 1998. Pada bulan Julai 2001, Sekretariat dipindahkan ke FRIM. Dalam Mesyuarat Agung Kali Keempat yang diadakan di Kuala Lumpur pada bulan Jun 2006, Jawatankuasa Eksekutif yang dilantik telah diberi mandat untuk mengawasi operasi pertubuhan sehingga 2009.

Sehingga kini, APAFRI telah menganjurkan beberapa mesyuarat, seminar dan persidangan bersama-sama agensi perhutanan antarabangsa serantau dan nasional. Dengan kerjasama *Bioversity International* yang dulunya dikenali sebagai *International Plant Genetic Resources Institute* (IPGRI), APAFRI telah berjaya menganjurkan *Asia Pacific Forest Genetic Resources Programme* (APFORGEN) di Kuala Lumpur pada tahun 2003. Ini merupakan program serantau dengan penekanan ke atas pemuliharaan dan pengurusan sumber-sumber genetik hutan. Program ini disertai oleh 14 negara ahli (Bangladesh, India, Nepal, Pakistan, Sri Lanka, Kemboja, Indonesia, Lao PDR, Malaysia, Myanmar, Filipina, Thailand, Viet Nam dan China). APFORGEN berjaya mendapat dana daripada International Tropical Timber Organization (ITTO) bagi projek tiga tahun yang dilaksanakan oleh FRIM, APAFRI dan *Bioversity International* dalam mengukuhkan kapasiti serantau bagi pemuliharaan genetik. Enam buah negara termasuk Malaysia telah menyumbang kepada projek ini sejak 2006.

International Union of Forestry Research Organizations (IUFRO) telah mengiktiraf APAFRI yang diberi tanggungjawab melaksanakan programnya, antaranya program khas IUFRO untuk negara-negara membangun (SPDC) dalam mempertingkatkan penyelidikan, dan menyelaras pembangunan Global Forest Information Service (GFIS) di peringkat Asia Pasifik.

Penerbitan juga merupakan usaha APAFRI dalam merapatkan hubungan antara ahli-ahlinya dan saintis perhutanan. Di bawah program penerbitannya, APAFRI telah berjaya menerbitkan beberapa siri tentang kejayaan penemuan penyelidikan.

Disebabkan masalah kelewatan dalam pembayaran yuran keahlian, banyak aktiviti APAFRI dibiayai oleh FAO, ITTO dan lain-lain agensi seperti *USDA Forest Service* dan *Korea Forest Research Institute*. FRIM sebagai urusetia juga telah banyak menyumbang terutama dalam menyediakan kemudahan infrastruktur, logistik dan pegawai dan kakitangan dalam memastikan kelancaran dan kesinambungannya.

forest genetic resources. A total of 14 partner countries (Bangladesh, India, Nepal, Pakistan, Sri Lanka, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, Viet Nam, and China) participated in this programme. APFORGEN had secured funding from the International Tropical Timber Organization (ITTO) for a three-year project, to be executed by FRIM together with APAFRI and Biodiversity International, on strengthening the regional capacity of genetic conservation. Six other countries, plus Malaysia, have been contributing to this project since 2006.

The International Union of Forest Research Organizations (IUFRO) has recognized APAFRI as its Asia-Pacific chapter. APAFRI has been collaborating closely with the IUFRO Special Programme for Developing Countries (SPDC) on strengthening research in the Asia Pacific region. APAFRI has also been given the task of coordinating the initial development of an Asia component in IUFRO's Global Forest Information Service (GFIS).

Publications form part of APAFRI efforts to bridge the information gap among member institutions and forestry scientists. Under its publishing programme, APAFRI has issued a series on successful applications of research results in forestry practices. Because of delay in payment of membership fees, APAFRI's activities are financed by various international agencies such as FAO and ITTO, as well as a number of national agencies, including the USDA Forest Service and Korea Forest Research Institute. FRIM hosted the Secretariat, and the in-kind support in terms of office space, infrastructure and logistics, and personnel (a senior researcher together with a secretary to manage the Secretariat) which is huge in financial terms and crucial to the smooth functioning and long-term sustainability of APAFRI.

During 2008, APAFRI organized the following events:

- *Workshop on Implementing Guidelines for Planted Forests—funded by FAO, 21–24 January, Chiang Mai, Thailand*
- *Workshop on Surveillance Strategy for Prevention of Invasive Species—funded by the USDA Forest Service and Australian Department of Agriculture, Fisheries, and Forestry; 20, 22–23 April, Hanoi, Viet Nam*
- *Special Event on Forestry Research and Education, funded jointly with the Indian Council of Forestry Research and Education (ICFRE), 24 April 2008, Hanoi, Viet Nam*
- *Asia Pacific Regional Workshop: State of the World's Forest Genetic Resources—funded by the FAO, 14–15 October, Kuala Lumpur, Malaysia*
- *Workshop on Implementing Guidelines for Forest Fire Management—funded by the FAO, 10–13 November, Pekanbaru, Indonesia*

Antara aktiviti yang dianjurkan di sepanjang 2008:

- Bengkel *Implementing Guidelines for Planted Forests*—dibiayai oleh FAO, 21–24 Januari, Chiang Mai, Thailand
- Bengkel *Surveillance Strategy for Prevention of Invasive Species*—dibiayai oleh USDA Forest Service and Australian Department of Agriculture, Fisheries, and Forestry; 20, 22–23 April, Hanoi, Viet Nam
- Aktiviti khusus bagi Pendidikan dan Penyelidikan Perhutanan—dibiayai bersama oleh *Indian Council of Forestry Research and Education (ICFRE)*, 24 April, Hanoi, Viet Nam
- Bengkel Rantau Asia Pasifik: *State of the World's Forest Genetic Resources*—dibiayai oleh FAO, 14–15 Oktober, Kuala Lumpur, Malaysia
- Bengkel Pelaksanaan Garis Panduan Pengurusan Kebakaran Hutan—dibiayai oleh FAO, 10–13 November, Pekanbaru, Indonesia
- Bengkel Kesihatan Hutan Asia Pasifik—dibiayai oleh *Korea Forest Research Institute*, 1–3 Disember, Kuala Lumpur, Malaysia
- *Symposium German Forestry Alumni Network*—dibiayai oleh beberapa universiti dan agensi dari Jerman, 17–20 Disember, Kuala Lumpur, Malaysia

Di bawah projek sumber-sumber genetik hutan ITTO, APAFRI juga telah membantu menganjur dan membiayai bengkel yang berikut :

- Bengkel Kebangsaan FGR—12 Februari, Phnom Penh, Kemboja
- Bengkel Kebangsaan FGR—26 Februari, Yezin, Myanmar
- Bengkel Kebangsaan FGR—12 Mac, Bangkok, Thailand
- Bengkel Latihan Biodiversiti Hutan: *Conservation and Management of Forest Genetic Resources*—7–11 Julai, Kuala Lumpur, Malaysia
- *National FGR Workshop*—31 Julai, Kuala Lumpur, Malaysia

APAFRI juga menyediakan bantuan kewangan bagi aktiviti yang berikut:

- *Second National Workshop on Long-Term Ecological Research in Malaysia*, 1–3 Julai, anjuran FRIM. APAFRI membiayai dua orang petugas dari China Taipei.
- *ASEAN Workshop on Standard Testing of Wood-Based Panel Products*, 24–26 Julai, Kuala Lumpur, anjuran FRIM. APAFRI membiayai penyertaan dua orang penyelidik dari Indonesia.
- Program latihan *Rattan Taxonomy and Resource Inventory*, Bangkok, Thailand, 7–13 September. Program latihan telah disertai oleh 17 orang wakil dari lapan negara ASEAN yang menjadi ahli. APAFRI membiayai lima orang peserta (Laos, Indonesia dan Filipina) serta seorang petugas (Malaysia).

- *Asia Pacific Forest Health Workshop*—funded by the *Korea Forest Research Institute*, 1–3 December, Kuala Lumpur, Malaysia
- *German Forestry Alumni Network Symposium*—funded by a number of German universities and agencies, 17–20 December, Kuala Lumpur, Malaysia

Under the ITTO Project on forest genetic resources (FGR), APAFRI assisted in organizing, and funded the following events

- *National FGR Workshop*, 12 February, Phnom Penh, Cambodia
- *National FGR Workshop*, 26 February, Yezin, Myanmar
- *National FGR Workshop*, 12 March, Bangkok, Thailand
- *Training Workshop on Forest Biodiversity: Conservation and Management of Forest Genetic Resources*, 7–11 July, Kuala Lumpur, Malaysia
- *National FGR Workshop*, 31 July, Kuala Lumpur, Malaysia

APAFRI also has provided financial support for the following events:

- *Second National Workshop on Long-Term Ecological Research in Malaysia*, 1–3 July, organized by FRIM. APAFRI supported two resource persons from Chinese Taipei.
- *ASEAN Workshop on Standard Testing of Wood-Based Panel Products*, 24–26 July, Kuala Lumpur, organized by FRIM. APAFRI supported the participation of two researchers from Indonesia.
- *Training Programme on Rattan Taxonomy and Resource Inventory*, Bangkok, Thailand, 7–13 September. The training programme was attended by 17 participants representing eight ASEAN member countries. APAFRI supported five participants (Laos, Indonesia, and Philippines) and one resource person (Malaysia).

APAFRI provides an excellent opportunity for agencies wishing to sponsor projects on forest research, conservation, management, and other forest-related activities in the Asia-Pacific region. The role of APAFRI is to provide a supporting structure for such projects. The philosophy behind the organization is to minimize duplication of time and effort by encouraging cooperation, collaboration, and sharing of information in order to maximize results for all parties.

APAFRI is continuously looking for opportunities to jointly develop programmes and services for its members and alliances. It operates on the principle that programmes and services should be based on the needs of members. APAFRI gratefully recognizes the generous support from the all agencies involved over the years.

APAFRI juga memberi peluang kepada agensi-agensi yang ingin menaja projek-projek penyelidikan perhutanan, pemuliharaan, pengurusan dan aktiviti-aktiviti lain yang berkaitan dengan hutan di rantau Asia Pasifik. APAFRI berperanan dalam memberi sokongan kepada projek-projek tersebut melalui kerjasama, kolaborasi dan perkongsian maklumat bagi memaksimumkan hasil untuk semua pihak.

APAFRI akan berterusan mencari peluang dalam membangunkan program dan perkhidmatan untuk ahli-ahlinya berdasarkan keperluan mereka. APAFRI juga menghargai sokongan yang diterima dari pelbagai agensi sepanjang tahun ini.

Mesyuarat Pegawai Kanan Perhutanan ASEAN (ASOF)

FRIM terlibat sepenuhnya dalam Mesyuarat Pegawai Kanan Perhutanan ASEAN (ASOF) ke-11 yang dianjurkan oleh NRE di Kuala Lumpur dari 28 Julai–1 Ogos. Mesyuarat ini melibatkan Kumpulan Pakar ASEAN dalam Tumbuhan Herba dan Ubatan, dan R&D Hasil Hutan.

Bersempena mesyuarat ini, satu bengkel tentang prosedur Standard Malaysia dan prosedur pengujian standard ISO bagi hasil panel yang berasaskan kayu telah diadakan dari 24–27 Julai, dianjurkan oleh Makmal Ujian Komposit Kayu, FRIM. Bengkel ini merupakan sebahagian daripada resolusi mesyuarat

ASEAN Senior Officials on Forestry (ASOF) Meeting

FRIM was fully involved in the 11th Meeting of ASOF which was organized by NRE, held in Kuala Lumpur from 28 July to 1 August. This meeting involved the ASEAN Expert Groups on Herbal and Medicinal Plants, and R&D Forest Products.

In conjunction with this meeting, a workshop on Malaysian Standard and ISO standard testing procedures for wood-based panel products was held on 24–27 July. It was organized by the Wood Composite Testing Laboratory, FRIM. The workshop was part of the resolutions from the previous ASOF meeting, requesting Malaysia to enhance capacity building and harmonize the standard testing for wood-based panel products among ASEAN member countries. Twelve participants from Indonesia, Brunei, Myanmar and Malaysia attended the workshop, which consisted of lectures and hands-on training pertaining to the Malaysian Standard in relation to International Standard development, sampling and procedures for conditioning of test samples prior to various physical and mechanical tests.

The 10th Meeting of the ASEAN Expert Group on Research and Development (AEG-R&D) for Forest Products was held on 28–29 July in Kuala Lumpur, Malaysia. The meeting was attended by delegates from Brunei Darussalam, Cambodia, Indonesia, Malaysia, Lao PDR and Thailand. The meeting was chaired by Dato' Dr Abdul Rashid Ab. Malik, Deputy Director General



Peserta bengkel Pengujian Standard Produk Berasaskan Kayu dari Rantau ASEAN

Participants of the Workshop on Standard Testing for Wood-Based Products from the ASEAN Region



*Peserta ASEAN Expert Group on R&D Forest Products
Participants of ASEAN Expert Group on R&D Forest Products*

ASEAN terdahulu yang meminta Malaysia untuk mempertingkatkan pembinaan keupayaan dan menyelaraskan standard pengujian bagi produk panel berasaskan kayu di kalangan negara-negara anggota ASEAN. Dua belas peserta dari Indonesia, Brunei, Myanmar dan Malaysia menghadiri bengkel yang mengandungi ceramah dan latihan amali tentang standard Malaysia dan antarabangsa, pensampelan dan prosedur pengujian sampel sebelum pengujian fizikal dan mekanikal.

Mesyuarat ke-10 Kumpulan Pakar Penyelidikan dan Pembangunan bagi Hasil Hutan ASEAN (AEG-R&D) telah diadakan pada 28–29 Julai di Kuala Lumpur Malaysia. Mesyuarat dihadiri oleh delegasi dari Brunei Darussalam, Kemboja, Indonesia, Malaysia, Lao PDR dan Thailand. Mesyuarat dipengerusikan oleh Dato' Dr Abdul Rashid Ab. Malik, Timbalan Ketua Pengarah (Penyelidikan) FRIM dan En. Anawat Sukhotanang dari Thailand selaku Timbalan Pengerusi. Mesyuarat ini menekankan kepentingan R&D dalam meningkatkan daya saing produk hutan dan menggalakkan pembangunan hutan secara lestari di rantau ini. Kerjasama dan galakan ke arah pembinaan keupayaan dan pengetahuan dalam aktiviti R&D di kalangan anggota dari negara-negara ASEAN adalah perlu dalam memperkasakan semangat setiakawan di kalangan mereka. Anggota-anggota AEG bersetuju untuk bekerjasama menerusi pendekatan koordinasi bersama memandangkan terdapat perbezaan dari segi tahap dan keupayaan R&D di kalangan negara di rantau ini.

Mesyuarat ke-11 Kumpulan Pakar Penyelidikan dan Pembangunan bagi Tumbuhan Herba dan Ubatan ASEAN (AEG-R&D) telah diadakan pada 28–29 Julai di

(Research and Development) FRIM and assisted by Mr Anawat Sukhotanang of Thailand as Vice-Chairman. The meeting stressed the importance of R&D in enhancing the competitiveness of forestry products and promoting sustainable development in the region. Further cooperation and promotion towards the capacity building and knowledge enhancement in R&D activities among the ASEAN member countries are required to strengthen the ASEAN solidarity. The AEG members agreed to work through a strong coordination approach due to different levels and capacity of R&D in the region.

The 11th Meeting of the ASEAN Expert Groups on Research and Development (AEG-R&D) for Herbal and Medicinal Plants was held on 28–29 July in Kuala Lumpur. The meeting was attended by delegates from Brunei Darussalam, Cambodia, Indonesia, Malaysia, Lao PDR, and Thailand. The meeting was chaired by Dr Hj Abd Rahman Hj Abd Rahim, Deputy Director General of Forestry Department of Peninsular Malaysia, and assisted by Ms. Pannee Denrungruang of Thailand as Vice-Chairman. The meeting highlighted the activities implemented under the ASEAN cooperation in herbal and medicinal plants. The meeting also stressed the importance of harmonizing quality and standards of traditional medicines and health supplements in ASEAN member countries to ensure safety, quality and efficacy of the herbal products. Among other matters discussed at the meeting were:

- National R&D information on evaluation of medicinal plants for anti-cholesterol and/or anti-diabetic activities
- National R&D information on quality control of raw materials
- Annual country reports on the production and marketing of products derived from herbal and medicinal plants

Kuala Lumpur. Mesyuarat dihadiri oleh delegasi dari Brunei Darussalam, Kemboja, Indonesia, Malaysia, Lao PDR dan Thailand. Mesyuarat dipengerusikan oleh Dr Hj. Abd Rahman Hj Abd Rahim, Timbalan Ketua Pengarah Jabatan Perhutanan Semenanjung Malaysia, dibantu oleh Pn Pannee Denrungruang dari Thailand selaku timbalan Pengerusi. Mesyuarat membincangkan tentang aktiviti berkaitan tumbuhan herba dan ubatan yang telah dilaksanakan dengan kerjasama ASEAN. Mesyuarat turut menekankan kepentingan penyelarasan mutu dan standard ubatan tradisi dan makanan kesihatan di kalangan anggota ASEAN bagi memastikan keselamatan, mutu dan keberkesanan produk herba. Turut dibincangkan ialah:

- Maklumat R&D kebangsaan tentang penilaian tumbuhan ubatan bagi aktiviti antikoolestrol dan antidiabetik
- Maklumat R&D kebangsaan tentang kawalan mutu bahan mentah
- Laporan tahunan negara tentang pengeluaran dan pemasaran produk yang dihasilkan daripada tumbuhan herba dan ubatan.

Mesyuarat menghargai penyertaan 14 syarikat dari Malaysia serta pameran 46 produk daripada tumbuhan herba dan ubatan. Mesyuarat turut menjemput Phytes Sdn Bhd, sebuah syarikat swasta dari Malaysia yang terlibat dalam pengeluaran dan perniagaan produk tumbuhan herba dan ubatan Malaysia untuk berkongsi pengetahuan. Bagi memperkukuh jalinan kerjasama di kalangan anggota negara ASEAN, beberapa aktiviti telah dilaksanakan:

- Mewujudkan pangkalan data tumbuhan herba dan ubatan ASEAN
- Dokumentasi maklumat/direktori R&D ASEAN
- Direktori produk dan syarikat

Konvensyen Kepelbagaian Biologi (CBD)

Tahun 2008 amat sibuk bagi mereka yang terlibat dalam pelbagai isu CBD. FRIM telah diberi peluang untuk terlibat dalam mesyuarat yang diadakan serentak iaitu Mesyuarat 'Working Group on Protected Areas (WGPA2)' yang kedua dan Mesyuarat 'Subsidiary Body on Technical and Technological Advise (SBSTTA13)' yang ketiga belas yang telah berlangsung pada 11–22 Februari, di Food and Agriculture Organization (FAO), Rom, Itali. Selain itu, Mesyuarat 'Conference of the Parties (COP9)' yang kesembilan juga diadakan pada 17 Mei–1 Jun di Bonn, Jerman.

Semasa WGPA2, FRIM telah memberi input perbincangan untuk pembentukan jawatankuasa penyelarasan pelbagai stakeholder untuk pengurusan kawasan perlindungan

The meeting acknowledged 14 Malaysian companies for their participation and exhibition of 46 products derived from herbal and medicinal plants. The meeting also invited Phytes Sdn Bhd, a private company from Malaysia, that was actively involved in the production and trade of products derived from Malaysian herbal and medicinal plants to share its knowledge. In order to strengthen collaboration among ASEAN countries, several activities were implemented:

- Establishment of database on ASEAN herbal and medicinal plants
- ASEAN documentation of R&D information/directory
- Directory of products and companies

Convention on Biological Diversity (CBD)

The year 2008 has been an extremely busy year for those involved in the issues of CBD. FRIM was given the opportunity to be involved in the back-to-back 2nd Meeting of the Working Group on Protected Areas (WGPA2) and the 13th Meeting of the Subsidiary Body on Technical and Technological Advise (SBSTTA13) held from 11 to 22 February in the Food and Agriculture Organization (FAO), Rome, Italy. Additionally, the 9th Meeting of the Conference of Parties (COP9) was held from 17 May to 1 June in Bonn, Germany.

In WGPA2, FRIM provided inputs for the establishment of a multi-stakeholder coordinating committee for protected area management and governance; establishment of transboundary protected areas; support for regional protected area initiatives such as Sulu-Sulawesi Region, Coral Triangle Initiative and Heart of Borneo; and sustainable financing through project proposals to funding organizations such as the Global Environment Facility (GEF). FRIM has also been invited to provide inputs to the agenda item of SBSTTA13 related to the in-depth review of the Programme of Work for forest biodiversity. These inputs were related to on-going studies on the impacts of climate change and the use of genetically modified tree species by adopting the precautionary approach of the CBD.

During COP9, FRIM was involved in providing inputs and interventions for the Global Strategy for Plant Conservation (GSPC), Global Taxonomy Initiative (GTI), Technology Transfer (TT) and Clearing House Mechanism (CHM). These CBD meetings have become increasingly challenging due to the presence of bracketed texts (no decision), overwhelming agenda items and contentious emerging issues such as biofuels and ocean fertilization. These issues have profound impacts to biodiversity conservation, sustainable use and benefit sharing which formed the pillars of the Convention.

dan perundangan; pembentukan kawasan perlindungan rentas sempadan; sokongan untuk inisiatif serantau seperti Rantau Sulu-Sulawesi, *Coral Triangle Initiative* dan *Heart of Borneo* dan kelestarian kewangan melalui cadangan projek kepada organisasi dana seperti Global Environment Facility (GEF). FRIM juga dijemput memberi input perbahasan untuk agenda mesyuarat SBSTTA13 yang berkaitan dengan kajian semula program kerja biodiversiti hutan. Input ini adalah berkaitan dengan kajian impak perubahan iklim dan penggunaan pokok genetik yang diubah menggunakan pendekatan tindakan berhati-hati yang diperkenalkan oleh CBD.

Dalam COP9, FRIM telah memberi input perbahasan untuk *Global Strategy for Plant Conservation* (GSPC), *Global Taxonomy Initiative* (GTI), *Technology Transfer* (TT) dan *Clearing House Mechanism* (CHM). Mesyuarat CBD telah menjadi semakin mencabar kerana terdapat banyak teks dalam kurungan (tiada keputusan), bilangan agenda yang bertambah dan isu baharu yang menimbulkan pertelagahan seperti biofuel dan memperkaya lautan. Isu-isu ini akan memberi impak kepada pemuliharaan biodiversiti, penggunaan lestari dan perkongsian faedah yang merupakan asas kepada Konvensyen berkenaan.

Plant Resources of South East Asia (PROSEA)

PROSEA merupakan sebuah program kerjasama antarabangsa yang berperanan mendokumentasi maklumat tentang tumbuh-tumbuhan di Asia Tenggara untuk digunakan dalam pendidikan, pengembangan, penyelidikan dan sektor industri. Projek ini diurus dan dilaksanakan secara bersama oleh lima negara anggota ASEAN iaitu Malaysia, Indonesia, Filipina, Thailand dan Viet Nam. Netherlands merupakan Negara yang terlibat pada awal penubuhannya sebagai ibu pejabat yang kemudian menjadi pejabat penerbitan. Di Malaysia, FRIM bertanggungjawab ke atas program ini dan akan mengambil alih pengurusan penerbitan bahan-bahan PROSEA tidak lama lagi.

Sejak penubuhannya, PROSEA telah berjaya mengumpulkan maklumat bagi 8000 tumbuh-tumbuhan di Asia Tenggara dan telah menerbitkan buku untuk kegunaan seperti disebut di atas. Buku panduan merupakan hasil yang bernilai bagi program ini. Sebanyak 19 jilid yang mengandungi 24 buah buku telah diterbitkan dan telah menerima maklum balas positif kedua-dua komuniti saintifik dan bukan-saintifik. Keseluruhannya sebanyak 7602 spesies telah dihurai dan dilaporkan dalam 9000 muka surat bercetak, 6592 daripadanya merupakan spesies utama dan 2023 ialah spesies minor. Penerbitan bagi buku panduan tanaman hiasan sedang dirancang.

Plant Resources of South East Asia (PROSEA)

PROSEA is an international collaborative programme with the main goal of documenting information on plant resources in South East Asia (SEA), and making them widely available for use by the education, extension, research and industry sectors. The project is jointly managed and implemented by a network of institutions in five SEA countries (i.e. Indonesia, Malaysia, the Philippines, Thailand and Viet Nam). The Netherlands was formerly involved from the beginning of its establishment as the Head Office and later as the Publication Office. For Malaysia, FRIM is responsible for the programme. In addition, FRIM will be taking over the management of the PROSEA's Publication Office soon. Procedures and formalities are being worked out.

Since its inception, PROSEA has synthesis information on some 8000 plants of SEA and to make them available in printed forms for the purposes of education, research, extension and industry. The handbook is the most valuable output of the Programme. Nineteen handbook volumes (or 24 books) have been published and have received positive feedbacks from both the scientific and non-scientific communities. Thus far, a total of 7602 species had been described, 6592 as major and 2023 as minor species in 9000 printed pages that have been treated and reported.

Most of the information is stored in a number of databases. The PROSEA's information system is SAPRIS (South East Asian Plant Resources Information System). It contains six databases that would help in the documentation, publishing and dissemination activities. These databases include information on plant resources, library of references and specialists.

Besides publication and documentation, PROSEA has conducted national projects in line with the need of the country. Translating the rich wealth of information into practical knowledge has been one of PROSEA's tasks. The First Urban Forest Workshop in 1995 was fully supported by PROSEA. This activity has been institutionalized and many budding arborists have been trained. PROSEA has supported many other training activities to create awareness on the rich biodiversity of our country and exploitation of lesser-known plant species.

Maklumat-maklumat PROSEA kebanyakannya disimpan di dalam pangkalan data, dan sistem maklumat ini dipanggil SAPRIS (South East Asian Plant Resources Information System). Sistem yang mengandungi enam pangkalan data yang memuatkan maklumat tumbuh-tumbuhan, rujukan dan pakar ini dapat memudahkan aktiviti pendokumentasian, penerbitan dan penyebaran.

Di samping penerbitan dan pendokumentasian, PROSEA juga menganjurkan projek-projek nasional selaras dengan keperluan negara. Menterjemahkan kekayaan maklumat kepada pengetahuan amali merupakan antara tugas PROSEA. Bengkel hutan bandar pertama yang diadakan pada tahun 1995 dibiayai sepenuhnya oleh PROSEA dan telah melatih ramai arboris. PROSEA juga telah menyokong banyak aktiviti latihan yang diadakan bagi mewujudkan kesedaran akan kekayaan biodiversiti negara ini dan eksploitasi ke atas spesies-spesies kurang terkenal.

Sekretariat Perhutanan CDM (Clean Development Mechanism)

NRE telah melantik FRIM sebagai sekretariat bagi menilai permohonan projek-projek dalam bidang perhutanan di bawah peruntukan CDM. Bagi melaksanakan tanggungjawab ini FRIM telah melantik unit Hal Ehwal Antarabangsa yang ditubuhkan pada 28 April 2005 di bawah Bahagian Pengurusan Penyelidikan dan Ekonomi. Sekretariat ini bertanggungjawab melaporkan semua aktiviti kepada Jawatankuasa Teknikal CDM, NRE.

Matlamat utama sekretariat ini adalah untuk menyokong Jawatankuasa Teknikal CDM Perhutanan dalam melaksanakan tugasnya. Bagi menggalak dan mempertingkatkan pembangunan projek CDM, sekretariat perhutanan telah bertindak sebagai pusat sumber CDM bagi:

- menyediakan maklumat-maklumat asas dalam semua aspek projek CDM termasuk garis panduan prosedur kajian dan pemantauan
- membantu Jawatankuasa Teknikal dengan membangunkan laman web peringkat nasional bagi aktiviti dan projek CDM
- memberi input dalam mempertingkatkan strategi dan membuat dasar perhutanan CDM (menyediakan kaedah seperti garis panduan, menilai keperluan dalam meningkatkan kapasiti dan menilai potensi CDM di Malaysia)
- mewujudkan pangkalan data nasional bagi pihak yang berkepentingan utama dalam pembangunan projek perhutanan CDM
- mewujudkan kesedaran dan menyebarkan maklumat (melalui laman web, media dan aktiviti seperti seminar dan mesyuarat dengan pihak yang berkepentingan

Clean Development Mechanism (CDM) Forestry Secretariat

NRE has assigned FRIM as the secretariat for considering applications of CDM projects on forestry. As CDM is related to issues on climate change that are of both national and international interest, FRIM top management has assigned the International Affairs Branch, which was established on 28 April 2005, to take the role of the Secretariat. This unit is currently under the Research Management and Economics Division. Activities related to the CDM Forestry Secretariat are reported to the CDM Technical Committee, chaired by the Under Secretary, Forestry Development Division, NRE.

The main aim of the secretariat is to provide support to the CDM Technical Committee for Forestry in carrying out its duties. In addition, to foster and promote CDM project development, the Forestry Secretariat will act as a resource centre by executing the following:

- *Provide background materials needed on all aspects of the CDM project cycle, including internationally approved guidelines for baseline studies and monitoring procedures*
- *Assist the Technical Committee by setting up a national website on CDM projects and activities*
- *Provide input into the formulation of the CDM forestry policy and promotional strategy (i.e. formulate methodologies such as baseline setting, assessment of needs for capacity building, and assessment of CDM potential in Malaysia)*
- *Create a national database on the major stakeholders in CDM Forestry project development*
- *Create awareness and disseminate information (through the website, media, and organization of events such as seminars and stakeholder meetings)*
- *Document and monitor successful projects and "good practices"*
- *Network with national stakeholders and identify local experts:*
 - o *Provide advisory services to foreign and local investors and developers in the identification and development of project proposals*
 - o *Conduct technical evaluation of CDM project proposals*

With an initial funding of RM500 000 from the 9th Malaysia Plan, the Secretariat started its activities by building capacity of members, which took the form of participating in workshops, meetings, seminars, and conventions (Table 1).

Besides setting up programmes for training members, efforts were also channeled into developing a website for the Secretariat (<http://citfor.frim.gov.my/cdm>).

- mendokumentasi dan memantau projek-projek yang berjaya dan amalan baik
- menjalin hubungan dengan pihak yang berkepentingan dan mengenal pasti pakar-pakar tempatan
 - o menyediakan khidmat nasihat kepada pelabur asing dan tempatan dan pemaju-pemaju dalam mengenal pasti dan membangunkan cadangan projek
 - o mengadakan penilaian teknikal ke atas kertas cadangan projek CDM

Dengan peruntukan permulaan sebanyak RM500 ribu dari Rancangan Malaysia Ke-9, sekretariat memulakan aktiviti dengan meningkatkan keupayaan ahli dengan menghadiri bengkel, mesyuarat, seminar dan persidangan (Jadual 1).

Di samping membangunkan program untuk latihan ahli-ahli, usaha juga dilakukan untuk membangunkan laman web khusus untuk sekretariat (<http://citfor.frim.gov.my/cdm>).

FRIM bersama-sama En. Michael Dushke, penasihat dari *BioCarbon Consult* berjaya mendapat dana dari *Royal Danish Embassy*, Kuala Lumpur bagi projek jangka pendek bernilai 500 000 Kroner. Pembinaan keupayaan bagi CDM Perhutanan di Malaysia (CBFORM) telah dimulakan pada 13 Julai 2007 dengan objektifnya seperti berikut:

- Meningkatkan kapasiti teknikal dan kaedah bagi ahli-ahli sekretariat dan ahli-ahli bersekutu dalam menilai aktiviti-aktiviti projek yang dihantar untuk kelulusan
- Meningkatkan kesedaran antara pelanggan utama seperti Jabatan Perhutanan, pemilik-pemilik ladang utama, sektor swasta, Badan Bukan Kerajaan tertentu dan orang awam.

Terma dan syarat awal termasuklah peraturan asas dan potensi; pembangunan manual prosedur kerja; latihan kakitangan; pembangunan dasar antarabangsa; pembinaan kesedaran dan penyelarasan projek.

Di samping mengambil ahli untuk mengendalikan projek-projek jangka pendek, Sekretariat Perhutanan CDM juga telah berjaya menganjurkan seminar tentang perubahan iklim di peringkat nasional dan serantau. Antaranya ialah seminar yang bertajuk *Capitalizing Forestry and Climate Change* yang diadakan di FRIM pada 11 Ogos dan berjaya menarik seramai 100 orang peserta dari organisasi bukan kerajaan, swasta dan orang awam. Objektif seminar adalah untuk meningkatkan kesedaran CDM perhutanan serta projek yang berpotensi untuk melihat peluang-peluang pada masa hadapan dalam mewujudkan program offset karbon dalam sektor perhutanan.

To further support the Secretariat, FRIM together with a German consultant from BioCarbon Consult (Mr Michael Dushke), managed to secure funding from the Royal Danish Embassy of Kuala Lumpur for a short-term project worth 500 000 Kroner. Capacity Building for Forestry CDM in Malaysia (CBFORM) was initiated on 13 July 2007.

Overall objectives of CBFORM were:

- *To enhance technical and methodological capacities of Secretariat members and associate members to assess project activities submitted for approval*
- *To increase awareness of forestry CDM among major stakeholders, such as the Forestry Departments, major plantation owners, private sectors, selected NGOs and the general public*

The initial terms of reference (ToR) included ground rules and potentials; development of a standard operation procedures manual; staff training; international policy development; outreach and awareness building; and project coordination. The short-term project ended on 30 August, and the ToRs were achieved as planned.

Besides engaging members in the short-term project, the CDM Forestry Secretariat successfully organized national and regional seminars related to climate change. The national seminar entitled "Capitalizing Forestry and Climate Change," was held on 11 August at FRIM. The objective of the seminar was to enhance the awareness of forestry CDM and possible projects that might be generated to look into future opportunities for creating a carbon-offset programme in the forestry sector. More than 100 participants from public, private, and NGOs attended this seminar.

A seminar themed "Information and Knowledge Sharing Among ASEAN Nations on CDM and REDD," jointly organized with NRE and the ASEAN Secretariat in conjunction with the 11th Meeting of ASEAN Senior Officials on Forestry (ASOF) was held on 1 August at the Le Meridien Hotel, Kuala Lumpur. The event was officiated by the Dato' Zol Azha Yusof, Deputy Secretary General 1, NRE. This seminar focused on four main objectives:

- *To create awareness of CDM Afforestation/ Reforestation (A/R), REDD, and the Bali Roadmap*
- *To present the perspective of ASEAN countries on national policy, methodological approaches, and experiences concerning CDM A/R and REDD*
- *To enhance cooperation of ASEAN countries in technology transfer and capacity building*
- *To recommend possible approaches to REDD for consideration by ASOF*

Seminar *Information and Knowledge Sharing Among ASEAN Nations on CDM and REDD* anjuran bersama NRE dan Sekretariat ASEAN bersempena Mesyuarat ASOF (ASEAN Senior Officials on Forestry) telah diadakan pada 1 Julai di Kuala Lumpur. Seminar yang dirasmikan oleh Dato' Zool Azha Yusof, KSU1, NRE. Seminar ini telah menumpukan pada empat objektif utama iaitu:

- Mewujudkan kesedaran bagi CDM A/R, REDD dan *Bali Roadmap*
- Menyampaikan pandangan negara-negara ASEAN ke atas dasar nasional, pendekatan kaedah dan pengalaman berkaitan dengan CDM A/R dan REDD
- Meningkatkan kerjasama negara-negara ASEAN dalam pemindahan teknologi dan peningkatan kapasiti
- Mencadangkan pendekatan-pendekatan kepada REDD untuk dipertimbangkan oleh ASOF

Hasil utama seminar ini adalah untuk menjadikan perubahan cuaca sebagai agenda tetap untuk dibincangkan dalam Mesyuarat ASOF setiap tahun di samping lapan resolusi lain yang berkaitan dengan perubahan iklim.

Kini, peningkatan minat dalam kesedaran terhadap isu-isu perubahan cuaca terutama mereka yang terlibat dengan sektor perhutanan telah memperluas peranan Sekretariat Perhutanan CDM yang turut melihat kepada isu pengurangan penyerapan akibat pembasmian hutan di negara-negara membangun dan pengurangan pelepasan sukarela. Dengan ahli-ahli bersekutu yang terlatih, dipercayai Sekretariat Perhutanan CDM akan memainkan peranan yang lebih proaktif dalam menangani isu-isu yang berkaitan dengan perubahan cuaca pada masa hadapan.

The major outcome of the seminar was to have climate change as a regular agenda item to be discussed at the ASOF meeting every year besides other resolutions regarding climate change to be addressed jointly by member countries.

Today, increased interest in awareness of climate change issues, especially those related to the forestry sector, have expanded the role of the CDM Forestry Secretariat to include looking into REDD, and Voluntary Emission Reduction (VER). With well-trained associate members, the CDM Forestry Secretariat is expected to play a more proactive role in handling issues regarding climate change in the future.

Jadual 1. Seminar/mesyuarat/bengkel/dialog yang dihadiri oleh Sekretariat Perhutanan CDM
 Table 1. Seminars/meetings/workshops/dialogues attended by the CDM Forestry Secretariat

Bil. No	Seminar/Mesyuarat/Bengkel/Dialog Seminars/Meeting/Workshop/Dialogue	Pegawai bertanggung jawab Officer-in-charge	Tarikh Date	Tempat Venue	Penganjur Organizer	Peranan Role	Tajuk pembentangan (jika ada) Title of presentation (if any)
1	Dialogue on Future International Actions to Address Global Climate Change	Dr Serafina Christine Fletcher	11-13 Februari	Tokyo, Japan	Centre for Clean Air Policy (CCAP)	Delegate	
2	Workshop on Developing a Methodology for Assessment of Enhancement of Forest Carbon Stocks Due to Conservation, Sustainable Management of Forests, and Increase in Forest Cover	Dr Serafina Christine Fletcher	7-8 Mac	New Delhi, India	Ministry of Forestry India	Presenter/ session co-facilitator	Reducing emissions from deforestation in developing countries (REDD) – A Malaysian Perspective
3	Dialogue on Future International Actions to Address Global Climate Change	Dr Serafina Christine Fletcher	1-3 Julai	San Francisco, US	Centre for Clean Air Policy (CCAP)	Delegate	
4	Seminar on Capitalizing Forestry and Climate Change in Malaysia	Secretariat Members	11 Ogos	FRIM	FRIM	Organizing committee	
5	Informal Meeting of Experts on Methodological Issues Relating to Reducing Emissions from Forest Degradation in Developing Countries	Dr Serafina Christine Fletcher	20-21 Oktober	Bonn, Germany	UNFCCC	Delegate	
6	ASEAN Knowledge Network on Forests and Climate Change	Dr Serafina Christine Fletcher & Dr Elizabeth Philip	30-31 Oktober	Jakarta, Indonesia	ASEAN/ APAFRI	Delegate	Malaysia's Experience on A/R CDM and REDD
7	Kick-Off Meeting on Greenhouse Gas Capacity Building in South East Asia	Dr Elizabeth Philip	3-4 April	Singapore	UNFCCC & Ministry of Environment, Singapore	Delegate	Key source analysis of greenhouse gas emissions for Malaysia

Sistem Pengurusan Kualiti Quality Management System

Bagi memastikan pelaksanaan sistem pengurusan kualiti FRIM berjalan dengan lancar dan sentiasa di tambah baik, Jawatankuasa Pelaksana Kualiti FRIM sentiasa mengenal pasti aktiviti yang dijalankan secara berterusan. Dengan pelantikan Dato' Dr Abd. Latif Mohmod sebagai Ketua Pengarah FRIM pada 26 April, beliau telah melantik Dr Abdul Rahim Nik, Timbalan Ketua Pengarah (Operasi) sebagai Wakil Pengurusan yang baharu mulai 24 Julai. Aktiviti yang dijalankan sepanjang 2008 adalah seperti yang berikut:

Pelaksanaan Audit Dalam

Pelaksanaan audit dalam bertujuan untuk memastikan proses yang dilaksanakan di semua CUMBS (Cawangan/Unit/Makmal/Bengkel/Stesen) FRIM sentiasa mematuhi standard kualiti (MS ISO 9001:2000 atau MS ISO/IEC 17025) dan sistem pengurusan kualiti yang ditetapkan bagi memenuhi kehendak pelanggan FRIM.

LAPORAN PELAKSANAAN AUDIT DALAM INTERNAL AUDIT REPORTS

SIRI SERIES	TARIKH DATE	CUMBS CUMBS	JURUAUDIT AUDITORS	CUMBS CUMBS
1/2008	24 Mac–11 April	72 CUMBS dan 18 Pejabat Pengarah 72 CUMBS and 18 Director's Office	120 orang 120 auditors	514 (6 major, 158 minor dan 350 pemerhatian) 514 (6 major, 158 minor and 350 observations)
2/2008	4–12 September	71 CUMBS dan 18 Pejabat Pengarah 71 CUMBS and 18 Director's Office	145 orang 145 auditors	443 (2 major, 106 minor dan 335 pemerhatian) 443 (2 major, 106 minor and 335 observations)

Jumlah penemuan bagi siri 2/2008 telah menurun bagi semua kategori major, minor dan pemerhatian. Peratusan jumlah penurunan bilangan penemuan audit adalah seperti yang berikut:

Various activities have been implemented throughout the year to ensure FRIM's QMS runs smoothly and fulfils the requirements of the standard. The new successor to the Management Representative (MR) for 2008, Dr Abdul Rahim Nik, was appointed on 24 July to replace Dato' Dr Abd. Latif Mohmod who became the Director General on 26 April.

Internal Audit

The objective of internal audit is to ensure processes at the CUMBS level are implemented in accordance with the requirements of the quality standard (MS ISO 9001:2000 and/or ISO/IEC 17025) and the quality management system in order to fulfill clients' needs.

Overall, the audit findings for 2008 has showed decrease for all categories (major, minor and observation). Detailed findings are as follows:

PERBANDINGAN PENEMUAN AUDIT COMPARISONS AND PERCENTAGES OF AUDIT FINDINGS

KATEGORI CATEGORY	SIRI 1/2008 SERIES 1/2008	SIRI 2/2008 SERIES 2/2008	PERBEZAAN DIFFERENCE	PERBEZAAN (%) DIFFERENCE (%)
Major	6	2	4	66.67
2/2008	158	106	52	32.91

PERBANDINGAN PENEMUAN AUDIT SIRI 1/2008 DAN SIRI 2/2008 COMPARISON OF AUDIT FINDINGS

KATEGORI PENEMUAN CATEGORY	SIRI 1/2008 SERIES 1/2008	SIRI 2/2008 SERIES 2/2008	PERBEZAAN DIFFERENCE	PERBEZAAN (%) DIFFERENCE (%)
Pemerhatian / Observation	350	335	15	4.29
Jumlah keseluruhan Total	514	443	71	13.81



Pelaksanaan Audit Dalam
Internal Audit implementation

Lawatan Wakil Pengurusan ke CUMBS Sebagai Persediaan Menghadapi Audit Pemantauan

Lawatan ini adalah untuk memantau pelaksanaan sistem pengurusan kualiti di CUMBS dan memastikan tahap kesediaan CUMBS untuk diaudit semasa Audit Pemantauan. Pemilihan dibuat berdasarkan skop dan CUMBS yang belum pernah diaudit oleh juruaudit luar. Dengan lawatan ini tahap kerjasama dan keseriusan sesuatu CUMBS dapat dikenal pasti dan dikategorikan mengikut warna iaitu; hijau menunjukkan sedia untuk diaudit, kuning bagi sistem kualiti yang perlu diperbaiki segera atau merah bagi sistem kualiti yang belum bersedia dan gagal mematuhi keperluan. Nasihat turut diberikan kepada CUMBS semasa sesi lawatan ini.

Management Representative Visit to CUMBS as a Preparation for Surveillance Audit

Besides internal audit, another type of monitoring activity that has been conducted include visits to selected CUMBS to ensure that they are well prepared for the coming Surveillance Audit. Criteria of selection depend on the scope of work and whether they have been assessed from the previous external audit. Simultaneously, the cooperation level and seriousness of the CUMBS were identified during the visits. CUMBS were given colour codes to show readiness for the audit: green indicates well prepared, yellow means improvement required and red shows unpreparedness and failure to implement the system. Advice were also given during the visit.

Lawatan pihak Wakil
pengurusan ke CUMBS
Management representative
visits to CUMBS



Pelaksanaan Audit Luar

Audit yang dilaksanakan oleh juruaudit luar adalah untuk memastikan kepatuhan kepada standard dan dokumen yang berkaitan bagi mengekalkan pensijilan/akreditasi MS ISO 9001:2000 dan ISO/IEC 17025.

External Audit Implementation

External audit by the certification body was conducted to evaluate whether the requirements of the standards and implementation of relevant documents set for the certification of MS ISO 9001:2000 and/or ISO/IEC 17025 had been continuously followed by FRIM.

PENEMUAN AUDIT PEMANTAUAN MS ISO 9001:2000
SURVEILLANCE AUDIT FINDINGS MS ISO 9001:2000

SIRI AUDIT SERIES	BIL CUMBS NO. OF CUMBS	JURUAUDIT (LRQA) AUDITOR (LRQA)	PENEMUAN FINDINGS
SV 1/2008 (3 & 4 Jun)	22	Foong TG, Lim Ming Wang dan Looi Shin Shin	• 5 RC (Requires Correction) • 3 SFI (Scope for Improvement) • 1 LRQA (Issues for follow up by LRQA at next visit)
SV 2/2008 (2 & 3 Disember)	24	Mohd Ramli Daud dan Saw Gek Hua	• 3 RC (Requires Correction) • 5 SFI (Scope for Improvement)



Pelaksanaan audit luar MS ISO 9001 / External Audit MS ISO 9001:2000

PENEMUAN AUDIT LUAR ISO/IEC 17025
EXTERNAL AUDIT FINDINGS ISO/IEC 17025

CUMBS CUMBS	JENIS AUDIT ASSESSMENT TYPE	JURUAUDIT AUDITOR (STANDARD MALAYSIA)	PENEMUAN FINDINGS
Makmal Pengujian Komposit Kayu <i>Wood Composite Testing Lab</i>	Pemantauan (2 April) <i>Surveillance</i>	Tham Koh Peng Wong Siew Kwan	• 3 Kategori 2 (Quite significant) • 1 Kategori 3 (Minor) • 2 Pemerhatian/Observation
Makmal Analisis & Awetan Kayu <i>Wood Analysis & Preservation Lab</i>	Pemantauan (25 September) <i>Surveillance</i>	Pua Hiang Ng Chang Chai	• 1 Kategori 2 (Quite significant) • 2 Pemerhatian/Observation
Makmal Perlindungan Api <i>Fire Protection Lab</i>	Penilaian Semula (12 November) <i>Re-assessment</i>	Yu Chun Lum Wong Siew Kwan	• 2 Kategori 2 (Quite significant) • 3 Pemerhatian/Observation
Makmal Pengujian Kertas <i>Paper Testing Lab</i>	Pemantauan (24 November) <i>Surveillance</i>	Tham Koh Peng Wong Siew Kwan	• 4 Kategori 2 (Quite significant) • 1 Kategori 3 (Minor) • 6 Pemerhatian/Observation


 Pelaksanaan audit luar MS ISO/IEC17025
 External audit implementation MS ISO/IEC 17025

Mesuarat Kajian Semula Pengurusan (MKSP) FRIM

Sebanyak empat siri MKSP FRIM telah diadakan sepanjang 2008 iaitu pada 31 Januari, 15 Mei, 6 Ogos dan 4 November.

Latihan Kualiti

Sebanyak 14 latihan yang menggabungkan keperluan kualiti dan teknikal telah diadakan sepanjang tahun 2008. Senarai latihan adalah seperti dalam jadual di bawah:

FRIM Quality Management Review (QMR) Meeting

Four series of QMR Meetings were conducted at FRIM level for the year 2008 on 31 January, 15 May, 6 August and 4 November.

Quality Training

A total of 14 trainings which combined quality and technical requirements were organized. The list of training courses is shown below:

BIL./ NO.	NAMA LATIHAN DESCRIPTION	TARIKH LAKSANA DATE
1	Latihan Pengurusan SPK dan Hubung Kait di CUMBS <i>Management of Quality Management System and Its Relation To Work Processes at CUMBS Level</i>	16 – 17 Januari
2	Bengkel Pengukuhan Juruaudit Dalam <i>Workshop for Internal Auditors (Refresh Course)</i>	28 – 29 Januari
3	Bengkel Pengurusan Personel dan Pelanggan <i>Workshop For Personnel and Customer Management</i>	20 – 21 Februari
4	Bengkel Pengurusan Peralatan, Pembekal/ Pekhidmat dan Perolehan Bahan <i>Workshop In Management of Equipment, Suppliers and Purchasing</i>	25 – 26 Februari
5	Bengkel Pengurusan Infrastruktur, Persekitaran Kerja dan Data Laporan <i>Workshop In Management of Infrastructure, Work Environment and Handling of Data & Report</i>	4 – 5 Mac
6	Bengkel Pengurusan Dokumen dan Rekod <i>Workshop in Management of Documents and Records</i>	12 – 13 Mac
7	Bengkel Audit Dalam (Kumpulan 1) <i>Workshop for Internal Auditors (Group 1)</i>	14, 17 – 19 Mac
8	Bengkel Audit Dalam (Kumpulan 2) <i>Workshop for Internal Auditors (Group 2)</i>	14 – 17 Mac
9	Latihan Teknikal – Analytical Balance <i>Technical Training – Analytical Balance</i>	23 Julai
10	Latihan Teknikal – Vernier Caliper <i>Technical Training – Vernier Caliper</i>	24 Julai
11	Latihan Measurement & Calibration System <i>Measurement & Calibration System</i>	3 & 31 Julai
12	Latihan Teknikal – Oven, Thermometer dan Thermocouple <i>Technical Training – Oven, Thermometer and Thermocouple</i>	19–20 Ogos
13	Bengkel Audit Dalam (Kumpulan 3) <i>Workshop for Internal Auditors (Group 3)</i>	28 – 30 Oktober
14	Bengkel Audit Dalam (Kumpulan 4) <i>Workshop for Internal Auditors (Group 4)</i>	24 – 26 November

Empat siri Bengkel Audit Dalam telah dilaksanakan untuk memberi pendedahan tentang pelaksanaan sistem kualiti kepada kakitangan yang dipilih dari setiap CUMBS bagi membolehkan mereka menjalankan audit sendiri (self-audit) di CUMBS masing-masing. Ia juga bertujuan untuk memastikan keberkesanan Sistem Kualiti dijalankan secara berterusan. Seramai 152 kakitangan telah mengikuti latihan Bengkel Audit Dalam tersebut dan 91 orang dilantik sebagai Juruaudit Dalam. Melalui latihan ini, dapat dipastikan sekurang-kurangnya seorang dalam setiap CUMBS diberikan pendedahan berkenaan pelaksanaan Audit Dalam berdasarkan keperluan Standard MS ISO 9001 supaya mereka berupaya mengenal pasti kelemahan yang wujud dan memastikan pelaksanaan proses kerja CUMBS mengikut keperluan yang ditetapkan. Kos bagi pelaksanaan latihan anjuran Unit Pengurusan dan Jaminan Kualiti (PJK) bagi tahun 2008 dianggarkan sebanyak RM80 000.

Penyemakan Semula Dokumen Kualiti FRIM

Penyemakan semula kesemua dokumen kualiti FRIM (Manual Kualiti, Prosedur Kualiti Wajib, Prosedur Kualiti Operasi dan Prosedur Kualiti Sokongan) telah dilaksanakan bermula dari 21 April–10 Julai. Sesi semakan dokumen melibatkan ketua sistem audit, pengurus dokumen, pegawai penyedia dokumen, ketua juruaudit dalam siri 2/2007 dan siri 1/2008 bagi proses yang terlibat dan juga pegawai-pegawai yang berpengalaman dalam proses tersebut.

Hasil semakan menyebabkan pengguguran dan pertambahan dokumen baharu bagi memenuhi keperluan pelaksanaan proses-proses di FRIM. Dokumen FRIM telah bertambah daripada 37 ke 40 buah dokumen yang terdiri daripada satu Manual Kualiti, enam Prosedur Kualiti Wajib, 22 Prosedur Kualiti Sokongan dan 11 Prosedur Kualiti Operasi. Kesemua dokumen FRIM boleh diakses oleh kakitangan melalui laman web intranet FRIM (Infocenter). Perancangan sesi semakan dokumen yang seterusnya adalah pada pertengahan tahun 2009.



Penilaian semula dokumen kualiti
Document review

Four workshops for internal auditors were conducted to expose selected employees to the QMS requirements. Of the 152 attendees, 91 were appointed as Internal Auditors. Besides training auditors, these workshops also served as platform for the attendees to learn and understand the system in order to conduct self audit. This is one of FRIM's strategies in ensuring continuous effectiveness of the QMS system i.e. by making sure at least one employee from each CUMBS understood the requirements needed. The whole cost incurred for training throughout the year has been estimated to be about RM80 000.



Pelaksanaan latihan kualiti
Quality training

Document Reviews

Reviews of all 37 FRIM Quality Procedures (Quality Manual, Mandatory Quality Procedures, Operational Quality Procedures and Support Quality Procedures) were conducted from 21 April to 10 July. Each review included Head of Audit System, Document Manager, officers-in-charge, process owners, internal head auditors from the previous audit and also experienced implementers of the processes.

As a result of the reviews, new procedures were developed and procedures considered as inappropriate were dropped. Consequently, the total number of procedures has increased to 40 (1 Quality Manual, 6 Mandatory Quality Procedures, 22 Support Quality Procedures and 11 Operational Quality Procedures). All Quality Procedures are accessible to all FRIM staff via the Intranet Website (Infocenter). The next review is scheduled for 2009.

Aktiviti-Aktiviti Lain

Bagi meningkatkan tahap pengetahuan serta pendedahan kepada Jawatankuasa Pelaksana Kualiti serta kakitangan di Unit Pengurusan Jaminan Kualiti FRIM, beberapa lawatan sambil belajar serta aktiviti kualiti di peringkat kementerian telah dilaksanakan.



- Lawatan sambil belajar ke MARDI, Serdang pada 16 April oleh pengarah dan pegawai FRIM bagi melihat pelaksanaan Sistem Pengurusan Kualiti di MARDI



- Lawatan sambil belajar ke QAMU, Universiti Malaya pada 26 Ogos oleh Jawatankuasa Pelaksana FRIM bagi melihat pelaksanaan Sistem Pengurusan Kualiti di Universiti Malaya



- Menyertai aktiviti Hari Kualiti peringkat NRE pada 6–7 November
 - mendapat tempat ke-2 Anugerah Peneraju Kualiti Peringkat Jabatan NRE
 - mendapat tempat ke-2 Pertandingan Pameran Terbaik

Other Activities

PJK has been involved in organizing various activities in an effort to gain exposure and knowledge, as well as to share information with regard to the implementation of an effective system quality. Among the activities were:



- *Educational visit to MARDI on 16 April by all directors and respective officers to share information and experiences on QMS management from the R&D agency perspective.*



- *Educational visit to QAMU, Universiti Malaya, on 26 August by FRIM Quality Steering Committee.*



- *Participation in the NRE Quality Day on 6–7 November whereby FRIM bagged the 2nd place for the Anugerah Peneraju Kualiti Peringkat Jabatan NRE and the Best Exhibition Award*

Petunjuk Prestasi Utama

Key Performance Indicators

PENCAPAIAN ACHIEVEMENT	2007	2008
Jumlah projek penyelidikan <i>Total research projects</i>		
- MOSTI	52	60
- non-MOSTI	76	65
Jumlah artikel <i>Total articles</i>	656	660
Jumlah penerbitan di dalam jurnal <i>Total publications in journals</i>	68	55
Tesis/Theses	18	6
Dialog dengan industri <i>Dialogues with the industries</i>	2	2
Seminar/persidangan dan bengkel <i>Seminars/conferences and workshops</i>	29	20
Kilang perusahaan kecil yang menerima faedah daripada FRIM R&D <i>SMEs benefited from FRIM R&D</i>	30	79
Kilang yang menggunakan mesin atau teknologi FRIM <i>Factories that use FRIM equipment or technology</i>	250	429
Biji benih spesies hutan yang dikutip (kg) <i>Forest tree seeds collected (kg)</i>	390	302
Latihan teknikal <i>Technical trainings</i>	4	21
Paten/Patents	4	6
Pendedahan reka cipta/ <i>Invention disclosures</i>	7	19

PENCAPAIAN ACHIEVEMENT	2007	2008
BILANGAN UJIAN YANG DIJALANKAN NUMBER OF TESTS CONDUCTED	2007	2008
Pintu rintangan api/ <i>Fire door</i>	16	200
Perabot/ <i>Furniture</i>	232	163
Awetan kayu/ <i>Wood preservation</i>	1088	468
Pengecaman kayu/ <i>Wood identification</i>	1447	1096
Ujian komposit kayu/ <i>Wood composite test</i>	270	280
Ujian kulat/ <i>Fungi test</i>	17	5
Ujian ubatan herba/ <i>Medicinal herb test</i>	384	571
Ujian pulpa dan kertas/ <i>Pulp and paper test</i>	224	105
Khidmat perundingan/ <i>Consultancy services</i>	35	34
Pameran/ <i>Exhibitions</i>	26	20
Pelawat ke FRIM/ <i>FRIM visitors</i>	59 557	64 732
Pelanggan kemudahan ekopelancongan (titian kanopi & Kem Perah) <i>Visitors using ecotourism facilities (canopy walkway & Perah Camp)</i>	22 963	32 414
Artikel dalam akhbar/ <i>Articles in newspaper</i>	92	118
Siaran media elektronik/ <i>Electronic media broadcast</i>	-	3

Anugerah dan Pengiktirafan Awards and Recognition

Saintis FRIM telah memenangi beberapa anugerah seperti di bawah:

Anugerah BioNexus Partners Program

Atas dasar kemudahan dan kemampuan dalam penyelidikan termaju, makmal Genetik dan Tisu Kultur telah dianugerahi status 'BioNexus Partner' Program (BNP) daripada Malaysian Biotechnology Corporation (MBC) pada September 2008. Program ini memberi peluang kepada pihak industri sains hayat di Malaysia untuk menggunakan kemudahan menjalankan penyelidikan termaju yang terdapat di kedua-dua makmal tersebut. Menjadi makmal yang tersenarai dalam BNP, kedua-dua makmal ini dikenali sebagai pengamal dan pemberi khidmat yang cekap dalam sektor bioteknologi.

Anugerah Saintifik

Saintis FRIM terus mengungguli pelbagai anugerah saintifik di dalam dan di luar negara, termasuklah anugerah Reka Cipta FRIM anjuran FRIM pada 15 Disember.

A number of awards were won by FRIM scientists. The awards are as stipulated below:

BioNexus Partners Program Award

Due to high-end research facilities and capabilities, the Genetic and Tissues Culture laboratories were awarded with BioNexus Partner Programme (BNP) status from the Malaysian Biotechnology Corporation (BiotechCorp) on September 2008. This program provides an opportunity to Malaysia's life sciences industries to utilise the high-end research facilities in both of the laboratories. By being in the BNP list of laboratories, both laboratories are being recognized as the competent players and service providers in the biotechnology sector.

Scientific Awards

A number of scientific awards were won by FRIM scientist, locally and internationally. The awards were as stipulated below:

ANUGERAH INOVASI 2008 INNOVATION AWARDS 2008

BIL./ NO.	PAMERAN EXHIBITION	TAJUK TITLE	NAMA NAME	ANUGERAH AWARDS
1	MTE 2008 PWTC, Kuala Lumpur, 21–23 Feb	<i>Parallel Oil Palm Strand Lumber (POPS Lumber)</i>	Dr Wan Tarmeze Wan Ariffin Khairul Awang Mohd Tamizi Mustafa Dr Marzalina Mansor Abdul Hamid Salleh Abd Rahim Ahmad	Perak/Silver
		<i>Development of Natural Herbal Based Essential Oil Product with Potential Adulticidal Effects</i>	Dr Nor Azah Mohd. Ali Zaridah Mohd Zaki Abd Majid Jalil Mohd Faridz Zollpatah Nik Yasmin Nik Yahya Abu Said Ahmad Mailina Jamil Saidatul Husni Saidin Mohamad Lokmal Ngah	Perak/Silver

ANUGERAH INOVASI 2008
INNOVATION AWARDS 2008

BIL./ NO.	PAMERAN EXHIBITION	TAJUK TITLE	NAMA NAME	ANUGERAH AWARDS
2	Reka Cipta R&D UiTM 2008 UiTM, Shah Alam 25–27 Mac	BIMBOARD	Sharmizi Ismail Shahril Anuar Bahari Mohd Ariff Jamaludin Mohamad Jani Saad Kamarulzaman Nordin Siti Aidaliza Subardi	Emas/ <i>Gold</i>
3	International Invention & Innovation Exhibition 2008 Geneva 3–7 April	<i>Parallel Oil Palm Strand Lumber (POPS Lumber)</i>	Dr Wan Tarmeze Wan Ariffin Khairul Awang Dr Marzalina Mansor Abd. Hamid Salleh Abdul Rahim Ahmad	Pereka Cipta Dunia/ <i>World Inventor</i> Emas/ <i>Gold</i>
4	Salon International Inventions Geneva, Swtzerland 4 April	<i>Panel Bio-Composite from Bamboo</i>	Shahril Anuar Bahari Mohd Ariff Jamaludin Kamarulzaman Nordin Mansur Ahmad Mohamad Jani Saad	Emas/ <i>Gold</i>
5	ITEX 2008 Kuala Lumpur Convention Centre 9–11 May	<i>JOYSTYN: Mangosteen Whole Fruit Antioxidant Juice Standardized Extract & Products</i>	Dr Vimala Subramaniam Rohana Shahdan Juliza Mohamad Sturat Soo Loh Kai Kwong	Emas/ <i>Gold</i> Anugerah Produk Inovatif Malaysia/ <i>Malaysia Innovative Product Award</i>
		<i>Chromolinx: An Enriched Flavonoids Extract from Pokok Kapal Terbang for Healthcare Product</i>	Dr Ling Sui Kiong Dr Nor Azah Mohd Ali Mastura Mohtar Dr Vimala Subramaniam Mary Khoo Maizura Pizar Saidatul Husni Saidin Salbiah Man Abdull Rashih Ahmad Ong Boo Kean Dr Rasadah Mat Ali	Perak/ <i>Silver</i>
		<i>Parallel Oil Palm Strand Lumber (POPS Lumber)</i>	Dr Wan Tarmeze Wan Ariffin Khairul Awang Dr Marzalina Mansor Abd. Hamid Salleh	Perak/ <i>Silver</i>
		<i>Education Furniture from POPS Lumber</i>	Abd. Hamid Salleh Khairul Awang Dr Wan Tarmeze Wan Ariffin Dr Marzalina Mansor Desmond Ho	Perak/ <i>Silver</i>

ANUGERAH INOVASI 2008
INNOVATION AWARDS 2008

BIL./ NO.	PAMERAN EXHIBITION	TAJUK TITLE	NAMA NAME	ANUGERAH AWARDS
		<i>Garden Furniture from POPS Lumber</i>	Abd. Hamid Salleh Dr Wan Tarmeze Wan Ariffin Dr Marzalina Mansor Desmond Ho Abdul Rahim Ahmad	Gangsa/ Bronze
		<i>Smart Bamboo-Home Office Furniture</i>	Abd. Hamid Salleh Irwan Shah Md Yusoff Mohd Shahrizal Dolah Khairul Awang P M Elias Ahmad A Roslee Radzal	Gangsa/ Bronze
		<i>Kenaf OSB</i>	Mohamad Jani Saad Puad Elham Hashim W. Samsi Nordin Putih Nazifuad Noran Rosly Joha Jalali Salleh	Gangsa/ Bronze
		<i>Hybrid MLVOP Chair</i>	Abd. Hamid Salleh Khairul Awang Dr Wan Tarmeze Wan Ariffin Dr Hamdan Husain Arshad Omar	Gangsa/ Bronze
		<i>Binderless Bamboo Fibre-Based Composite for Indoor Construction Material</i>	Sharil Anuar Bahari Mohd Ariff Jamaludin Mansur Ahmad Kamarulzaman Nordin	Gangsa/ Bronze
6	Pameran Reka Cipta, Penyelidikan & Inovasi Universiti Putra Malaysia 29–31 July	<i>Development of Durable Biocomposite through Pretreatment with Low Molecular Weight Phenolic Resin</i>	Paridah Md Tahir Loh Yueh Feng Dr Mohd Khairun Anwar Uyup Ong Lay Lee Zaidon Ashaari Edi Suhaimi Bakar Dr Hamdan Husain Andrian Choo Cheng Yong	Anugerah Merit Merit Award
7	Festival Antarabangsa Landskap & Taman Malaysia (LAMAM 2008) Taman Tasik Perdana, Kuala Lumpur 19–27 July	<i>Rhythm of Nature</i>	Nik Adlin Mohamed Sukri Ahmad Azaruddin Mohd Noor Mohd Afendi Hussin Sreetheran Maruthaveeran Syamsurina Arshad Samsol Bohari Mohd Zulfadli Mat Yassin Mohd. Raif Zainuddin Norain Mohd. Ariff	Anugerah Merit Merit Award

ANUGERAH INOVASI 2008
INNOVATION AWARDS 2008

BIL./ NO.	PAMERAN EXHIBITION	TAJUK TITLE	NAMA NAME	ANUGERAH AWARDS
8	Anugerah Reka Cipta FRIM Auditorium FRIM 15 Disember	ESSENTIA™ HERBAL CARE KIT	Dr Nor Azah Mohd. Ali Saidatul Husni Saidin Mailina Jamil Abd Majid Jalil Abu Said Ahmad Siti Humeirah Abd Ghani Nik Yasmin Nik Yahya Mohammad Faridz Zollpatah	Anugerah Terbaik Keseluruhan <i>The Best Overall Invention</i> Emas/Gold
		Pembiakan Tampang Keratan Daun Kacip Fatimah (<i>Labisia pumilla</i>) dalam Sistem Pembiakan Tanpa Renjisan	Dr Aminah Hamzah	Emas/Gold
		<i>Natural Antioxidants Standardized Extract from Kesom Leaves as Digestive Products</i>	Dr Vimala Subramaniam Rohana Sahdan Abdull Rashih Ahmad Juliza Mohamed	Emas/Gold
		<i>Fibreglass Reinforced Wood Veneer Moulded Product</i>	Dr Hamdan Husain Ana Azrena Ramly Dr Mohd Khairun Anwar Uyup Othman Mohd Desa Mohd. Yatim Abdul Aziz Abdul Hamid Salleh	Emas/Gold
		<i>POPScrim- Parallel Oil palm Scrim Lumber</i>	Dr Wan Tarmeze Wan Ariffin Dr Marzalina Mansor Abdul Hamid Salleh Khairul Awang Mohd Tamizi Mustafa Abd Rahim Ahmad	
		<i>Separation "Andrographolide Using Activated Carbon Column</i>	Abdull Rashih Ahmad	Perak/Silver
		<i>Pre-Freezer/Shell-Freezer</i>	Ahmad Shukri Abdullah Abdul Rashid Li Nurain Abdul Majid Mohd Radzi Ahmad	Perak/Silver

ANUGERAH INOVASI 2008
INNOVATION AWARDS 2008

BIL./ NO.	PAMERAN EXHIBITION	TAJUK TITLE	NAMA NAME	ANUGERAH AWARDS
		Penghasilan <i>Acacia</i> Hibrid Melalui Kaedah Pendebungaan Terkawal	Mohd Zaki Abdullah Dr Ab. Rasip Ab. Ghani Dr Norwati Muhammad Dr Ng Chin Hong Mohd Jaffar Shaari Samsul Bahrin Abdullah Samsuri Toh Harun Amran Haron	Perak/Silver
		<i>FRIENDS-Friendly Environment for Expertise Networking and Document Sharing</i>	Dr Marzalina Mansor Dr Wan Tarmeze Wan Ariffin Norul Maslissa Ahmad Mohd Fadzil Ahmad	Perak/Silver
		<i>Self Service Asset Verification/On-Line Inventory</i>	Zaliha Che Muda Norashikin Mohd. Zabri Ismail Mansor Norihan Salih Mohd Adil Ramli	Perak/Silver
		Penyesuaian Bank Berkomputer	Zainorasri Yahya Siti Sanisah Kamsah Sailesuze Mohd Salim Mohd Izwan Salim	Perak/Silver
		<i>Internal Bond Glue Sample Aligner</i>	Mohamad Jani Saad Saimin Basir Nordin Putih Jalali Hj. Salleh	Perak/Silver
		<i>Phenolic Treated Plybamboo</i>	Dr Mohd Khairun Anwar Uyup Dr Paridah Md Tahir Dr Hamdan Husain Mohd Tamizi Mustafa Siti Rafidah Mahmud Mat Yaacob Che Wan	Perak/Silver
		<i>Potential Anti-Inflammatory Agent from <i>Prismatomeris malayana</i> for Topical Application</i>	Nor Hayati Abdullah Dr Nor Azah Mohd. Ali Mazura Md. Pisar Saidatul Husni Saidin Mohd Faisal Iskandar	Gangsa/Bronze
		<i>Kenaf Ecopaper</i>	Latifah Jasmani Dr Ainun Zuriyati Mohamed@Ashaari Mahmudin Saleh Dr Rushdan Ibrahim	Gangsa/Bronze

ANUGERAH INOVASI 2008
INNOVATION AWARDS 2008

BIL./ NO.	PAMERAN EXHIBITION	TAJUK TITLE	NAMA NAME	ANUGERAH AWARDS
		<i>Application of Band Type Wire Dendrometers to Study of radial Growth Periodicity in Tropical Trees and Wire</i>	Dr Ahmad Zuhaidi Yahya Dr Tadashi Nabuchi Amir Affan Abdul Azim	Gangsa/Bronze
		<i>Dry Steam Treated Particleboard</i>	Mohamad Jani Saad Nordin Putih	Gangsa/Bronze
		<i>Hybrid MLVOP Chair</i>	Abdul Hamid Salleh Dr Hamdan Husain Dr Wan Tarmeze Wan Ariffin Khairul Awang Mohd Nazri Abdul Latif Azizatul Akhmam Abd Wahab Dr Khalil H P Shawkataly	Gangsa/Bronze

Anugerah Bintang Kebesaran

Beberapa orang pegawai FRIM terus dianugerahi bintang kebesaran. Dato' Dr Abd. Latif Mohmod, Ketua Pengarah FRIM, menerima anugerah Johan Setia Mahkota (JSM) manakala Dato' Dr Abdul Rashid Abd. Malik (Timbalan Ketua Pengarah (Penyelidikan)) FRIM dianugerahi Darjah Indera Mahkota Pahang (DIMP). Pn Wan Rahmah Wan A. Raof (Kesatria Mangku Negara, KMN), Dr Woon Weng Chuen dan Dr Ahmad Zuhaidi Yahya (Ahli Mangku Negara, AMN). Dr Ab. Rasip Ab. Ghani (Ahli Mahkota Perak, AMP) dan Encik Khairuddin Kamaruddin (Pingat Pekerti Terpilih, PPT) oleh DYMM Paduka Seri Sultan Perak.


Honorary Awards

Several FRIM officers were conferred honorary awards. Dato' Dr Abd. Latif Mohmod, FRIM Director General, was conferred Johan Setia Mahkota (JSM) while Dato' Dr Abdul Rashid Abd. Malik (Deputy Director General FRIM (Research and Development)) was conferred Darjah Indera Mahkota Pahang (DIMP). Pn. Wan Rahmah Wan A. Raof (Kesatria Mangku Negara, KMN), Dr Woon Weng Chuen and Dr Ahmad Zuhaidi Yahya (Ahli Mangku Negara, AMN). Dr Ab. Rasip Ab. Ghani (Ahli Mahkota Perak, AMP) and Mr Khairuddin Kamaruddin (Pingat Pekerti Terpilih, PPT) received from His Royal Highness Paduka Seri Sultan Perak.



NAMA / NAME	ANUGERAH / AWARD
Dato' Dr Abd. Latif Mohmod	Johan Setia Mahkota (JSM)
Dato' Dr Abdul Rashid Abd. Malik	Darjah Indera Mahkota Pahang (DIMP)
Wan Rahmah Wan A. Raof	Kesatria Mangku Negara (KMN)
Dr Woon Weng Chuen	Ahli Mangku Negara (AMN)
Dr Ahmad Zuhaidi Yahya	Ahli Mangku Negara (AMN)
Dr Ab. Rasip Ab. Ghani	Ahli Mahkota Perak (AMP)
Khairuddin Kamaruddin	Pingat Pekerti Terpilih (PPT)

Tanggungjawab Sosial Korporat Corporate Social Responsibilities

Sebagai sebuah organisasi yang bertanggungjawab, FRIM telah melaksanakan beberapa aktiviti sosial yang bertujuan untuk berkongsi kemudahan dan keindahan alam persekitaran yang terdapat di kampusnya. Aktiviti-aktiviti ini disamping meningkatkan kesedaran terhadap alam sekitar juga memupuk rasa kasih sesama makhluk. Aktiviti yang dirancang mencakupi semua peringkat masyarakat termasuk mereka yang kurang keupayaan.

FRIM komited untuk meneruskan usaha ini hasil dari maklumbalas positif yang diterima.

Jom Jaga Alam

Bersempena dengan sambutan Hari Perhutanan Sedunia, pelajar tahun akhir Ijazah Sarjana Muda Komunikasi dan Pengajian Media (Perhubungan Awam) UiTM Shah Alam dengan kerjasama Institut Penyelidikan Perhutanan Malaysia (FRIM) telah menganjurkan satu program 'JOM JAGA ALAM' pada 22 Mac di Auditorium, FRIM. Upacara penutup telah disempurnakan oleh Dato' Dr Abd. Latif Mohmod, Timbalan Ketua Pengarah (Operasi) FRIM yang mewakili Datuk Dr Abdul Razak Mohd. Ali, Ketua Pengarah FRIM.

Program 'JOM JAGA ALAM' dilihat sebagai salah satu langkah proaktif untuk mendidik kanak-kanak di bangku sekolah tentang kepentingan memelihara alam sekitar. Program ini diadakan sebagai usaha mendidik dan menanam kesedaran di kalangan kanak-kanak sekolah untuk mencintai dan memelihara hutan tropika di samping untuk menerapkan isu-isu kesedaran, pembangunan dan pemuliharaan alam sekitar.

Seramai 100 orang murid dari tiga buah sekolah rendah iaitu SRK Putri Pandan 1, SRJKC Tsun Jin dan SRKT Kg Pandan telah diundang untuk menjayakan program tersebut. Selain itu, beberapa agensi kerajaan dan bukan kerajaan (NGO) seperti Zoo Negara, Globalsoft (MSC) Bhd, Jabatan Alam Sekitar Selangor, Gabungan Persatuan Pengguna Malaysia (FOMCA), DIGI-CSR (Tasik Chini) dan WWF Malaysia juga turut terlibat dalam menjayakan program ini. Agensi-agensi ini juga terlibat dalam pameran yang ditaja oleh mereka.

Antara aktiviti menarik yang diadakan ialah Green Clues, Art Attack, Picasso Time, Cari-Cari, Kutip-Kutip, demonstrasi panjat pokok, High-5 serta lawatan ke tapak pameran.

As a responsible organization, FRIM had organized various social activities with the aim of sharing the facilities available in its scenic campus with the community. The activities were specifically implemented to create awareness of the environment as well as increasing tolerance and understanding amongst the residents and community. The activities were also designed to reach out to all level of the community including the disabled.

FRIM is committed to continuing this noble effort and our enthusiasm is further strengthened by the positive feedbacks received.

Let's Care for the Environment

In conjunction with the World Forestry Day, final-year students doing their degree in Communications and Media Studies at UiTM Shah Alam in collaboration with the Forest Research Institute Malaysia (FRIM) had organized "JOM JAGA ALAM" at the FRIM Auditorium on 22 March. The closing ceremony was graced by the Deputy FRIM Director General (Operations) Dato' Dr Abd. Latif Mohmod on behalf of Director-General Datuk Dr Abdul Razak Mohd. Ali.

The "JOM JAGA ALAM" programme was organized as part of an effort to educate and inculcate seeds of awareness among schoolchildren of the importance of caring and conserving tropical forests apart from highlighting related awareness, development and conservation issues. It was also a proactive step towards educating the young about the importance of conserving the environment.

One hundred pupils from three primary schools, namely SRK Putri Pandan 1, SRJKC Tsun Jin dan SRKT Kg Pandan, were invited to participate in the programme. Apart from that, several government and non-governmental agencies such as Zoo Negara, Globalsoft (MSC) Bhd, Selangor Department of Environment, Federation of Malaysian Consumer Association (FOMCA), DIGI-CSR (Tasik Chini) dan WWF Malaysia, were also involved in the exhibition held during the programme.

Among the interesting activities were Green Clues, Art Attack, Picasso Time, Cari-Cari, Kutip-Kutip, tree climbing demonstration, High-5 and exhibition site visit.

Bulan Kesihatan

Sempena dengan Bulan Kesihatan yang dianjurkan oleh FRIM dalam bulan April setiap tahun, Unit Komunikasi Korporat dan Perkumpulan Wanita FRIM telah menganjurkan beberapa program kesihatan kepada kakitangan seperti berikut:



16 April di Bangunan Auditorium FRIM

- Kempen Derma Darah oleh Pusat Darah Negara disertai oleh 33 orang kakitangan.
- Pemeriksaan Mata Percuma oleh Qausar Optometrist.
Seramai 14 orang datang ke kaunter pemeriksaan mata yang disediakan untuk membuat pemeriksaan mata, serta membuat tempahan untuk membaiki, menukar dan membeli cermin mata baharu pada hari tersebut.

24 April, di Auditorium FRIM

- Ceramah Kesihatan "Memahami Kitaran Haid dan Penyakit-Penyakit yang Berkaitan Dengannya" oleh Kol. (B) Dr Hanifullah Khan Wahidullah Khan, seorang Pakar Perunding O&G dan Pembedahan Leproskopi dari Pusat Pakar Wanita dan Rawatan Endometriosis, Lumut, Perak. Seramai 96 orang peserta yang terdiri daripada kakitangan FRIM dan ahli PWFRIM telah menghadiri sesi ceramah ini.

29 April, di Bangunan Auditorium FRIM

- Pemeriksaan gigi secara percuma oleh Klinik Kesihatan Taman Ehsan.
Seramai 40 orang peserta telah mendaftar dan diberi rawatan gigi oleh Dr Lily Laura dari Klinik Gigi Taman Ehsan. Rawatan merangkumi cara-cara menjaga gigi, gusi, kebersihan, tampalan dan sebagainya.

29 April, di Auditorium FRIM

- Ceramah kesedaran kanser payu dara dan penyakit-penyakit lain yang berkaitan oleh Pride Foundation (Pink Ribbon Deeds). Seramai 36 orang telah menghadiri sesi ceramah tersebut. Pride Foundation telah membawa Puan Rogayah

Health Awareness Month

In conjunction with the Health Awareness Month organised by FRIM every year in April, the FRIM Corporate Communications Unit and Women's Group (PWFRIM) had jointly carried out the following activities involving FRIM staff:



16 April, at the FRIM Auditorium:

- *Blood Donation Campaign by the National Blood Centre
A total of 33 staff participated.*
- *Free eye check by Qausar Optometrist
A total of 14 staff went to the counter to have their eyes checked, as well as to order, change or purchase new pair of glasses.*

24 April, at the FRIM Auditorium

- *Health talk on "Understanding the Menstrual Cycle and Related Diseases" delivered by Col. (B) Dr Hanifullah Khan Wahidullah Khan, Consultant Specialist in O&G and Laproscopic Surgery from Pusat Pakar Wanita dan Rawatan Endometriosis, Lumut, Perak. The talk was attended by 96 participants, comprising FRIM staff and PWFRIM members.*

29 April, at the FRIM Auditorium

- *Free dental treatment by the Taman Ehsan Health Clinic
A total of 40 participants registered for dental treatment by Dr Lily Laura from the Taman Ehsan Dental Clinic.*

29 April, at the FRIM Auditorium

- *Lecture on breast cancer and other related diseases by Pride Foundation (Pink Ribbon Deeds). Thirty-six participants attended the lecture. Pride Foundation brought breast cancer survivor Puan Rogayah Abdul Wahab to share her experience with FRIM staff and also conducted a Q&A survey. The survey participants were presented with Cosmetic Surgery and Beauty magazines published in 2004 and 2005, containing information on breast cancer and related issues.*

Abdul Wahab, seorang bekas pesakit kanser untuk berkongsi pengalaman beliau dengan kakitangan FRIM. Mereka telah menjalankan soal selidik dengan mengedarkan keratan Q&A. Peserta yang memberi maklum balas telah dihadahi majalah 'Cosmetic Surgery & Beauty' keluaran tahun 2004 dan 2005. Majalah tersebut mengandungi maklumat berkaitan kanser payu dara dan hal-hal yang berkaitan dengannya.

Sambutan Bulan Kemerdekaan

Sempena sambutan Bulan Kemerdekaan pada 16 Ogos–16 September, Unit Komunikasi Korporat sekali lagi menganjurkan beberapa aktiviti sebagai menghormati serta untuk menyemarakkan lagi semangat patriotik di kalangan kakitangan FRIM. Tema "Perpaduan Teras Kejayaan", merupakan antara cermin kepada keunggulan FRIM selama ini. Menerusi kepelbagaian bangsa di kalangan kakitangan FRIM, kejayaan demi kejayaan telah dapat dirangkul sejajar dengan aspirasi kerajaan yang menggalakkan muhibah antara pelbagai kaum di Malaysia.

Majlis pelancaran ringkas bersempena Bulan Kemerdekaan peringkat FRIM telah disempurnakan oleh Dato' Dr Abd. Latif Mohmod selaku Ketua Pengarah FRIM pada 22 Ogos. Turut diadakan ialah upacara penyerahan bendera kepada semua Pengarah Bahagian untuk dikibarkan di pejabat masing-masing serta aktiviti gotong-royong.

Dato' Dr Abd. Latif juga melancarkan hari Khamis pertama setiap bulan sebagai "Hari Bebas Nikotin"; yang merupakan salah satu langkah untuk memerdekakan diri daripada aktiviti merokok.

Pada 27 Ogos pula, FRIM menganjurkan pertandingan kenderaan patriotik manakala pada 28 Ogos, aktiviti diteruskan dengan pemilihan pejabat patriotik.

Merdeka Month Celebration

In conjunction with the Merdeka Month Celebration from 16 August–16 September, the Corporate Communications Unit had again organized several activities to commemorate the country's Merdeka celebration as well as to awaken the patriotic spirit of the FRIM personnel. The theme for this celebration, "Perpaduan Teras Kejayaan" (Unity is the Core of Success), reflected the approach adopted by FRIM in its quest for excellence. It was through the multi-racial unity of the FRIM staff that enabled the institute to achieve one success after another in line with the Government's aspiration to promote and enhance multi-racial harmony in Malaysia.

The launching ceremony of Merdeka Month celebration held on 22 August was graced by the FRIM Director General, Dato' Dr Abd. Latif Mohmod. The programme included the presentation of Jalur Gemilang to all FRIM division directors to fly at their respective offices, and gotong-royong activities.

Dato' Dr Abd. Latif had also officially declared every first Thursday of the month as a "Nicotine Free Day"; as a first step towards encouraging smokers to free themselves from the addiction.

On 27 August, FRIM conducted a "patriotic vehicle" competition, while on 28 August, the selection of "patriotic offices".



Hari Anugerah Awards Day

Hari Anugerah FRIM pada tahun ini telah diadakan di Taman Botani Kepong pada 23 Oktober. Majlis tersebut yang buat pertama kalinya diadakan di kawasan yang terbuka dengan pemandangan yang indah dan nyaman di tepi tasik buatan manusia telah dirasmikan oleh Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod. Acara kemuncak ialah penyampaian Anugerah Ketua Pengarah FRIM, Anugerah Khidmat Cemerlang (individu dan kumpulan), Anugerah Khidmat Setia, Anugerah Penerbitan Terbaik, Anugerah Khidmat Masyarakat, Anugerah Penyelidikan Terbaik dan Anugerah Saintis Terbaik. Buat pertama kalinya juga satu anugerah telah diperkenalkan bagi mengiktiraf projek-projek FRIM yang menerima dana penyelidikan yang signifikan. Dua kategori anugerah ialah Sijil Emas yang diberikan kepada projek yang mendapat dana melebihi RM1 juta dan sijil Perak kepada projek yang mendapat RM500 000 – RM999 000.

ANUGERAH MFRDB

Penerima Anugerah/Awardee:

Tiada pencalonan/No nomination

ANUGERAH KETUA PENGARAH

Penerima Anugerah/Awardee:

Dato' Dr Abdul Rashid Ab. Malik



ANUGERAH PEKERJA TERBAIK TAHUNAN BEST EMPLOYEE AWARD

KUMPULAN PENGURUSAN & PROFESIONAL MANAGEMENT & PROFESSIONAL GROUP	KUMPULAN SOKONGAN 1 SUPPORTING GROUP 1	KUMPULAN SOKONGAN 2 SUPPORTING GROUP 2
Adnan Mohamad	Abdull Rashih Ahmad	Mohd Suffian Hamsan

FRIM Awards Day was held at the Kepong Botanic Gardens on 23 October. The occasion, which was held at the open area with beautiful and calm scenery near a man-made lake was officiated by the Dato' Dr Abd. Latif Mohmod, Director General FRIM. Highlights of the event included the presentations of the FRIM Director General's award, excellent service (individual and group), long service and outstanding publications, community service awards, best research project awards and best research scientist awards for the year. A new award was introduced this year as a recognition to FRIM projects which received significant R&D funds. The award consists of two categories: Gold Certificate given to projects that manages to secure more than RM1 million, whereas Silver Certificate awarded to projects with RM500 000 – RM999 000.

ANUGERAH SAINTIS TERBAIK BEST SCIENTIST AWARD

Dr Abdul Rahim Nik



ANUGERAH PENYELIDIKAN TERBAIK BEST RESEARCH AWARD

Tiada pencalonan

No nomination



Adnan Mohammad



Abdull Rashih Ahmad



Mohd Suffian Hamsan

ANUGERAH ANJAKAN GAJI SALARY INCREMENT AWARD

Kumpulan Pengurusan dan Profesional Management and Professional Group

Abdul Rahman Kassim, Dr
Ahmad Azaruddin Mohd. Nor
Asiah Osman
Elizabeth Philip, Dr
Hamdan Husain, Dr
Hashim W. Samsi
Ho Wai Mun, Dr
Khali Aziz Hamzah, Dr
Laurence G. Kirton, Dr
Lee Chai Ting
Ling Sui Kiong, Dr
Muhammad Farid Abd. Rashid
Nashatul Zaimah Noor Azman
Nor Hasnida Hassan, Dr
Norhara Hussein
Norlia Basheruddin, Dr
Rozita Ahmad
Rushdan Ibrahim, Dr
Samsudin Musa
Sarifah Kunju Ahmad
Sharmiza Adnan
Suffian Misran
Vimala Subramaniam, Dr
Wan Mohd. Shukri Wan Ahmad
Wan Zahiri Wan Yaacob
Zaihan Jalaludin
Zainon Abu Samah

Kumpulan Sokongan Supporting Group

Abu Husin Harun
Ahmad Sariani Salimat
Aminudin Ab. Aziz
Azahar Abdullah
Azman Ahmad
Fadzlinah Zollfatah

Fesal Johan
Ghazali Jaafar
Habibah Mohamad
Halim Man
Hamsinah Hashim
Kamarul Hizam Hamsan
Mohamad Asri Adam
Mohd Afendi Hussin
Mohd Ghaus Hussein
Mohd Md. Sahat
Mohd Nazri Mohd Alis @ Alias
Mohd Shukri Said
Mohd Sopian Muktar
Muhammad Asri Lias
Nik Yasmin Nik Yahya
Nor Azian Mohd Kasby
Rasyidah Salleh
Rosidi Sulaiman
Roslan Abdullah
Rozita Ibrahim
Saharudin Musa
Sahrol Ab Lah
Salamah Alias
Salmah Sepat
Shamizam Shariff
Sukeri Don
Sumardi Husin
Yusniza M. Yusof
Zaidi Hamid
Zainab Bakar
Zainun Othman

ANUGERAH KHIDMAT CEMERLANG: INDIVIDU EXCELLENT SERVICE AWARD: INDIVIDUAL

Kumpulan Pengurusan & Profesional Management & Professional Group

Aminah Hamzah, Dr
Azman Hassan
Ismariah Hj. Ahmad, Dr
Khairul Najwan Ahmad Jahari
Koh Mok Poh, Dr

Lim Hin Fui, Dr
 Mohd Arshad Saru
 Nor Azah Mohd. Ali, Dr
 Norazian Mohd Zain
 Norhayati Nordin
 Nurul Hilal Hj. Ahmad Tarmidzi
 Sim Heok Choh, Dr
 Wan Tarmeze Wan Ariffin, Dr



Kumpulan Sokongan **Supporting Group**

Abd. Rahim Ahmad
 Abd. Samad Lalil
 Abdul Ghani Mohamad
 Abdul Karim Mohd Nasir
 Abdul Molok Ab. Ghani
 Amrah Hj. Toha
 Arshad Hj Anuar
 Ayau Kanil
 Fazilah Ahmad
 Gunasegaran Ponusamy
 Hamidon Ahmad
 Hashim Mohd
 Jamal Abdul Ghani
 Jamaludin Malek
 Kamarudin Saleh
 Maskom Peseri
 Mohamad Akhir Abdul Rahman
 Mohd Razali Hamat
 Mohd Yatim Abd. Aziz



Muhammad Deraman
 Mukhtar Ismail
 Nor Rizan Mohamad
 Norli Raja Mohamad
 Norziah Salleh
 Raja Aminah Raja Aman Shah
 Ramli Saad
 Rohimah Abdullah
 Rosman Ibrahim
 Saimin Basir
 Saripah Barom
 Shahudin Sulung
 Shuhaimi Sulaiman
 Siti Hasanah Mat Said
 Zainal Abidin Mansor
 Zaisatul Khairy Salleh
 Zulkarnain Razali
 Zuriati Ahmadin

ANUGERAH KHIDMAT CEMERLANG: KUMPULAN **EXCELLENT SERVICE AWARD: GROUP**

Kumpulan Penerbitan Laporan Tahunan MFRDB/FRIM **MFRDB/FRIM Annual Report Team**

Bahagian Pengurusan Penyelidikan **& Ekonomi** **Reserach Management & Economic Division**

Nik Zanariah Nik Mahmood (Ketua)
 Azrinawati Samsuri
 Nor Azman Hussein
 Asmar Hj Hassan
 Mohd Yusof Mohamed

Kumpulan Penyelidik Antioksidan **Antioxidant Research Team**

Bahagian Bioteknologi Perhutanan **Forest Biotechnology Division**

Vimala Subramaniam, Dr (Ketua)
 Rohana Sahdan
 Juliza Mohammed
 Abdul Rahih Ahmad

POPS LUMBER

Wan Tarmeze Wan Ariffin, Dr (Ketua)
 Khairul Awang
 Marzalina Mansor, Dr
 Mohd. Tamizi Mustafa
 Abdul Hamid Saleh
 Abd. Rahim Ahmad

ANUGERAH KHIDMAT MASYARAKAT COMMUNITY SERVICE AWARD

Othman Mohd Desa

ANUGERAH KHIDMAT SETIA LONG SERVICE AWARD

Salmiah Ujang, Dr
Zainol Khalid

ANUGERAH TESIS TERBAIK BEST THESIS AWARD

Kategori PhD / PhD Category Tesis Terbaik/ Best Thesis

Grace Tabitha Lim Wui Oi
TFBC/Virginia Polytechnic Institute and State
University

Enhancing the Weaver Ant, *Oecophylla smaragdina*
(Hymenoptera: Formicidae), for Biological Control of
Shoot Borer, *Hypsipyla robusta* (Lepidoptera: Pyralidae),
in Malaysia Mahogany Plantations

Anugerah Merit / Merit Award

Ismail Harun
Program Hutan Asli/Universiti Putra Malaysia
Natural Forest Programme/University Putra Malaysia

Optimization of Cutting Cycle and Growing Stock for
Sustainable Harvest in Timber Production Forest in
Peninsular Malaysia

Kategori MSc / MSc Category Tesis Terbaik / Best Thesis

Tnah Lee Hong
Universiti Putra Malaysia
University Putra Malaysia

DNA Fingerprint Databases of Chengal
(*Neobalanocarpus heimii*) for Forensic Forestry
Investigations

Anugerah Merit / Merit Award

Norulaiman Yusoff
Universiti Putra Malaysia
University Putra Malaysia

Purification and Characterization of Organic: Solvent
Tolerant Protease from *Pseudomonas aeruginosa* Strain K.

ANUGERAH PENERBITAN PUBLICATION AWARD

Anugerah ini diberikan kepada pegawai penyelidik yang
telah menghasilkan penerbitan yang cemerlang pada
tahun ini. Pemenang bagi pelbagai kategori adalah
seperti yang berikut:

These awards are conferred to research officers for
their outstanding publications for the year. Winners of
the various categories of publications in 2007 were as
follows:

Kategori A: Penerbitan Teknikal Category A: Technical Papers

Pertama / First

Laurence G. Kirtan & Shawn Cheng
Ring Barking and Root Debarking of Dipterocarp
Saplings by Termites in Enrichment Planting Site in
Malaysia

Kedua / Second

Hamdan Hussain, Callum Hill, Zaidon Ashaari & Abd.
Latif Mohmod
Equilibrium Moisture Content and Volumetric: Changes
of *Gigantochloa scortechinii*

dan/and

Avelinah Julius, Monica Suleiman & Atsuko Takano
Five New Species of *Plagiostachys* (Zingiberaceae)
from Borneo

Kategori B: Penerbitan Separa/Bukan Teknikal Category B: Semi/Non-Technical Papers

Pertama / First

Sreetheran Maruthaveeran
Performance Indicator to Evaluate Urban Parks from
the Safety and Security Perspective

dan/and

Abdul Razak Mohd. Ali, Norini Haron & Lim Hin Fui
The Role of Forestry Research and Development (R&D)
Institution in Policy Formulation and Implementation:
A Malaysian Perspective

dan/and

Shawn Cheng & Laurence G. Kirton
Overview of Insect Biodiversity Research in Peninsular
Malaysia



Kategori C: Buku
Category C: Book

Anugerah Merit
Merit Award

Wan Asma Ibrahim, Wan Rasidah Wan A. Kadir &
Mohd. Nor Mohd.Yusoff
Turning Oil Palm Residues into Products



Kategori D: Buku Panduan
Category D: Handbook

Tiada pencalonan
No nomination

ANUGERAH KHAS LAPORAN AUDIT DALAM TERBAIK

SPECIAL AWARD FOR THE BEST INTERNAL AUDIT REPORT

Penghargaan

Unit Kewangan, Cawangan Kewangan & Akaun
Laporan Auditan Ke Atas Simpanan Tetap FRIM

Jumaaton Abu Bakar

ANUGERAH PERSEKITARAN KERJA TERBAIK **BEST WORK ENVIRONMENT AWARD**

Kategori Pejabat **Office Category**

Pertama / First

Cawangan Perniagaan
Bahagian Kewangan, Perniagaan & Teknologi
Maklumat
Business Branch
Finance, Business & Information Technology Division

Kedua / Second

Unit Pengurusan Aset
Bahagian Kewangan, Perniagaan & Teknologi
Maklumat
Asset Management Unit
Finance, Business & Information Technology Division

Kategori Makmal/Bengkel/Stesen Penyelidikan **Laboratory/Workshop/ Research Station Category**

Pertama / First

Makmal Genetik, Program Bioteknologi &
Farmaseutikal
Genetic Laboratory, Biotechnology & Pharmaceutical
Programme

Kedua / Second

Makmal Kultur Tisu, Program Bioteknologi &
Farmaseutikal
Tissue Culture Laboratory, Biotechnology & Pharmaceutical
Programme

Aktiviti Lain Other Activity

Ekspedisi Botani ke Gunung Telapa Burok dan Bukit Tangga, Negeri Sembilan

Bukit Tangga (2°50'37.8"N, 102°00'43.8"E) terletak di dalam kawasan HS Gunung Beremban 19 km di timur laut Seremban melalui Jalan Seremban-Kuala Klawang. Bukit ini dihubungkan dengan Gunung Telapa Burok (2°50'28.8"N, 102°04'06.3"E) melalui jalan sejauh 11.3 km menghala ke puncak gunung tersebut yang berketinggian 1100 m dari aras laut. Bukit Tangga sememangnya diketahui sebagai sebuah lokaliti yang menarik dari aspek botani dengan kehadiran ahli famili halia yang jarang ditemui, *Haniffia cyanescens* var. *cyanescens* (Zingiberaceae) yang endemik kepada kawasan ini. Palma berdaun-payung terbesar yang endemik kepada Semenanjung Malaysia, *Johannesteijsmannia magnifica* (Palmae), juga dijumpai. Setakat ini, flora di Gunung Telapa Burok masih belum diterokai secara menyeluruh dari aspek botani. Ekspedisi yang berlangsung pada April telah dianjurkan oleh Projek Flora of Peninsular Malaysia dan melibatkan seramai 14 orang kakitangan. Sasaran utama ekspedisi ini adalah untuk mengesan populasi spesies-spesies yang jarang ditemui dan terancam; selain menjalankan kutipan spesimen secara menyeluruh pada altitud yang berbeza bagi mengkaji taburan tumbuhan dari hutan tanah pamah ke hutan pergunungan bawah yang terdapat di puncak gunung ini.



Haniffia cyanescens var. *cyanescens* (Zingiberaceae)

Botanical Expedition to Gunung Telapa Burok and Bukit Tangga, Negeri Sembilan

Bukit Tangga (2°50'37.8"N, 102°00'43.8"E) is located 19 km north-east of Seremban on the Seremban-Kuala Klawang Road within the Gunung Beremban FR. It is linked to Gunung Telapa Burok (2°50'28.8"N, 102°04'06.3"E) by a 11.3 km road to the summit at 1100 m altitude. Bukit Tangga is known to be interesting botanically because the rare ginger, *Haniffia cyanescens* var. *cyanescens* (Zingiberaceae) is endemic to this area, while the Peninsular Malaysian endemic of the largest of umbrella leaf palms, *Johannesteijsmannia magnifica* (Palmae) is also found in this area. The flora of Gunung Telapa Burok had not previously been comprehensively explored botanically. The expedition in April organized by the Flora of Peninsular Malaysia Project involved 14 staff. The first aim of the expedition was to locate populations of rare and endangered species; the second to make comprehensive collections at different altitudes in order to study plant distribution from lowland forest to the lower montane forest on the summit.



Johannesteijsmannia magnifica atau daun sang (Palmae)
Johannesteijsmannia magnifica or daun sang (Palmae)

Sejumlah 623 spesimen yang mewakili 500 spesies dalam 189 genus dan 97 famili telah dikumpul. Populasi kedua-dua spesies endemik (*Haniffia cyanescens* var. *cyanescens* dan *Johannesteijsmannia magnifica*) telah ditemui dan sebagai tambahan, satu spesies baharu *Begonia* (Begoniaceae) telah dijumpai di beberapa kawasan sungai. *Henckelia winkleri* (Gesneriaceae) yang cantik, dihuraikan dari Gunung Angsi, terbukti lazim ditemui di Gunung Telapa Burok dan spesies ini endemik kepada Negeri Sembilan. Antara spesies pokok yang jarang ditemui adalah dari famili keruing-meranti, *Dipterocarpus acutangulus* (Dipterocarpaceae) yang hanya terdapat di satu kawasan permatang dan selain kawasan ini di Semenanjung Malaysia, hanya diketahui terdapat di Perak. *Maingaya malayana* (Hamamelidaceae) ialah penemuan yang mengejutkan di bahagian Panti di Gunung Telapa Burok. Sebelum ini spesies tersebut hanya dilaporkan di Pulau Pinang dan dua lokasi di Perak. Dijangkakan terdapat lebih banyak penemuan-penemuan menarik apabila pengecaman kesemua spesimen dilengkapkan.

A total of 623 specimens was collected representing about 500 species in 189 genera and 97 families. Populations of both the endemics (*Haniffia cyanescens* var. *cyanescens* and *Johannesteijsmannia magnifica*) were encountered and in addition a new species of *Begonia* (Begoniaceae) was discovered in several streams. The beautiful *Henckelia winkleri* (Gesneriaceae), described from Gunung Angsi, proved to be common on Gunung Telapa Burok and so is a Negeri Sembilan endemic. Among the rare tree species was the dipterocarp, *Dipterocarpus acutangulus* (Dipterocarpaceae), which occurred only on a single ridge and elsewhere in Peninsular Malaysia is known only from Perak, and *Maingaya malayana* (Hamamelidaceae) was a surprise find on the Panti side of Gunung Telapa Burok, because previously it was known only from Penang and two localities in Perak. Further interesting results are expected when the identification of all the specimens has been finalised.



Henckelia winkleri (Gesneriaceae).



Spesies *Begonia* (Begoniaceae) yang baru.
The new *Begonia* species (Begoniaceae).

Kewangan Finance

Kedudukan Kewangan

Prestasi kewangan FRIM bagi tahun berakhir 31 Disember 2008 adalah hampir sama dengan tahun 2007. Lebih pendapatan yang diperoleh pada tahun 2008 ialah sebanyak RM13.7 juta berbanding RM21.0 juta pada tahun sebelumnya. Manakala lebih pendapatan terkumpul pada tahun 2008 pula bertambah RM116.4 juta berbanding dengan RM102.6 juta pada tahun 2007.

Bagi tahun 2008, Kementerian Sains, Teknologi dan Inovasi (MOSTI) telah meluluskan peruntukan dana penyelidikan kepada FRIM berjumlah RM6.6 juta di bawah dua projek TechnoFund. Selain itu, FRIM turut mendapat pembiayaan sebanyak RM554 000 bagi tiga projek di bawah ScienceFund dan RM1.5 juta bagi kumpulan penyelidik dari Tekno-Ekonomi yang mendapat geran levi dari Tabung Pembangunan Industri Kayu-Kayan Malaysia.

Pendapatan

Sebagai sebuah Badan Berkanun Persekutuan, aktiviti FRIM masih dibiayai oleh Kerajaan Persekutuan melalui Geran Tahunan dan selebihnya hasil sumbangan organisasi luar dan dalam negara serta sumber dalaman. Jumlah pendapatan FRIM keseluruhannya pada tahun 2008 ialah sebanyak RM115.2 juta. Angka ini menunjukkan pertambahan sebanyak RM10.8 juta atau 10.3% berbanding pendapatan pada tahun 2007 iaitu RM104.4 juta.

Faktor utama yang menyebabkan pertambahan pendapatan tersebut ialah peningkatan dalam sumber kewangan yang diterima daripada organisasi di dalam dan di luar negara iaitu sebanyak RM7.3 juta bagi melaksanakan aktiviti penyelidikan dan pembangunan (R&D). Kenaikan ini mengimbangi pengurangan peruntukan Mengurus pada tahun 2008 yang didapati menurun daripada sebanyak RM51.2 juta pada tahun 2007 kepada RM46.1 juta, iaitu penurunan sebanyak RM5.1 juta. Penurunan ini disebabkan pada tahun 2007, FRIM telah diperuntukkan sebanyak RM8 juta untuk bayaran one-off premium tanah bagi kampus FRIM di Kepong. Selain itu, pendapatan pembangunan bagi tahun 2008 meningkat sebanyak RM32.6 juta berbanding RM29.7 juta dalam tahun sebelumnya.

Financial Position

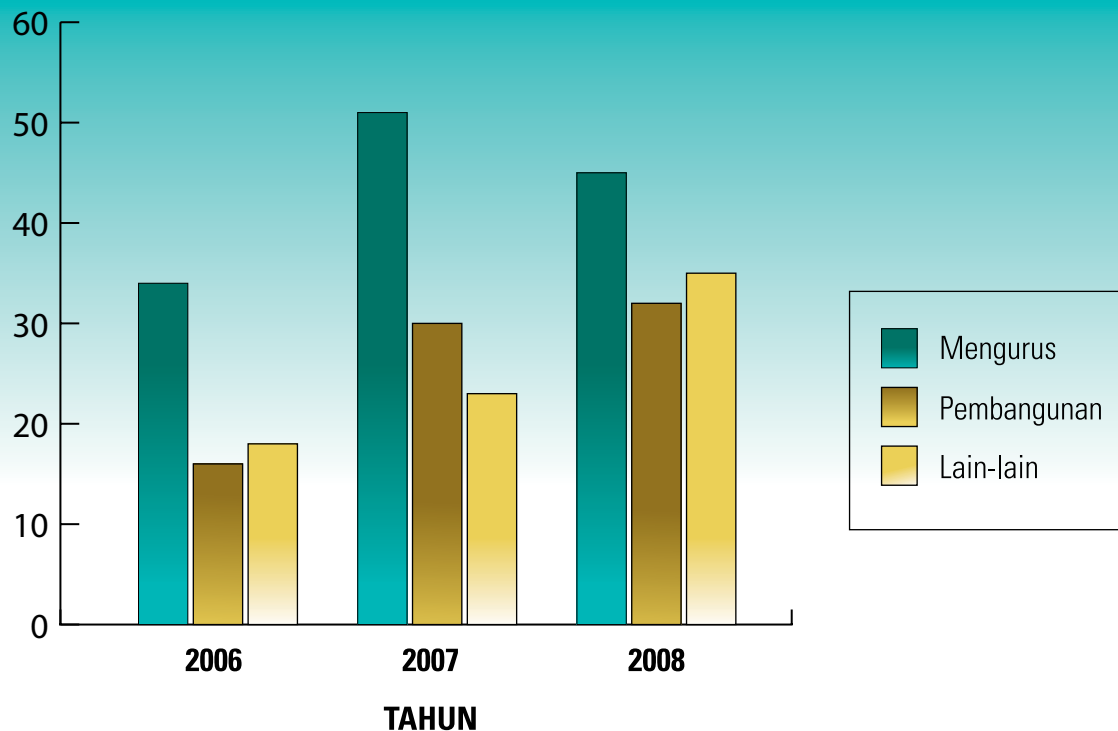
FRIM's financial performance for the year ending 31 December 2008 was nearly identical with that for the year 2007. The revenue surplus achieved in 2008 was RM13.7 million compared with RM21.0 million in the previous year. The accumulated profit for the year 2008 increased to RM116.4 million compared with RM102.6 million for the year 2007.

For the year 2008, FRIM has been approved two research grants under the Ministry of Science, Technology and Innovation (MOSTI)'s TechnoFund Project amounting to RM6.6 million. Apart from that, FRIM also received financing to the value of RM554 000 for three projects under the ScienceFund and RM1.5 million for a group of researchers from the Techno-Economics Programme from levy grants under the Malaysian Development of Timber Industries Fund.

Income

The activities of FRIM, as a federal statutory body, are still funded by the Federal Government through annual grants with the rest coming from contributions by local as well as foreign institutions and also from internally generated funds. FRIM's total income for the financial year 2008 was RM115.2 million. This figure shows an increase of RM10.8 million or 10.3% compared with the total income for the year 2007 which was RM104.4 million.

The key factor which resulted in the increase of revenue for the year was brought about by the increase in contributions received from local and foreign institutions by RM7.3 million to implement research and development (R&D) activities. This increase compensated for the reduction in operational grants for the year 2008, in which the allocation declined from RM51.2 million in 2007 to RM46.1 million in 2008, a drop of RM5.1 million. The decline was due to the fact that in 2007 FRIM had been approved an one-off allocation of RM8 million to pay for the cost of land premium for FRIM's land in Kepong. On top of that, the development income for the year 2008 had increased to RM32.6 million as compared with that of the previous year of RM29.7 million.



Perbelanjaan

Bagi tahun 2008, perbelanjaan keseluruhan FRIM ialah sebanyak RM101.5 juta iaitu meningkat sebanyak RM18.1 juta atau 21.7% berbanding RM83.4 juta pada tahun sebelumnya.

i. Perbelanjaan Mengurus

Sebahagian besar perbelanjaan mengurus adalah untuk pembayaran gaji dan perbelanjaan yang berkaitan dengan gaji. Bagi tahun 2008, perbelanjaan berkaitan gaji telah meningkat sebanyak RM5.1 juta (RM30.7 juta) berbanding tahun 2007 yang berjumlah RM25.6 juta. Selain itu, sebanyak RM9.3 juta dibelanjakan untuk perkhidmatan dan bekalan yang merangkumi perbelanjaan utiliti, penyelenggaraan dan lain-lain yang berkaitan.

ii. Perbelanjaan Pembangunan dan Penyelidikan

Perbelanjaan Pembangunan dan Penyelidikan berjumlah RM41.8 juta dibiayai melalui Geran Pembangunan dan peruntukan Kerajaan yang lain. Sebahagian besar daripada perbelanjaan ini adalah untuk aktiviti Penyelidikan dan Pembangunan Perhutanan yang merupakan aktiviti teras FRIM.

Expenditure

For the year 2008, FRIM's overall expenditure was RM101.5 million, a growth of RM18.1 million or 21.7% compared with RM83.4 million for the previous year.

i. Operating Expenditure

Most of the operation expenditure was salary-related expenditure payment. For the year 2008, expenditure related to salary had increased by RM5.1 million (RM30.7 million) compared with that for the year 2007 which amounted to RM25.6 million. Apart from that, RM9.3 millions was spent on services and supplies which encompass utility, maintenance and related expenditures.

ii. Research and Development Expenditure

Research and Development expenditure amounted to RM41.8 million, which was funded by the Development Grant and other allocations from the government. Most of this expenditure was for research and development activities, which constitute FRIM core activities.

Pelaburan dan Kedudukan Tunai

Kedudukan tunai wang tunai di bank pada akhir tahun 2008 ialah sebanyak RM2.3 juta berbanding RM3.3 juta bagi tahun 2007 iaitu penurunan sebanyak RM1 juta. Sementara itu, simpanan tetap pula meningkat sebanyak RM35.8 juta daripada RM23.1 juta pada tahun 2007 kepada RM58.9 juta pada tahun 2008. Peningkatan ketara simpanan tetap disebabkan sebahagian daripada peruntukan Mengurus dan Pembangunan bagi tahun 2007 diterima lewat memasuki tahun 2008. Walau bagaimanapun, bayaran tetap dibuat dalam tahun 2007 dengan mendahulukan wang Lembaga. Selain itu, terdapat terimaan peruntukan 2008 yang agak besar tidak dapat dibelanjakan pada tarikh penutupan akaun tetapi hanya dapat dibelanjakan pada awal 2009. Secara keseluruhannya kedudukan kewangan FRIM adalah baik.

Kunci Kira-kira

Kedudukan aset FRIM juga bertambah baik dalam tahun 2008 berbanding tahun 2007. Peningkatan turut dicatatkan dalam nilai aset yang mencatatkan peningkatan nilai aset tetap bersih FRIM sebanyak 16% daripada RM59 juta pada tahun 2007 kepada RM69 juta dengan siapnya bangunan Herbarium dan Mobile Lab pada tahun 2008. FRIM telah berjaya melaksanakan fungsinya selaras dengan objektif yang telah ditetapkan.

Investment and Cash Position

Cash money in the bank at 2008 year end was RM2.3 million compared with RM3.3 million for the year 2007 showing a decline of RM1 million. Nevertheless, fixed deposit grew by RM35.8 million, an increase from RM23.1 million in 2007 to RM58.9 million in 2008. This notable increase of fixed deposit was due to the allocation for the year 2007 which was received late. Despite that, payments were still made in 2007 using the Board's money. However, the substantial allocation for 2008, although received in 2008, could not be disbursed by the year end but was only disbursed in early 2009. Overall, the financial position of FRIM is well and good.

Balance Sheet

FRIM's asset position has also improved in the year 2008 relative to the year 2007. The Increase was also recorded in net asset value by as much as 16% from RM59 million in 2007 to RM69 million in 2008, due to the completion of the Herbarium building and the successful delivery of the Mobile Lab in 2008. FRIM has been able to successfully implement its functions in accordance with its set objectives.



Lawatan Rasmi Official Visit

Pada tahun 2008, FRIM terus menjadi tumpuan pelawat yang terdiri daripada orang kenamaan serta para saintis dari dalam dan luar Negara; selain orang awam yang berminat untuk mempelajari dan memahami aktiviti-aktiviti terutamanya aktiviti penyelidikan dalam bidang perhutanan dan hasil hutan tropika yang dijalankan oleh FRIM. Di samping itu, pelbagai kemudahan yang terdapat di FRIM seperti Titian Kanopi, Muzium, Taman Etnobotani dan Herbarium menjadi tarikan utama pelancong. Antaranya ialah:

During the year, FRIM continued to attract visitors including local and foreign VIPs and scientists as well as the public who were interested to learn about FRIM, especially her research activities in tropical forestry and forest products. Various facilities and attractions are available in FRIM such as the Canopy Walkway, Museum, Ethnobotanic Garden and Herbarium were also the main tourist attractions. Among the visitors were:

BIL. NO.	PELAWAT VISITORS	TARIKH DATE
1	Delegasi Kedutaan Korea: H.E. Bong Ryull Yang, Duta Korea, Pn Paik Ji Ah (Kaunselor) dan En. Choi Won Seok (Second Secretary)	17 Januari
2	En. Raja Khalid Hussain, Ketua Pengarah, Pakistan Forest Institute, Peshawar	24 Januari
3	En. Filip Szolomicki (Konsultan MTC Poland), Pn Jeniffer (MTC Malaysia) dan En. Azmir Husni Mohd Nor (MTC Malaysia)	26 Februari
4	Y. B. Datuk Douglas Uggah Embas, Menteri NRE	10 April
5	Prof. D. K. Bandyopadhyay, Pengarah IIFM; Prof. Manmohan Yadav, Professor Madya, IIFM; Smt. Rebecca Nayar, IFS, <i>Conservator of Forests (Policy and Planning)</i> , Orissa State Forest Department dan En A. K. Jha, IFS, <i>Conservator of Forests (Monitoring)</i> , Gujarat State Forest Department	20 Mei
6	Pegawai MTC bersama Wakil Media Massa En. Joseph Jupiol, Pn Chien Wee Yoon, En. Mohd Iswandi Kassan En. Harun Jau, En. Valintine anak Ngumbang, En. Nahar Tajri, Pn Lee Pay Chiann, Pn Chong Hui Ching, Chai Kam Ching, Dato' Dr. Freezailah Che Yeom dan Dr Efransjah	26 Mei
7	Y. B. Senator Dato' Maznah Mazlan, Timbalan Menteri NRE ke Makmal Tisu Kultur	11 Jun
8	Kunjungan Hormat Y. B. Dato' Subahan Kamal, Ahli Dewan Undangan Negeri Taman Templer, Selangor Darul Ehsan bersama wakil MTPN	24 Jun
9	Y. B. Dato' Subahan Kamal, Ahli Dewan Undangan Negeri Taman Templer, Selangor Darul Ehsan bersama peserta FAM Trip Domestik	2 Julai
10	Wakil MTC bersama Peserta Familiarization Programme for Timber Trade Representatives: Mr Johannes Jacobs de Groot, Prof. Dr HansKoepp, En. Walter Pitt, En. Duncan Brack, En. David Pittman, Pn Marietta Van Der Gaag, En. Sten Landmann, En. Stephen Mitchell dan Pn Sheam Satkuru	16 Julai



Dr Abdul Rahim Nik
bersama-sama Dr A.P.J.
Abdul Kalam
*Dr Abdul Rahim Nik with
Dr A.P.J. Abdul Kalam*

BIL. NO.	PELAWAT VISITORS	TARIKH DATE
11	Delegasi Jabatan Perhutanan Viet Nam Dr Dao Cony Khanh (Management Board for Forest Projects of MARD)	26 Ogos
12	Mantan Presiden India Dr A. P. J. Abdul Kalam	29 Ogos
13	Pegawai Penyelidik National Chiayi University, Taiwan	3 September
14	Y. B. Senator Dato' Maznah Mazlan, Timbalan Menteri NRE	10 September
15	Tuan Pak Ryon Yon, Ambassador Extraordinary and Plenipotentiary of Democratic People's Republic Korea; En Ri Jin Yong, Counsellor of the Embassy dan En Kim Yu Song, Counsellor of the Embassy	23 Oktober
16	Saintis Russia, Prof. Alexander I. Popov; <i>Corresponding Member of the Russian Academy of Natural Science</i> , Pn Olga Fitch; Director AgriSciences Limited, Pn Marina A. Efzemora; Agrazian State University, Prof. Madya Datuk Badanuddin Nordin	4 November
17	H.E. Mashiko Horie dan isteri, Duta Jepun; En. Takehiro Ono dan Pn Kobayashi, Counsellor of the Embassy	5 November
18	Pn Valerie Peceese, Honourable Minister of Higher Education and Research, Government of France	10 November
19	En. Shintaro Ishihara, Governor of Tokyo Metropolitan Government	21 November
20	Delegasi Malaysia Technical Cooperation Programme (MTCP), Training Programme for Officials from Agencies Responsible for SME Development in OIC Member Countries	28 November
21	Pembantu Menteri Pertanian dan Industri Makanan Sabah, Y. B. Datuk Bobbey Ahfang Suan; Pembantu Menteri Pertanian dan Industri Makanan Sabah, Y. B. Datuk Hj Sapawi Hj Ahmad, SLDB Chairman; Datuk Abdul Ghani Datuk Mohd Yassin, SLDB Deputy Chairman; En. Jhuvarri Majid, Pengurus Besar SLDB; En. Redzwan L. Tangkong, Pengurus Projek SLDB Jatropha; En. Bonny Yun, Pengurus Projek SLDB; En. Ricky Wong; En. Andi Asmar; En. Terry Eping dan enam orang pelabur dari Sabah	16 Disember

Perjawatan Establishment

Pelantikan

Pada tahun 2008, FRIM telah melantik seramai 11 orang Pegawai Penyelidik dan seorang Pegawai Tadbir baharu di bawah Kumpulan Pengurusan dan Profesional. Seramai 15 orang kakitangan (termasuk dua Penolong Pegawai Penyelidik) dari Kumpulan Sokongan turut dilantik. Mereka terdiri daripada:

Appointments

In 2008, 11 new Research Officers and one Administrative Officer under the Management and Professional Category were appointed. Fifteen staff members (including two Assistant Research Officers) from the Supporting Group were also appointed. The details are as follows:

Pegawai Penyelidik Gred Q41 Research Officer Grade Q41	Tarikh Lantikan Appointment date	Pembantu Akauntan Gred W17 Account Assistant Grade W17	Tarikh Lantikan Appointment date
Rozita Ahmad	1 Mac	Nor Afizah Arshad	16 Oktober
Nurul Hilal Hj. Ahmad Tarmidzi	1 Mac		
Tumirah Khadiran	3 Mac	Pembantu Juruaudit Gred W17/ Audit Assistant Grade W17	
Siti Zaliha Ali	3 Mac	Yusmaliza Hanim Mohd Arifin	16 Disember
Lau Kah Hoo	3 Mac		
Rohana Abd Rahman	3 Mac	Pengawas Hutan Gred G11 Forester Grade G11	
Nik Azyyati Abdul Kadir	3 Mac	Zairi Sudin	1 Oktober
Abd Rashid Li	3 Mac		
Adiana Mohamed Adib	3 Mac	Pengawal Keselamatan Gred KP11 Security Guard Grade KP11	
Avelinah Julius	3 Mac	Thooyavan Subramaniam	16 Oktober
Norulaiman Yusoff	3 Mac		
Pegawai Tadbir Gred N41/ Administrative Officer Grade N41		Pembantu Tadbir Rendah Gred N11 Junior Administrative Assistant Grade N11	
Noorsuhanis Abdul Latif	1 Disember	Nurul Idayu Baharom	3 November
Penolong Pegawai Penyelidik Gred Q27 Assistant Research Officer Grade Q27		Pemandu Kenderaan Gred R3 Driver Grade R3	
Azril Deenor Md. Dan	16 Oktober	Razali Mustafa	17 November
Kamarul Hisham Mustafa	17 Oktober		
Pembantu Penyelidik Gred Q17 Research Assistant Grade Q17		Pekerja Awam Khas Gred R3 General Worker Grade R3	
Juliza Mohamed	16 Oktober	Shamsuri Mohd Som	1 Oktober
Mohd Saidin Kamaludin	16 Oktober		
Pembantu Tadbir (S/U) Gred N17 Administrative Assistant (Sec) Grade N17		Pekerja Awam Gred R1 General Worker Grade R1	
Nor Shahidah Hussin	5 Mei	Norziah Ishak	16 Oktober
Pembantu Tadbir (P/O) Gred N17 Administrative Assistant Grade N17			
Suzanaakma Mansor	1 April		
Nor Aniza Suhud	2 April		

Kenaikan Pangkat

Seramai 60 orang kakitangan FRIM telah dinaikkan pangkat pada tahun 2008. Mereka ialah:

Promotions

A total of 60 FRIM Staff members were promoted in the year 2008. The details are as follows:

NAMA / NAME	GRED / GRADE	TARIKH / DATE
Dato' Dr Abd. Latif Mohmod DIMP, JSM, KMN, AMN	Peg. Penyelidik Gred Utama 'A' VU 5	26 April
Dr Abdul Rahim Nik KMN, AMN	Peg. Penyelidik Gred Utama 'B' VU 6	1 Jun
Dr Hashim Md Nor	Peg. Penyelidik Gred Q54	1 Mac
Dr Wan Rasidah Wan Ab. Kadir	Peg. Penyelidik Gred Q54	1 Mac
Salamah Selamat	Peg. Penyelidik Gred Q54	1 Mac
Dr Khali Aziz Hamzah	Peg. Penyelidik Gred Q54	1 Mac
Dr Ahmad Zuhaidi Yahya, AMN	Peg. Penyelidik Gred Q54	1 Mac
Dr Lillian Chua Swee Lian	Peg. Penyelidik Gred Q54	1 Mac
Dr Norwati Mohammad	Peg. Penyelidik Gred Q54	1 Mac
Dr Elizabeth Philip	Peg. Penyelidik Gred Q54	1 Mac
Dr Laurence G. Kirton	Peg. Penyelidik Gred Q54	1 Mac
Dr Ismail Harun	Peg. Penyelidik Gred Q54	1 Mac
Dr Ani Sulaiman	Peg. Penyelidik Gred Q54	1 Julai
Norhara Hussein	Peg. Penyelidik Gred Q54	1 Julai
Samsudin Musa	Peg. Penyelidik Gred Q54	1 Julai
Muhammad Farid Abdul Rashid	Peg. Penyelidik Gred Q52	1 Mac
Wan Zahiri Wan Yaacob	Peg. Penyelidik Gred Q52	1 Mac
Dr Chang Yu Shyun	Peg. Penyelidik Gred Q52	1 Mac
Mastura Mohtar	Peg. Penyelidik Gred Q52	1 Mac
Mahmudin Saleh	Peg. Penyelidik Gred Q52	1 Mac
Dr Ling Sui Kong	Peg. Penyelidik Gred Q52	1 Mac
Hashim W. Samsi	Peg. Penyelidik Gred Q48	1 Mac
Dr Hamdan Hussain	Peg. Penyelidik Gred Q48	1 Mac
Lee Chai Ting	Peg. Penyelidik Gred Q48	1 Mac
Ahmad Azaruddin Mohd. Nor	Peg. Penyelidik Gred Q48	1 Mac
Dr Norwati Adnan	Peg. Penyelidik Gred Q48	1 Mac
Dr Norlia Basherudin	Peg. Penyelidik Gred Q48	1 Mac
Roszaini Kadir	Peg. Penyelidik Gred Q48	1 Mac
Rosdi Koter	Peg. Penyelidik Gred Q48	1 Mac
Mohd. Zaki Abdullah	Peg. Penyelidik Gred Q48	1 Mac
Wan Mohd. Shukri Wan Ahmad	Peg. Penyelidik Gred Q48	1 Mac
Dr Nor Hasnida Hassan	Peg. Penyelidik Gred Q48	1 Mac
Norsham Suhaina Yaakob	Peg. Penyelidik Gred Q48	1 Mac
Ismail Parlan	Peg. Penyelidik Gred Q48	1 Julai
Siti Aisah Shamsuddin	Peg. Penyelidik Gred Q48	1 Julai

NAMA / NAME	GRED / GRADE	TARIKH / DATE
Zahari Othman	Peg. Penyelidik Gred Q44	1 Mac
Liza Ismail	Peg. Penyelidik Gred Q44	1 Mac
Mohd Farid Ahmad	Peg. Penyelidik Gred Q44	1 Mac
Khairul Awang	Peg. Penyelidik Gred Q44	1 Mac
Nik Zanariah Nik Mahmood	Peg. Penyelidik Gred Q44	1 Mac
Dr Mohd Khairun Anwar Uyup	Peg. Penyelidik Gred Q44	1 Mac
Mohamad Jani Saad	Peg. Penyelidik Gred Q44	1 Mac
Ahmad Nazaruddin Mohd Roseli	Peg. Penyelidik Gred Q44	1 Mac
Dr Ho Wai Mun	Peg. Penyelidik Gred Q44	1 Mac
Patahayah Mansor	Peg. Penyelidik Gred Q44	1 Mac
How Seok Sean	Peg. Penyelidik Gred Q44	1 Mac
Dr Ainun Zuriyati Mohamed @ Asa'ari	Peg. Penyelidik Gred Q44	1 Mac
Mary Khoo Gaik Hong	Peg. Penyelidik Gred Q44	1 Mac
Farah Fazwa Md Ariff	Peg. Penyelidik Gred Q44	1 Mac
Dr Getha R. Krisnasamy	Peg. Penyelidik Gred Q44	1 Mac
Mohd. Asmawee Ismail	Peg. Tadbir Gred N44	1 Disember
Mohd. Radzi Ahmad	Pen. Peg. Penyelidik Gred Q32	1 Oktober
Amrah Toha	Pemb. Tadbir (S/U) Gred N32	1 Julai
Othman Mohd. Desa	Pemb. Penyelidik Gred Q22	1 Oktober
Mukhtar Ismail	Pemb. Penyelidik Gred Q22	1 Oktober
Samsor Saleh	Pemb. Tadbir (P/O) Gred N22	1 April
Che Mohd. Shamsudin Che Seman	Pengawas Hutan Gred G14	1 Oktober
Mohd Nanyan Ismail	Pekerja Awam Gred R4	1 Oktober
Ahmad Marhani	Pekerja Awam Gred R4	1 Oktober
Ahmad Sariyani Salimat	Pekerja Awam Gred R4	1 Oktober

Peletakan Jawatan

Pada tahun 2008, lima orang Pegawai Penyelidik dan empat orang kakitangan Kumpulan Sokongan telah meletak jawatan. Mereka terdiri daripada:

Resignation

In 2008, five Research Officers and four staff members of the Supporting Group resigned from the Institute. The details are as follows:-

NAMA / NAME	TARIKH PELETAKAN JAWATAN DATE OF RESIGNATION
Chong Mew Im	14 Januari
Haminuddin Hassan	14 Januari
Noor Syilawati Ahmad	1 Februari
Dr Safiah @ Yusmah Dato' Muhammad Yusoff	1 April
Shahrul Nizam Sanudin	1 April
Rosilah Ab Aziz	1 Ogos
Nurul Zamzurina Osman	1 Ogos
Dr Grace Tabitha Lim Wui Oi	1 November
Dr Ainun Zuriyati Mohamed @ Asa'ari	31 Disember

Persaraan

Seramai enam orang kakitangan bersara pada tahun ini iaitu:

Retirement

Six staff members retired in the year 2008. The details are as follows:

PERSARAAN / RETIREMENT	TARIKH / DATE
Persaraan Wajib Mandatory Retirement	
Ong Tai Hock	22 Februari
Dr Sim Heok Choh	17 Mac
Dr Shamsudin Ibrahim	24 Mei
Boon Kok San	8 Jun
Persaraan Pilihan Optional Retirement	
Siti Asha Abu Bakar	1 Januari
Eshah Ariffin	1 Januari
Meninggal Dunia Deceased	
Tekoh Sulaiman	18 Ogos

Latihan Training

Latihan Akademik

Pada tahun ini, seramai lima orang pegawai FRIM berjaya menamatkan pengajian dari universiti tempatan dan luar Negara. Mereka termasuklah tiga pegawai yang berjaya memperoleh ijazah Doktor Falsafah dan dua orang mendapat Ijazah Sarjana.

Academic Training

During the year, five officers successfully completed their academic training from local and overseas universities. The degrees included three PhD and two MSc.

BIL. NO.	NAMA NAME	IJAZAH DEGREE	UNIVERSITI UNIVERSITY
1	Dr Mohd Khairun Anwar Uyup	Ph. D.	Universiti Putra Malaysia
2	Dr Vimala Subramaniam	Ph. D.	Universiti Malaya
3	Dr Ho Wai Mun	Ph. D.	National Seoul University
4	Mohd Zamshari Abd. Rahman	MBA	Universiti Islam Antarabangsa Malaysia
5	Mailina Jamil	M. Sc.	Universiti Kebangsaan Malaysia

Pegawai yang Mendaftar untuk Pengajian Lepas Ijazah

Seramai tiga orang pegawai telah mendaftar untuk pengajian lepasan ijazah pada 2008. Dua orang mendaftar untuk Ijazah Doktor Falsafah dan satu orang untuk Ijazah Sarjana.

Officers Registered for Post-Graduate Studies

Three officers registered for post-graduate studies in 2008. Two officers registered for the PhD programme and one registered for the M. Sc. programme.

LATIHAN AKADEMIK ACADEMIC TRAINING	LUAR NEGERI OVERSEAS		DALAM NEGERI LOCAL		JUMLAH TOTAL	
	2007	2008	2007	2008	2007	2008
Ph. D.	7	-	4	2	11	2
M. Sc.	-	-	3	1	3	1
Jumlah / Total	7	0	7	3	14	3

Latihan Bukan-Akademik

Pegawai FRIM yang menyertai kursus latihan bukan-akademik di dalam dan luar Negara menunjukkan sedikit penurunan bagi Kumpulan Pengurusan dan Profesional, manakala bagi Kumpulan Sokongan terdapat peningkatan yang sangat ketara.

Non-academic Training

FRIM officers attending non-academic training courses both locally and overseas registered a slight decrease in the Management and Professional Group while there was a tremendous increase in the Supporting Group.

BIL. NO.	LATIHAN BUKAN AKADEMIK NON-ACADEMIC TRAINING	KUMPULAN PENGURUSAN & PROFESIONAL MANAGEMENT & PROFESSIONAL GROUP		KUMPULAN SOKONGAN SUPPORTING GROUP		JUMLAH TOTAL	
		2007	2008	2007	2008	2007	2008
Kursus / Courses							
Luar Negara / Overseas		82	47	4	-	86	47
Tempatan / Local		661	628	553	1090	1214	1090
Persidangan / Conferences							
Luar Negara / Overseas		29	13	-	-	29	13
Tempatan / Local		46	52	7	-	53	52
Jumlah / Total		818	740	564	1090	1382	1202

Penerbitan Publications

Sebanyak 25 judul baharu telah diterbitkan manakala enam judul telah dicetak semula disebabkan permintaan yang menggalakkan. Perinciannya dijadualkan di bawah. Nilai faktor impak bagi Journal of Tropical Forest Science (JTFS) telah meningkat dari 0.167 ke 0.287 pada 2008.

A total of 25 new titles were published while six titles were reprinted due to popular demand. The details are tabulated below. The impact factor for the Journal of Tropical Forest Science (JTFS) has increased from 0.167 to 0.287 in 2008.

JENIS PENERBITAN/ TYPE OF PUBLICATION	JUDUL/TITLE	BIL./ NO.
<i>Journal of Tropical Forest Science</i>	JTFS 20(1–4)	4
<i>Malayan Forest Records</i>	<i>An In-depth Look at Enrichment Planting</i>	1
Siri Alam dan Rimba	<i>Activities in Wetlands</i>	1
<i>Timber Technology Bulletin</i>	<i>Identification and Utilization of Lesser-Known Commercial Timbers in Peninsular Malaysia 10: Meraga, Merbau Kera, Merbau Lalat and Minyak Berok</i>	1
FRIM Reports	<i>Local Gaharu Trade and its Contribution to Household Economy of Harvesters</i> Pembalakan Berimpak Rendah di Hutan Malaysia	2
Proceedings	<i>Proceedings of the Conference on Forestry and Forest Products Research 2007: Balancing Economics and Ecological Needs</i> <i>Proceedings of the Urban Forestry Conference: Managing Urban Green for Sustainable Cities; 6–8 June 2006; Kuala Lumpur</i> <i>Proceedings of the International Agroforestry Conference (IAC) 2006; Agroforestry: Harnessing the Benefits; 1–2 August 2006</i> Prosiding Bengkel Hutan Pesisiran Pantai Negara: Kesedaran dan Tindakan Bersama; Terengganu; 5–7 November 2007 <i>Plant, Health and Man—Past, Present and Future</i>	5
<i>Special Publications</i>	<i>Natural History Museum Malaysia. Planning & Development</i>	1
<i>FRIM in Focus</i>	March, June, September, December	4

JENIS PENERBITAN/ TYPE OF PUBLICATION	JUDUL/TITLE	BIL./ NO.
<i>Annual Report</i>	Laporan Tahunan 2007	1
<i>Research Report</i>	Research Report 2007	1
<i>Other Publications</i>	<i>Highlights of FRIM Non-MOSTI Projects 2007: Project Evaluation Meeting; 2 July 2007; Kuala Lumpur</i> <i>Highlights of FRIM MOSTI Projects 2007 (CD)</i> <i>Khazanah Alam untuk Kesihatan dan Kecantikan</i> <i>Publications Catalogue</i>	4
<i>Reprints</i>	<i>Pocket Check List of Timber Tree</i> <i>Nature's Choice to Wellness: Antioxidant Vegetables/Ulam</i> <i>A Dictionary of Malaysian Timbers</i> <i>Tumbuhan Ubatan untuk Rawatan Penyakit Radang</i> <i>Pokok-Pokok untuk Tanaman Bandar</i> <i>Common Commercial Timbers of Peninsular Malaysia</i>	6

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STANDARD/STANDARDS

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- 2 MS ISO7175-1:2008 Children's cot and folding cots for domestic use - part 2: test methods
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- 128 SAMSUDIN, M. AR CDM and REDD: Country report by Malaysia. A paper presented at the ASEAN Senior Officials on Forestry Seminar, 30 July 2008, Kuala Lumpur
- 129 SAMSUDIN, M., MOHD. YUNUS, Z. & FLETCHER, C. Outlook for Reducing Emissions from Forest Degradation and Deforestation (REDD) in Malaysia. A paper presented at the Seminar on Capitalising Forestry and Climate Change in Malaysia, 11 August 2008, Forest Research Institute Malaysia, Kepong
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- 134 SHAMSUDIN, I. & SALLEH, M. Intensive forest management: The way forward in the managing the forest for timber production and conservation of biodiversity. A paper presented at the Seminar on Management of Second Growth Forests: Challenges and Opportunities, 12 to 13 December 2007, Kuantan
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- 136 SREETHERAN, M. Pengurusan pokok merbahaya di Kuala Lumpur. A paper presented at the Bengkel Penyelenggaraan Pokok, 18 to 19 August 2008, Kuala Lumpur
- 137 SYARIFAH DORA, S.M., SYAMSURINA, A. & SUHARTI, S. Kepelbagaian spesies burung di Taman Tasik Perdana. A paper presented at 10th Applied Biology, 6 to 8 November 2008, Kuching
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- 139 TAN, H.P., LING, S.K. & CHUAH, C.H. Multi-steps infrared macro-fingerprinting of *Phyllagathis praetermissa* from two geographical origins. A paper presented at the Seminar on Medicinal and Aromatic Plants, 21 to 22 October 2008, Kuala Lumpur

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- 141 TOH, A.N. & LIEW, S.F. Peat swamp forest sustainability: The need for an effective communication strategy. A paper presented at the International Symposium on Peat Swamp Forests, 11 to 12 March 2008, Kuala Lumpur
- 142 TUMIRAH, K. Statistical design for evaluation of Proficiency Testing (PT) Result. A paper presented at the Workshop on Proficiency Testing Programmes for CCA Wood Preservative and Treated Wood, 20 November 2008, Forest Research Institute Malaysia, Kepong
- 143 WAN RASIDAH, K., ROSAZLIN, A., ROZITA, A. & WAN ASMA, I. Properties and application of sludge from paper mill processing recycle paper. A paper presented at the Symposium on the Management and Utilization of Paper Mill Residuals, 25 to 26 February 2008, Wisconsin, United State of America

POSTER/POSTERS

- 1 ABD RASHID, L., MOHD RADZI, A., JULIZA, M., AHMAD SHUKRI, A., RASADAH, M.A. & VIMALA, S. Potential antioxidant activities of aqueous acetone extract from *Leucaena leucocephala* leaves. A poster presented at the Medicinal and Aromatic Plants Seminar, 21 to 22 October 2008, Kuala Lumpur
- 2 ABD. RAZAK, O. & JAMALUDIN, M. Effects of soil conditions on survival and growth performances of *G. levis* tissue culture plantlets in field plantings. A poster presented at the National Seminar of Bamboo and Rattan 2008, 25 to 26 Mac 2008, Kuala Lumpur
- 3 ADIANA, M.A. & SAIFUL AZMI, J. Synthesis and anti-multidrug-resistant *Staphylococcus aureus* (MRSA) activity of alkylated apigenin. A poster presented at the Medicinal and Aromatic Plants Seminar, 21 to 22 October 2008, Kuala Lumpur
- 4 AHMAD AZARUDDIN, M.N., NOOR AZLIN, Y. & PHILIP, E. Urban tree management in Malaysia: An emphasis on inventory and management system. A poster presented at the International Federation of Parks and Recreation Administration (IFPRA) Asia Pacific Congress, 15 to 28 September 2008, Christchurch, New Zealand
- 5 AHMAD NAZARUDIN, M.R. A non-mechanical approach in maintaining landscape plants. A poster presented at the Landscape Seminar 2008, 10 to 11 March 2008, International Islamic University Malaysia
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- 7 AHMAD NAZARUDIN, M.R., PHILIP, E., SYAMSURINA, A., SUHARTI, S., MOHD RAIF, Z. & SHARIFAH DORA, S.M. Flower induction of urban landscape trees by using growth regulators: A preliminary study. A poster presented at the 19th Malaysian Society of Plant Physiology Conference, 18 to 20 November 2008, Penang
- 8 AMINAH, H. Vegetative propagation of leaf cuttings of *Labisia pumila* (kacip fatimah) in non-mist propagation system. A poster presented at the Hari Rekacipta FRIM, 15 December 2008, Forest Research Institute Malaysia, Kepong
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- 12 ANG, L.H., KHALI AZIZ, H., HUI, T.F. & TANG, L.K. Chemical soil properties of grassland, peat swamp forest and fresh water swamp forest at Pekan, Pahang. A poster presented at the Association for Tropical Biology and Conservation, Asia-Pacific Chapter and the Japanese Society for Tropical Ecology (ATBC) Conference: Toward sustainable land-use in tropical Asia, 23 to 26 April 2008, Kuching

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- 14 ANI, S., NORDAHLIA, A.S. & MOHD NASIR, H. Some physical properties of *Lumnitzera littorea* and *Sonneratia alba* from Bagan Lalang Mangrove Strip. A poster presented at the Soils Science Conference of Malaysia 2008, 15 to 17 April 2008, Ipoh
- 15 ANI, S., SALAMAH, S. & SHAHARUDDIN, H. Boron-based compound treatment of sentang by full-cell process using rubberwood as standard. A poster presented at the International Research Group-IRG 39 Conference, 25 to 29 May 2008, Istanbul, Turkey
- 16 ANWAR, U.M.K., HAMDAN, H., ZAIDON, A., PARIDAH, M.T. & SITI RAFIDAH, M. Manufacturing process of Bamwood and its mechanical properties. A poster presented at the Rattan and Bamboo Seminar, 25 to 26 Mac 2008, Kuala Lumpur
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- 18 CHEE, B.J. & SHAMSUL, K. The ecology, knowledge and conservation of medicinal plants in Peninsular Malayisa. A poster presented at the Medicinal and Aromatic Plants Seminar, 21 to 22 October 2008, Kuala Lumpur
- 19 CHIU, S.J., KANDASAMY, K.I., YAP, J.W., HALIZA, I., MITRA, R., SONG, B.K. & YAP, L.V. Perambatan mikro dua spesies perintis (*Avicennia alba* dan *Avicennia officinalis*) di hutan paya bakau di Malaysia. A poster presented at the Seminar Pemuliharaan Hutan Persisiran Pantai, 28 to 29 October 2008, Kuantan
- 20 FADZUREENA, J. & MAZURA, M.P. In-vitro soybean lipoxxygenase activity of Malaysian Medicinal Plants. A poster presented at the Medicinal and Aromatic Plant Seminar, 21 to 22 October 2008, Kuala Lumpur
- 21 FARAH SHAHANIM, M.M. & RAJA BARIZAN, R.S. Optimizing the growth rate of chengal seedlings under different levels of sunlight exposure in nursery. A poster presented at the 3rd Regional Symposium on Environmental and Natural Resources, 5 to 6 August 2008, Kuala Lumpur
- 22 FARIDAH, Q.Z., LEE, C.T., LEE, S.L., SITI SHAPOR, S., NG, K.K.S., NORLIA, B. & MOHD NOOR, M.I. Development of microsatellite markers in *Koompassia malaccensis* (kempas) and cross-species amplification in 13 related timber species. A poster presented at the Pameran Reka Cipta, Penyelidikan & Inovasi (PRPI08), 29 to 31 July 2008, Universiti Putra Malaysia, Serdang
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- 25 HAMDAN, O., KHALI AZIZ, H. & AZHAN SHAH, I. Pengesanan perubahan terhadap kawasan hutan paya laut di pesisiran pantai Selangor menggunakan kaedah penderiaan jauh dan GIS. A poster presented at the Seminar Pemulihan Hutan Persisiran Pantai Negara 2008, 28 to 29 October 2008, Kuantan
- 26 HAZRINA, H., ILYANIE, H.Y., WONG, T.W., & CHOO, C.Y. Evaluation of *Ficus deltoidea* extracts on methicillin-resistant *Staphylococcus aureus* (MRSA) inhibition. A poster presented at the Penang International Conference for Young Chemists (ICYC) 2008, 18 to 20 June 2008, Universiti Sains Malaysia, Penang
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- 30 IHSAN SAFWAN, K., MAZURA, M.P., FADZUREENA, J. & KHOO, G.H.M. Evaluation of anti-inflammatory and cytotoxic activities of stem and leaf extracts of a plant from the family Thymelaeaceae. A poster presented at the Medicinal and Aromatic Plants Seminar, 21 to 22 October 2008, Kuala Lumpur
- 31 ILYANIE, Y., WONG, T.W. & CHOO, C.Y. Acute and sub-chronic toxicity study of *Ficus deltoidea* in diabetic rats. A poster presented at the Medicinal and Aromatic Plant Seminar, 21 to 22 October 2008, Kuala Lumpur
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- 33 ISMAIL, P. & MOHD NASIR, H. Restoration trials of peat swamp forests in Peninsular Malaysia. A poster presented at the Regional Symposium on Environment and Natural Resources, 5 to 6 August, 2008, Kuala Lumpur
- 34 JOANN, C.L., WONG, C.H. & FLETCHER, S.C. A preliminary study on a community of fruit bats in a fragmented mangrove forest compared with various other forest fragments. A poster presented at the Association of Tropical Biology and Conservation (ATBC) Seminar: Towards sustainable land-use in tropical Asia, 23 to 26 April 2008, Kuching
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- 36 KHAIRUL KAMILAH, A.K., ZULKHAIRI, A., AZRINA, A., NORHAIZAN, M.E. & MAZNAH, I. The potential nutritive value of germinated brown rice diet against Hypercholesterolemia in Hypercholesterolemic-induced rabbits. A poster presented at the Symposium on Diet, Nutrition and Immunity, 16 to 17 April 2008, Singapore
- 37 KHAIRUL KAMILAH, A.K., ZULKHAIRI, A., AZRINA, A., NORHAIZAN, M.E., MAZNAH, I., HASNAH, B., SAKINAH, I., TAUFIK HIDAYAT, M., MOKHLAS, M.A.M., KHAIRUNNUUR, F.A. & MOHD NOR FAZALI, F. Germinated brown rice as a potential hypocholesterolemic agent. A poster presented at the International Conference on Food Science and Technology, 31 July to 1 August 2008, Semarang, Indonesia
- 38 KHAIRUL NAJWAN, A.J., SAMSUDIN, M., JALIL, M.S., ABD RAHMAN, K. & ISMAIL, H. A poster presented at the 3rd Regional Symposium on Environment and Natural Resources, 5 to 6 August 2008, Kuala Lumpur
- 39 KHALI AZIZ, H. & HAMDAN, O. Coastal erosion mapping and impact assessment using remote sensing and GIS – A case study in Selangor. A poster presented at the 3rd Regional Symposium on Environment and Natural Resources, 5 to 6 August 2008, Kuala Lumpur
- 40 KHOO, G.H.M., ROHANA, S., SEE, N.J.K. & LING, S.K. Toxicological evaluation of medicinal plants using cell-based assay. A poster presented at the Seminar on Medicinal and Aromatic Plants, 21 to 22 October 2008, Kuala Lumpur
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- 43 MAILINA, J., NOR AZAH, M.A., MAZURA, P., SITI HUMEIRAH, A.G., SAIDATUL HUSNI, S., NIK YASMIN, N.Y., MOHD FARIDZ, Z. & AHMAD ABDUL QAYYUM, M. In-vitro anti-inflammatory activity of selected medicinal plants from the family Annonaceae. A poster presented at the Medicinal and Aromatic Plants Seminar 2008, 21 to 22 October 2008, Kuala Lumpur
- 44 MASTURA, M. & IZANUDIN, Z. FRIM-MECD Herbal product quality enhancement programme: Herbal industries empowerment towards globalisation. A poster presented at the Pameran Gala Kosmetik, 11 to 13 April 2008, Shah Alam

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- 46 MAZURA, M.P., FADZUREENA, J., KAVEENA, K., NUZIAH, H. & HANI IDAYU, B. Evaluation of anti-inflammatory properties of leaf extracts of *Senna occidentalis* Linn. A poster presented at the Medicinal and Aromatic Plants Seminar 2008, 21 to 22 October 2008, Kuala Lumpur
- 47 MOHD FARID, A. & MAZIAH, Z. Histological studies of pathogens *R. lignosus* and *P. noxius* infection in root of Sentang (*Azadirachta excelsa*). Poster presented at 4th Life Sciences Postgraduate Conference USM. Life Sciences: Harmonizing Civilization, Environment and Technology. 18-20th June 2008.
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- 57 NASHATUL ZAIMAH, N.A. & HAMSINAH, H. Cold storage of kempas (*Koompassia malaccensis*) seeds. A poster presented at the 3rd Seminar on Forest Biotechnology, 11 to 12 November 2008, Forest Research Institute Malaysia, Kepong
- 58 NIK AZYYATI, A.K., NOOR AZLIN, Y. & AHMAD NAZARUDIN, M.R. Involving the youths in greening programme. A poster presented at the Pameran Misi Membina Hijau: Menangani Pemanasan Global sempena Kursus Hortikultur Landskap, 31 March to 3 April 2008, Putrajaya
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- 60 NOOR AZLIN, Y. & PHILIP, E. Urban forestry and climate cooling: From knowledge to practice. A poster presented at the International Federation of Parks and Recreation Administration (IFPRA) Asia Pacific Congress. 15 to 28 September 2008, Christchurch, New Zealand

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- 68 NOR HAYATI, A., MOHD. RADZI, A., SALBIAH, M. & LING, S.K. Chemical analysis for qualitative discrimination on three cultivars of *Psidium guajava*. A poster presented at the Seminar on Medicinal and Aromatic Plants, 21 to 22 October 2008, Kuala Lumpur
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- 70 NORDAHLIA, A.S. & ANI, S. Physical and mechanical properties of 8-yr-old sentang grown from rooted cutting. A poster presented at the National Conference on Forest Products 2008: Towards competitiveness and sustainability, 29 to 31 October 2008, Kuala Lumpur
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I. MODUL KURSUS LATIHAN/ LAPORAN MESYUARAT TRAINING COURSE MODULE/MEETINGS REPORT

- 1 AB. RASIP, A.G., FARAH FAZWA, M.A. & ROSDI, K. Amalan pertanian yang baik (APB) dalam pelaksanaan skim amalan ladang baik Malaysia (SALM). A paper presented at the Kursus Penanaman Kacip Fatimah Pharmaniaga, 16 to 20 June 2008, Forest Research Institute Malaysia, Kepong
- 2 AB. RASIP, A.G., FARAH FAZWA, M.A. & ROSDI, K. Teknik penanaman kacip fatimah secara komersial. A paper presented at the Kursus Penanaman Kacip Fatimah Pharmaniaga, 16 to 20 June 2008, Forest Research Institute Malaysia, Kepong
- 3 ABD. RAHMAN, K., ISMAIL, H., SAMSUDIN, M., WAN SHUKRI, W.A. & SHAMSUDIN, I. Threshold level of harvest for mixed dipterocarp forest: Assessment using pre-F data. A paper presented at the 39th MAJURUS Meeting, 14 July 2008, Unit Latihan Perhutanan, Kepong
- 4 AHMAD FAUZI, M.S. & AMINAH, H. Penubuhan dan pengurusan tapak semaian landskap. A paper presented at the Kursus Dalaman Jabatan Landskap Negara, 10 October 2008, Kuala Lumpur
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- 6 AHMAD FAUZI, M.S. Amalan dan pengurusan tapak semaian kacip fatimah. A paper presented at the Kursus Kacip Fatimah Pharmaniaga, 9 to 20 June 2008, FRIM Kepong
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- 61 NOR HAYATI, A. & LING, S.K. Teknologi kimia dan pemiawaian ekstrak. A paper presented at the FMBIOSIS Induction Course, 21 to 30 May 2008, Petaling Jaya
- 62 NOOR RASYILA, M.N., PIN, K.Y., HADA MASAYU, I.D., MOHD SHAHIDAN, M.A., ZAMREE, M.S., MOHD. HAPIZUL, U.L., MOHD. ISKANDAR HASSAN, A. Formulasi dan pembangunan produk: Kaedah pengadunan dan penggranulan. A paper presented at the Kursus Teknologi Pembangunan Produk Herba, (Kursus Lanjutan), KKLW-FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong
- 63 NOOR RASYILA, M.N., PIN, K.Y., HADA MASAYU, I.D., MOHD SHAHIDAN, M.A., ZAMREE, M.S., MOHD. HAPIZUL, U.L., MOHD. ISKANDAR HASSAN, A. Formulasi dan pembangunan produk: Kaedah penghasilan produk kapsul dan tablet. A paper presented at the Kursus Teknologi Pembangunan Produk Herba, (Kursus Lanjutan), KKLW-FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong
- 64 NUR AKMAL, A. & HAMDAN, H. Application of timber in architecture. A paper presented at the Short Course on Structural Timber Design Based on MS544, 12 to 13 May 2008, Cameron Highlands
- 65 ONG, C. B. Laboratory testing: Solid and laminated profiles for wood windows. A paper presented at the QAS Course for Lamscants, 21 February 2008, Seremban.
- 66 ONG, C.B. Laboratory testing: In-house quality control-laboratory testing. A paper presented at the QAS Course for Lamscants, 22 May 2008, Forest Research Institute Malaysia, Kepong
- 67 PIN, K.Y., MOHD. SHAHRUL, M.N., MOHD. FAIZAL, K., NOOR RASYILA, M.N., HADA MASAYU, I.D., ZAMREE, M.S. & MOHD SHAHIDAN, M.A. Modul kaedah pengekstrakan tumbuhan ubatan. A paper presented at the Kursus Teknologi Pemprosesan Herba, 14 to 16 April 2008, Forest Research Institute Malaysia, Kepong
- 68 PIN, K.Y., MOHD. SHAHRUL, M.N., MOHD. FAIZAL, K., NOOR RASYILA, M.N., HADA MASAYU, I.D., ZAMREE, M.S. & MOHD SHAHIDAN, M.A. Modul teknologi pemprosesan: extraction, concentration, freeze drying and spray drying. A paper presented at the Kursus Teknologi Pemprosesan Herba, 14 to 16 April 2008, Forest Research Institute Malaysia, Kepong
- 69 PIN, K.Y., MOHD. SHAHRUL, M.N., MOHD. FAIZAL, K., NOOR RASYILA, M. N., HADA MASAYU, I.D., ZAMREE, M.S. & MOHD SHAHIDAN, M.A. Teknologi pemprosesan 1: Kaedah pengekstrakan tumbuhan ubatan. A paper presented at the Kursus Teknologi Pembangunan Produk Herba (Kursus Lanjutan), KKLW-FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong
- 70 PIN, K.Y., MOHD. SHAHRUL, M.N., MOHD. FAIZAL, K., NOOR RASYILA, M.N., HADA MASAYU, I.D., ZAMREE, M.S. & MOHD SHAHIDAN, M.A. Teknologi pemprosesan 2 : Kaedah pemekatan. A paper presented at the Kursus Teknologi Pembangunan Produk Herba (Kursus Lanjutan), KKLW-FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong
- 71 PIN, K.Y., MOHD. SHAHRUL, M.N., MOHD. FAIZAL, K., NOOR RASYILA, M.N., HADA MASAYU, I.D., ZAMREE, M.S. & MOHD SHAHIDAN, M.A. Teknologi pemprosesan 3 : Kaedah pengeringan beku. A paper presented at the Kursus Teknologi Pembangunan Produk Herba (Kursus Lanjutan), KKLW-FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong

- 72 PIN, K.Y., MOHD. SHAHRUL, M.N., MOHD. FAIZAL, K., NOOR RASYILA, M.N., HADA MASAYU, I.D., ZAMREE, M.S. & MOHD SHAHIDAN, M.A. Teknologi pemprosesan 4 : Kaedah screw press. A paper presented at the Kursus Teknologi Pembangunan Produk Herba (Kursus Lanjutan), KKLW-FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong
- 73 PIN, K.Y., MOHD. SHAHRUL, M.N., MOHD. FAIZAL, K., NOOR RASYILA, M.N., HADA MASAYU, I.D., ZAMREE, M.S. & MOHD SHAHIDAN, M.A. Teknologi pemprosesan 5 : Kaedah jet mixer. A paper presented at the Kursus Teknologi Pembangunan Produk Herba (Kursus Lanjutan), KKLW-FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong
- 74 RASADAH, M.A. Tumbuhan ubatan dan beraroma: Penemuan penyelidikan dan pembangunan (R&D) semasa. A paper presented at the FMBIOSIS induction course, 21 to 30 May 2008, Petaling Jaya
- 75 ROSDI, K. & WAN SHUKRI, W.A. Nota kursus mensurasi hutan. A paper presented at the Kursus Mensurasi Hutan, 23 to 25 April 2008, Forest Research Institute Malaysia, Kepong
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- 77 ROZITA, A. Pengumpulan dan pelupusan sisa kimia di Makmal Kimia Tanah. A paper presented at the Latihan Pengurusan dan Pelaksanaan Proses Utama dalam Sistem Pengurusan Kualiti Secara Korporat Siri 1, 26 February 2008, Forest Research Institute Malaysia, Kepong
- 78 ROZITA, A. Pengumpulan dan pelupusan sisa kimia di Makmal Kimia Tanah. A paper presented at the Latihan Pengurusan dan Pelaksanaan Proses Utama dalam Sistem Pengurusan Kualiti Secara Korporat Siri 2, 17 March 2008, Forest Research Institute Malaysia, Kepong
- 79 RUSHDAN, I. Pembangunan dan pengkomersilan pulpa dan kertas dari jerami padi MADA untuk penghasilan produk-produk kraf. A paper presented at the Project Management Meeting (PMC), 4 November 2008, Malaysian Agriculture Development Authority, Alor Star
- 80 SHAHIDAN, M.A., HADA MASAYU, I. & RASADAH, M.A. National R&D and information on quality control of raw material. A paper presented at the Eleventh Meeting of ASEAN Expert Group, 28 to 29 July 2008, Kuala Lumpur
- 81 SHAHIDAN, M.A., HADA MASAYU, I., KHAIRUDDIN, K. & FIRMANSYAH, J.S. Pengurusan tuaian. A paper presented at the Kursus Usahawan Teknologi Herba (Asas), 24 to 28 April 2008, Kuala Lumpur
- 82 SHAHIDAN, M.A., HADA MASAYU, I., KHAIRUDDIN, K., FIRMANSYAH, J.S., PIN, K.Y., FAIZAL, K., SHAHRUL, N. & NOOR RASYILA, M.N. Pemprosesan bahan mentah dan pembangunan produk. A paper presented at the Kursus Usahawan Teknologi Herba (Asas), 24 to 28 April 2008, Kuala Lumpur
- 83 SHAHIDAN, M.A., HADA MASAYU, I., KHAIRUDDIN, K., FIRMANSYAH, J.S., PIN, K.Y., FAIZAL, K., SHAHRUL, N. & NOOR RASYILA, M.N. Pengenalan teknologi pemprosesan herba: Makmal hingga komersial. A paper presented at the Kursus Usahawan Teknologi Herba (Lanjutan), 13 to 15 May 2008, Kuala Lumpur
- 84 SHAHIDAN, M.A., HADA MASAYU, I., KHAIRUDDIN, K., FIRMANSYAH, J.S., PIN, K.Y., FAIZAL, K., SHAHRUL, N., NOR RASYILA, M.N. & ZAMREE, M.S. Pembangunan produk herba. A paper presented at the Kursus Usahawan Tapak Semaian Komersial, 24 to 28 May 2008, Kota Kinabalu
- 85 SAMSUDIN, M., ABD RAHMAN, K. RODZIAH, H., HARRY, Y., AZEYLA, A. & FLETCHER, S.C. Designing an optimum harvesting regime for the inland forest. A paper presented at the Centre for Tropical Forest Sciences (CTFS) Biodiversity Field Course, 1 to 2 August 2008, Grik
- 86 SHAHIDAN, M.A., HADA MASAYU, I., KHAIRUDDIN, K., FIRMANSYAH, J.S., PIN, K.Y., FAIZAL, K., SHAHRUL, N., NOR RASYILA, M.N. & ZAMREE, M.S. High quality herbal products. A paper presented at the FMBIOSIS induction course, 21 to 30 May 2008, Petaling Jaya
- 87 TAN, Y.E. & ONG, C.B. Structural glue-lamination technology for construction in Malaysia. A paper presented at the MTC Timber Talk Series, 12 May 2008, Petaling Jaya
- 88 ZAMREE, M.S., KHAIRUL KAMILAH, A.K., NOOR, S.M.Y., MASITAH, M.T., PIN, K.Y., NOOR RASYILA, M.N., HADA MASAYU, I.D. & MOHD SHAHIDAN, M.A. Jaminan kualiti penghasilan produk herba : Keperluan, pelaksanaan dan pemantauan kawalan kualiti. A paper presented at the Kursus Teknologi Pembangunan Produk Herba (Kursus Lanjutan), KKLW - FRIM, 13 to 15 Mei 2008, Forest Research Institute Malaysia, Kepong
- 89 ZAMREE, M.S., KHAIRUL, K.A.K. & NOOR, S.M.Y. Pengenalan kepada teknologi pemprosesan herba. A paper presented at the Kursus Usahawan Tapak Semaian Komersial, 24 to 28 May 2008, Kota Kinabalu

- 90 ZAMREE, M.S, KHAIRUL, K.A.K. & NOOR, S.M.Y. Aspek kawalan kualiti dalam pemprosesan dan penghasilan produk herba. A paper presented at the FMBIOSIS induction course, 21 to 30 May 2008, Petaling Jaya
- 91 ZAMREE, M.S, KHAIRUL, K.A.K. & NOOR, S.M.Y. Jaminan kualiti dalam penghasilan produk berasaskan herba. A paper presented at the Kursus Teknologi Herba, 24 to 28 April 2008, Kuala Lumpur
- 92 ZAMREE, M.S, KHAIRUL, K.A.K., NOOR, S.M.Y., MASITAH, M.T, PIN, K.Y., NOOR RASYILA, M. N., HADA MASAYU I.D. & MOHD SHAHIDAN, M.A. Kawalan kualiti penghasilan produk herba. A paper presented at the Kursus Usahawan Tapak Semaian Komersial, 24 to 28 May 2008, Kota Kinabalu
- 93 ZAMREE, M.S, KHAIRUL, K.A.K., NOOR, S.M.Y., MASITAH, M.T., PIN, K.Y., NOOR RASYILA, M.N., HADA MASAYU, I.D. & MOHD SHAHIDAN, M.A. Pembangunan produk herba: Kawalan kualiti. A paper presented at the FMBIOSIS induction course, 21 to 30 May 2008, Petaling Jaya

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- 2 Chua L.S.L. Ramin (*Gonystylus bancanus*) in Malaysia. Case study prepared for The International Expert Workshop on CITES Non Detriment Findings. Mexico, 17–22 November 2008. <http://www.cites.org>
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Pegawai Officers

Pada 2008, terdapat 699 orang kakitangan FRIM. Daripada jumlah ini, 200 orang ialah Pegawai Penyelidik dan selebihnya ialah Penolong Pegawai Penyelidik serta Kakitangan Kumpulan Sokongan. Terdapat sembilan Pengarah Bahagian dan tujuh Pengarah Program.

In the year 2008, FRIM employed 699 staff. Out of these 200 were Research Officers, and the rest were Assistant Research Officers and Supporting Staff. There were nine Divisional Directors and seven Programme Directors

Komposisi Kakitangan semasa Current staff composition	Bil
Bilangan Kakitangan FRIM Total number of FRIM staff	699
Kategori Perjawatan Staff Categories	
• Bilangan Pegawai Penyelidik (JUSA) Number of Research Officers (JUSA)	13
• Bilangan Pegawai Penyelidik Number of Research Officers	187
• Bilangan Penolong Pegawai Penyelidik Number of Assistant Research officers	44
• Bilangan Kakitangan Sokongan Number of Supporting Staff	455

PEJABAT KETUA PENGARAH DIRECTOR GENERAL'S OFFICE

Ketua Pengarah Director General

Datuk Dr Abdul Razak Mohd. Ali
PJN, DIMP, JMN, FMIC
B. Sc. (Hons) (Tasmania)
Ph. D. (UM)
(Hingga /Until 25 April)

Dato' Dr. Abd. Latif Mohmod
DIMP, JSM, KMN, AMN
B. Sc. (Hons) (UKM)
M. Sc., Ph. D. (UPM)
(Dari/From 26 April)

Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan) Deputy Director General (Research and Development)

Dato' Dr Abdul Rashid Ab. Malik, DIMP
B. Sc. (UPM)
M. Sc. DIC (Imperial College)
Ph. D. (London)

Timbalan Ketua Pengarah (Operasi) Deputy Director General (Operations)

Dr Abdul Rahim Nik KMN, AMN
Dip. Agric. (UPM)
B. Sc. For. (Louisiana State)
M. Sc. (West Virginia)
Ph. D. (Wales)
(Dari/From 1 Jun)

Taman Botani Kepong Kepong Botanic Garden

Pegawai Penyelidik/Research Officers

Adnan Mohammad
B. Sc. (UTM)
M. Sc. (London)

Zalani Abdul Kadir
B. Sc. Agric. (Washington)
Landscape Design (Idaho)

Pegawai Audit Dalam/Internal Auditor

Ilyani Mazlan
Dip. Acc. (UiTM)
B. Acc. (Hons.) (UiTM)

Unit Pengurusan dan Jaminan Kualiti Quality Management and Assurance Unit

Ketua/Head

Salamah Selamat
B. Sc. (Hons.) (UKM)

Pegawai Penyelidik Kontrak Contract Research Officers

Suhana Rafidah Mohd. Yusof
Dip. For., B. Sc. For. (UPM)

Nor Haliyan Tan Shilan
B. Sc. (Hons.) (UUM)

Norhasni Ramli
B. Sc. (UKM)

Pegawai Penerangan (Kontrak) Contract Information Officer

Shereen Haron
B. Sc. (Hons.) (UiTM)

Unit Hal Ehwal Undang-Undang Legal Affairs Unit

Pegawai Undang-Undang/Legal Officer

Nor Azura Ahmad Murad
LLB (Hons.) (UIA)

Unit Komunikasi Korporat Corporate Communication Unit

Ketua/Head

Norhayati Nordin
Dip. Civil Eng. (UTM)
B. Civil Eng. (Hartford)
M. Sc. (Sussex)

Pegawai Penerangan/Information Officer

Wahayu Abd. Wahab
B. Mass Comm. (UPM)

Pembantu Tadbir Kesetiausahaan Administrative Assistant

Amrah Toha
Dip. Sec. Science (UiTM)

BAHAGIAN KEWANGAN, PERNIAGAAN DAN MULTIMEDIA FINANCE, BUSINESS AND MULTIMEDIA DIVISION

Pengarah/Director

Mohd. Zamshari Hj. Abd Rahman
CA (MIA), CPA (Australia)
B. Com. (W. Aust.)
MBA (UIAM)

Akauntan/Accountant

Mohd. Redzuan Hasan
B. Acc., MBA (UKM)

Jumaaton Abu Bakar
Dip. Acc., B. Acc. (Hons.) (UiTM)

Pegawai Penyelidik/Research Officers

Azman Hassan
Dip. For. (UiTM)
B. Sc. For. (Wisconsin)
M. Sc. (UKM)

Wan Zahiri Wan Yaacob
Dip. Comp. Sc.,
B. Comp. Sc. (UTM)

Zahari Othman
B. Sc. (Hons.) (UiTM)

Norul Maslissa Ahmad
B. Info. Tech. (UUM)

Maizura Ishak
Dip. Comp. Sc (UiTM)
B. Comp. Sc (UTM)

Nurul Hilal A. Tarmidzi
Dip. Elec. Comm. Eng. (UTM)
B. Sc. (Hons) Info Tech. (UNISEL)

Pegawai Tadbir/Administrative Officer

Abdul Jabbar Sabli
Dip. Bus. Stud.(UiTM)
B. Bus. Adm. (Hons.), MBA (UKM)

Pegawai Penyelidik Kontrak Contract Research Officers

Intan Dalina Rafidah Othman
B. Multimedia (UUM)

Penolong Akauntan/Assistant Accountants

Norli Raja Mohamad
Dip. Bus. Stud. (UiTM)

Norbaite Saharudin
Dip. Bus. Stud. (UiTM)

Emylia Ayoub
Dip. Bank. (UiTM)

Zainorasri Yahya
Dip. Acc. (UiTM)

BAHAGIAN PENTADBIRAN ADMINISTRATIVE DIVISION

Pengarah/Director

Mohd. Dzaki Jusoh
B. A. (Hons.) (UKM)

Pegawai Tadbir/Administrative Officer

Zamri Mohd. Zangi
B. Sc. (Hons.) (UUM)

Noorsuhanis Abdul Latif
Dip. Pub. Adm. (UiTM)
B. (Hons.) (UiTM)

Pegawai Penyelenggaraan/Maintenance Officer

Jamal Abdul Razak
Dip. Qty. Survey (UiTM)

Penolong Pegawai Tadbir Assistant Administrative Officers

Md. Nasir Dayat PPN, PJK

Nazly Jamaludin

Penolong Pegawai Penyelidik Assistant Research Officer

Mohd Azhar Ishak @ Asahak
Dip. Mech. Eng. (Polytech)

BAHAGIAN PENGURUSAN SUMBER MANUSIA HUMAN RESOURCES MANAGEMENT DIVISION

Pengarah/Director

Wan Rahmah Wan A. Raof. KMN
B. Sc. (Hons) (USM)
M. HRM. (UPM)

Pegawai Penyelidik/Research Officers

Liza Ismail
B. Sc. (UPM)

Noor Atizza Hj. Mansor
B. A. (UiTM)
M. Sc. (UKM)

Pegawai Penerangan/Information Officer

Norain Mohd Arif
B. Sc. (Hons.) (UiTM)

Pegawai Tadbir/Administrative Officer

Mohd. Asmawee Ismail
Dip. Pub. Adm. (UiTM)
B. HRM (Hons.) (UUM)

Azuarni Abdul Adzis
B. A. (Hons.) (UPM)

Penolong Pegawai Penyelidik Assistant Research Officers

Ruziah Ripin
Dip. Ind. Chem. (UiTM)

Penolong Pegawai Tadbir Assistant Administrative Officer

Mohd. Akhir Abd. Rahman

Penolong Pegawai Penerangan
Assistant Information Officer

Azmarizawati Zainal Azhar
 Dip. Sec. Sc., B. Mass Comm. (UiTM)

Pereka Grafik/Graphic Artist

Jamaluddin Abdullah
 Dip. Graphic Des. (Cosmopoint)

BAHAGIAN BIODIVERSITI DAN ALAM SEKITAR
BIODIVERSITY AND ENVIRONMENT DIVISION

Pengarah/Director

Dr Abdul Rahim Nik KMN, AMN
 Dip. Agric. (UPM)
 B. Sc. For. (Louisiana State),
 M. Sc. (West Virginia), Ph. D. (Wales)
 (Hingga/*until* 31 Mei)

BAHAGIAN PERHUTANAN
FORESTRY DIVISION

Pengarah/Director

Dr Shamsudin Ibrahim AMN
 B. Sc. (UPM)
 M. Sc. (James Cook), Ph. D. (Wales)

Program Hutan Asli
Natural Forest Programme

Pengarah/Director

Dr Ismail Harun
 Dip. For., B. Sc. M. Sc., Ph. D. (UPM)

Pegawai Penyelidik/Research Officers

Dr Raja Barizan Raja Sulaiman
 B. Sc., M. Sc. (UKM)
 Ph. D. (Stirling)

Dr Khali Aziz Hamzah
 B. Sc. (UPM), M. Sc. (AIT)
 Ph. D. (Reading)

Dr Abd. Rahman Kassim
 Dip. For., B. Sc. (UPM)
 M. Sc. (UPLB)
 Ph. D. (Oregon State)

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 B. Sc. (UPM)
 M. Sc. (UKM)

Dr Nur Supardi Md. Noor AMK
 Dip. Sc. (UPM), M. Sc. (Wales)
 Ph. D. (Reading)

Muhammad Farid Abdul Rashid
 B. Eng. (UPM)
 M. For. (Oregon State)

Samsudin Musa
 B. Sc. (UPM)

Mohd. Nasir Husin
 Dip. For. (UiTM)
 B. Sc. (UPM)
 M. Sc. (UKM)

Ismail Parlan
 Dip. Sc. (UiTM)
 B. Sc., M. Sc. (UPM)

Dr Safiah @ Yusmah Muhd.Yusoff
 Dip. Sc. (UiTM)
 B. Sc., M. Sc. (UM),
 Ph. D. (Wales)

Siti Aisah Shamsuddin
 B. Sc., M. Phil. (UM)

Wan Mohd. Shukri Wan Ahmad
 B. Sc., M. Sc. (UPM)

Nur Hajar Zamah Shari
 Dip. For., B. Sc., M. Sc. (UPM)

Dr Serafina Christine Fletcher
 B. Sc. (Hons.) M. Sc., Ph. D. (UKM)

Tan Sek Aun
 B. Sc. (UPM)

Saiful Iskandar Khalit
 B. Comp. Sc., M. Sc (UPM)

Marryanna Lion
 B. A. Geog. (UM)
 M. Soc. Sc. (UPM)

Azian Mohti
 Dip. For., B. Sc., M. Sc. (UPM)

Salleh Mat
 B. Sc., M. Sc. (UPM)

Pegawai Penyelidik Kontrak **Contract Research Officers**

Khairul Najwan Ahmad Jahari
B. Sc. (UPM)

Norazian Mohd. Zain
Dip. For., B. Sc. (UPM)

Azeyla Ahmad
B. Sc. (Hons.) (UKM)

Ahmad Faiz Mokhtar
Dip. Human Dev. (UPM)
B. Sc. (UPM)

Farah Shahanim Mohamed Mohiden
B. Sc. (Hons.), M. Sc. (Hons.) (UKM)

Siti Normaslina Mohd. Tarli
B. Sc. (UMT)

Hamdan Omar
B. Sc. (UTM)

Mohd Rizuwan Mamat
Dip. Mech. Eng.,
B. Mech. Eng. (UiTM)

Siswazah Penyelidikan **Graduate Research Assistantship**

Joann Christine Luruthusamy
B. Sc. (UMT)

Nur Fadzliza Kamarulbahrin
B. Sc. (UPM)

Penolong Pegawai Penyelidik **Assistant Research Officers**

Shahrulzaman Idris
Dip. For. (UiTM)

Mohd. Md. Sahat

Nazaruddin Ramli
Dip. Agric. (UPM)

Rodziah Hashim
Dip. Sc. (UiTM)

Mohd. Azhan Shah Idris
Dip. For. (UPM)

Harfendy Osman
Dip. Comp. Sc. (UPM)

Sadali Sahat

Program Pusat Biodiversiti Hutan Tropika **Tropical Forest Biodiversity Centre Programme**

Pengarah/Director

Dr Saw Leng Guan
B. Sc. For. (UPM)
M. Sc., Ph. D. (Reading)

Pegawai Penyelidik/Research Officers

Dr Lee Su See AMN
B. Sc. (Hons.) (UM)
M. Sc. (UPM)
Ph. D. (Aberdeen)

Dr Pan Khang Aun
B. Sc. (UPM), M. Sc. (UM),
Ph. D. (Salford)

Dr Laurence G. Kirton
B. Sc. (Hons) (USM)
Ph. D. (London)

Dr Lillian Chua Swee Lian
B. Sc. (UKM), M. Sc. (London),
Ph. D (Bath)

Dr Richard Chung Cheng Kong FLS
B. Sc. (Hons.), M. Sc, Ph. D. (UM)

Dr Gary W. Theseira
B. Sc. (Hons.), MSc (Illinois)
Ph. D. (Mississippi)

Dr Grace Tabitha Lim Wui Oi
B. Agric. Sc., M. Sc. (UPM)
Ph. D. (Virginia Tech)

Sam Yen Yen
B. Agric. Sc., M. Agric. Sc. (UPM)

Hamidah Mamat
B. Sc. (Geoinformatics), M. Sc. (UTM)

Nor Ezzawanis Abdullah Thani
B. Sc. (Hons.) (UKM)

Phoon Sook Ngoh
B. Sc. (Hons.), M.Sc. (UPM)

Ummul Nazrah Abdul Rahman
B. Sc. Ed. (Hons.), M.Sc. (UKM)

Syahida Emiza Suhaimi
B. Sc. For. (UPM)

Chew Ming Yee
B. Sc. For. (UPM)

Shawn Cheng
B. Sc. (UPM)
M. Sc. (Imperial College)

Nada Badruddin
B. App. Sc. (USM)

Mohd. Farid Ahmad
Dip. For., B. Sc. For., M. Sc. (UPM)

Patahayah Mansor
B. Sc. For. (UPM)

Avelinah Julius
B. Sc. (Hons.), M. Sc. (UKM)

Lau Kah Hoo
B. Sc., M. Sc. (UKM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Dr E. Soepadmo
B. Sc. (Bogor), Ph. D. (Cambridge)

Dr Ruth Kiew
B. A., M. A., Ph. D. (Cantab).

Chan Yoke Mui
B. Sc. (UM)

Suzana Sabran
B. Sc. (UMS)

Rafidah Abdul Rahman
Dip. For., B. Sc. For. (UPM)

Wendy Yong Sze Yee
B. Sc. (Hons), M. Sc. (UPM)

Suhaida Mustafa
B. Sc. For. (UPM)

Mariam Abdullah @ Jutta Poetz
B. Sc. (UPM)

Nadiah Idris
B. Sc. (Hons) (UKM)

Tan Hui Sin
B. Sc. For. (UPM)

Lim Chung Lu
B. Sc. For. (UPM)

Yao Tze Leong
B. Sc. For. (UPM)

Aslina Baharum
B. Sc. (Hons.) (UMS)

Siti Munirah Mat Yunoh
B. Sc. (Hons.), M. Sc. (UKM)

Phon Choi Khim
B. Sc. (Hons.), M. Sc. (USM)

Shahlinney Lipeh
B. Sc., M. Sc. (UKM)

Thi Bee Khin
B. Sc. (Hons.) (UKM)
M. Sc. (UKM)

Zan Mirani Tajuddin
Dip. Sc. (UiTM)
B. Sc. (UM)

Mohammad Shahfiz Azman
B. Sc. (UNIMAS)

Nazura Zainuddin
B. Sc. (UM)

Ong Poh Teck
B. Sc. (UPM)

Nur Zati Akma Mustafa
B. Sc. (UKM)

Chan Kin Onn
B. Sc. (UKM)
(Sehingga/Until Mac)

Ong Su Ping
B. Sc. (USM)

Veronica Khoo Swee Imm
B. Sc. (USM)

Ng Wei Lun
B. Sc. (Hons.) (UTAR)

Nor Azlin Mohd Fauzi
B. Sc. (UPM), M. Sc. (UKM)

Izzati Adilah Azmir
B. Sc., M. Sc. (UKM)

Kaviarasu Munian
B. Sc. (UPM)

Yeong Hui Yin
B. Sc. (Hons.) (UM)

Gan Hui Hoon
B. Sc. (Hons.) (UM)

Cheng Pei Leng
B. Sc. (Hons.) (UM)

Penolong Pegawai Penyelidik Kontrak **Contract Assistant Research Officers**

Kamarudin Saleh

Kamarul Hisham Mustafa
Dip. Agric. Sc.
(Dari/From 17 Oct)

Marzita Zuliana Zahariya @ Zakaria
Sijil IT (Cosmotact)
Dip. IT (Cosmopoint)
(Sehingga/Until August)

Program Ekopelancongan dan Hutan Bandar **Ecotourism and Urban Forestry Programme**

Pengarah/Director

Dr Noor Azlin Yahya
B. Sc. (Doane, Nebraska)
M. Sc. (New York)
Ph. D. (UPM)

Pegawai Penyelidik/Research Officers

Dr Elizabeth Philip
B. Sc. (UPM)
Ph. D. (UM)

Ahmad Azaruddin Mohd. Noor
B. Sc., M. Sc. (UPM)

Ahmad Nazarudin Mohd. Roseli
B. Sc., M. Sc. (UPM)

Sreetheran Maruthaveeran
B. Sc. (UMS)
M. Sc. (UPM)

Nik Azyyati Abdul Kadir
Dip. For. (UPM)
B. Sc. (UPM)

Pegawai Penyelidik Kontrak **Contract Research Officers**

Mohd Aswad Ramlan
B. Sc. (UPM)

Sharmillah Saleh
B. Sc. (UMS)

Syamsurina Arshad
B. Sc. (UMS)

Naimah Che Long
B. Sc. (UPM)

Mohd. Firdaus Ab. Latif
B. Sc. (UM)

Sharifah Azzuwani Syed Intan
B. Sc. (UPM)

Arkitek Landskap Kontrak
Contract Landscape Architect

Nik Adlin Nik Mohamed Sukri
B. Sc. (UTM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Mohd. Afendi Husin
Dip. Agric. (UPM)

Azahari Hj. Mohd. Yusoff
Dip. Lands. Des. (UiTM)

Mohd. Rizal Mohd. Kassim
Dip. Plant. Mgmt. (UiTM)

Suharti Samod
Dip. For. (UPM)
B. Sc. (UPM)

BAHAGIAN KELUARAN HUTAN **FOREST PRODUCTS DIVISION**

Pengarah/Director

Dr Mohd. Nor Mohd. Yusoff, KMN
B. Sc. (Louisiana), M.Sc. (Virginia)
Ph. D. (Manchester)

Program Kimia dan Perlindungan Kayu
Chemistry and Timber Protection Programme

Pengarah/Director

Dr Rahim Sudin AMN, DSM
 B. Sc. (Hons.) (UKM)
 M. Sc. (USM)
 Ph. D. (Sheffield)

Pegawai Penyelidik/Research Officers

Dr Mohd. Dahlan Jantan
 B. Sc. (UPM), M. Agric. Dev. (Ghent)
 Ph. D. (Portsmouth)

Dr Rushdan Ibrahim
 B. Sc. (Montana), M. Sc. (UPM)
 Ph. D. (Manchester)

Salamah Selamat
 B. Sc. (Hons.) (UKM)

Dr Koh Mok Poh
 B. Sc. (Hons.) (London)
 M. Sc., Ph. D. (Du Maine)

Dr Salmiah Ujang
 Dip. Wood Tech. (UiTM)
 B. Sc., M. Sc. (Mississippi State)
 Ph. D. (Portsmouth)

Dr Wan Asma Ibrahim
 B. Sc. (Kansas State),
 M. Sc. (Missouri-Rolla), Ph. D. (UPM)

Mahmudin Saleh
 B. Eng. (Hons.) (UM)
 M. Sc. (UiTM)

Hashim W. Samsi
 Dip. Agric., B. Sc., M. Sc. (UPM)

Roszaini Kadir
 Dip. Wood Tech. (UiTM)
 B. Sc., M. Sc. (UPM)

Zaihan Jalaludin
 B. Sc. (Hons.) (UKM)
 M. Sc. (UPM)

Suffian Misran
 B. Sc. (Hons.), M. Sc. (UPM)

Sharmiza Adnan
 B. Chem. Eng. (Vanderbilt)
 M. Sc. (UKM)

Puad Elham
 Dip. Wood Tech. (UiTM)
 B. Sc., M. Sc. (UPM)

Shaharuddin Hashim
 B. Sc. (USM)

Rafeadah Rusli
 B. Sc. (Hons.) (USM)
 M. Sc. (UPM)

Mohamad Jani Saad
 B. Sc. (Hons.), M. Sc. (USM)

Dr Ainun Zuriyati Mohamed @ Asa'ari
 B. Sc. (Hons.), M. Sc. (USM)
 Ph. D. (UKM)

Latifah Jasmani
 B. Sc. (Hons.) (Manchester)
 M. Sc. (UKM)

Mohamad Nasir Mat Arip
 B. Sc. (Hons.), M. Sc. (UKM)

Mahanim Sarif @ Mohd. Ali
 B. Eng. (Hons.), M. Sc. (USM)

Rafidah Jalil
 B. Eng. (Hons.), M. Sc. (UKM)

Dr Mohd Khairun Anwar Uyup
 B. Sc., M. Sc., Ph. D. (UPM)

Tumirah Khadiran
 B. Sc., M. Sc. (UKM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Nurul Husna Mohd Hassan
 B. Sc. (Hons.), M. Sc. (USM)

Khairul Azmi Jabar
 B. Sc. (Hons.), M. Sc. (USM)

Norhairul Nizam Awg Malek
 B. Sc. (UPM)
 (Sehingga/Until 29 Mei)

Siswazah Penyelidikan
Graduate Research Assistantship

Noraswati Mohd Nor Rashid
 B. Sc. (Hons.) (UPM)

Izran Kamal
B. Sc. (Hons.) (UMS)

Mohd Zharif Ahmad Thirmizir
B. Sc. (UiTM)

Nor Azrieda Abd. Rashid
B. Sc. (UiTM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Habibah Mohamad, PPN
Dip. Ind. Chem. (UiTM)

Nor Azian Mohd. Kasby
Dip. Civil Eng. (UTM)

Baharuddin Kamaruddin
Dip. Wood Tech. (UiTM)
B.Sc. (UPM)

Zaitun Said
Dip. Wood Tech. (UiTM)

Rozaida Latip
Dip. Wood Tech. (UiTM)

Siti Rafidah Mahmud
Dip. Wood Tech. (UiTM)

Azizi Abdul Jalil
Dip. Wood Tech. (UiTM)

Noraidah Subakin
Dip. Sc. (UiTM)
B. Sc. (Hons.) (UKM)

Program Pemprosesan dan Teknologi Kayu
Timber Processing and Technology Programme

Pengarah/Director

Dr Tan Yu Eng
B. Sc. (Hons.) (UKM)
Ph. D. (Brighton)

Pegawai Penyelidik/Research Officers

Dr Gan Kee Seng
Dip. Mech Eng. (UTM)
B. Sc., Ph.D. (Strathclyde)

Dr Mohamad Omar Mohamad Khaidzir
Dip. Civil Eng. (UTM)
B. Sc. (CBU Memphis)
M. Sc. (British Columbia)
Ph. D. (Sheffield)

Dr Ani Sulaiman
B. Sc. (Hons.) (USM)
M. Sc. (Wales)
Ph. D. (Reading)

Mohd. Arshad Saru
Dip. Mech. Eng. (UTM)
B. Eng. (Sunderland)

Mohd. Tamizi Mustafa
Dip. Wood Tech. (UiTM)
B. Sc. (UPM), M. Sc. (USM)

Dr Hamdan Husain
Dip. Arch. (UTM)
B. Sc., B. Arch. (USM)
Ph. D. (Wales)

Abdul Hamid Saleh
B. Ind. Design (UiTM)
B. Sc. (Hons.), M. Sc. (UiTM)

Ong Chee Beng
B. Sc. (Hons.), M. Sc. (UPM)

Khairul Awang
Dip. Pl. Mgmt., B. Sc. (Hons.) (UiTM)
M. Sc. (USM)

How Seok Sean
B. Sc., M. Sc. (UPM)

Sik Huei Shing
B. Sc. (UPM)

Siti Zaliha Ali
Dip. Manuf. Eng. (KUSZA)
B. Eng. (Hons) (UIAM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Choo Kheng Ten AMN
B. Sc. (Hons.) (UM)

Lim Seng Choon
Dip. Timb. Stud. (Bucks.)
M. Sc. (Wales)
(Dari/ from 1 Mac)

Mohd. Jamil Abdul Wahab
B. Eng. (Hons.) (UM)

Zairul Amin Rabidin
B. Eng. (Hons.) (UM)

Khairul Masseat
Dip. Wood Tech, B. Sc. (Hons.) (UiTM)

Thilagawathy Maniam
B. Sc. (UPM)

Siswazah Bantuan Penyelidikan Graduate Research Assistantship

Nordahlia Abdullah Siam
B. Sc. (UKM)

Ana Azrena Ramly
B. Eng. (Hons.) (USM)

Penolong Pegawai Penyelidik Assistant Research Officers

Zawawi Kassim
Dip. Sc. (UiTM)

Noor Nazreen Nasir
Dip. Elec. Eng. (UiTM)

Ahmad Ismail

Roszalli Mohd.

Emlee Mohd. Taib

Pembantu Teknik/Technical Assistant

Ya'akob Zahari
Dip. Mech. Marine Eng. (P.U.O)

BAHAGIAN BIOTEKNOLOGI PERHUTANAN FOREST BIOTECHNOLOGY DIVISION

Pengarah/Director

Dr Marzalina Mansor
B. Sc. (Hons.) (Carlton)
Ph. D. (UKM)
MBA (UiTM)
(Dari/From 1 Julai)

Program Tumbuhan Ubatan Medicinal Plants Programme

Pengarah/Director

Dr Rasadah Mat Ali, AMP
B. Sc. (Hons.), M. Sc. (UM)
Ph. D. (London)

Pegawai Penyelidik Research Officers

Dr Nor Azah Mohamad Ali
B. Sc. (Waterloo)
M. Sc. (UKM)
Ph. D. (UPM)

Dr Chang Yu Shyun
B. Sc. (Hons.), Ph.D. (Tasmania)

Mastura Mohtar
B. Sc. (Hons.), M.Sc. (UKM)

Dr Vimala Subramaniam
B. Sc. (Hons.) (UKM)
M. Sc., Ph. D. (UM)

Dr Ling Sui Kiong
B. Sc. (Hons.) (UKM)
M. Biotech. (UM)
Ph. D. (Nagasaki)

Ong Boo Kean
B. Sc. (Hons.) (UKM)
M. Sc. (UPM)

Dr Nik Musa'adah Mustapha
B. Sc. (Hons.) (UKM)
Ph. D. (London)

Zainon Abu Samah
B. Sc.(Hons.), M. Sc. (UM)

Zaridah Mohd. Zaki
B. App. Sc. (Hons.) (USM)
M. Sc. (UKM)

Mohd. Shahidan Mohd. Arshad
B. Sc. (Hons.) (UM)

Zamree Md. Shah
Dip. Vet., B. Sc. (Hons.) M.Sc. (UPM)

Chee Beng Jin
B. Sc. (Hons.), M. Sc. (UPM)

Mary Khoo Gaik Hong
B. Sc. (Hons.), M. Sc. (UPM)

Norhayati Abdullah
B. Sc. (Hons.), M. Sc. (UM)

Mazura Pizar
B. Sc. (Hons.)
M. Sc. (UKM)

Hada Masayu Ismail @ Dahlan
B. Process & Food Eng. (Hons.) (UPM)

Saidatul Husni Saidin
B. Sc. Nutr. & Comm. Health,
M. Sc. (UPM)

Noor Rasyila Mohamed Noor
B. Sc., M. Sc. (UPM)

Fauziah Abdullah
B. Sc. (Hons.), M. Sc. (UKM)

Saiful Azmi Johari
B. App. Sc. (Hons.) (USM)
M. Sc. (UPM)

Abdul Rashid Li
Dip. Ind. Chem., B. Sc. (Hons.)
M. Sc. (UiTM)

Adiana Mohd Adib
B. Sc., M. Sc. (UTM)

Norul Aiman Yusoff
B. Sc., M. Sc. (UPM)

Pegawai Penyelidik Kontrak Contract Research Officers

Mailina Jamil
Dip. Ind. Chem., B. Sc. (Hons.) (UiTM)

Pin Kar Yong
B. Eng. (Hons.) (UPM)

Fadzureena Jamaluddin
B. Sc. (Hons.) (UM)

Ihsan Safwan Kamarazaman
B. Sc. (UPM)

Ilyanie Hj. Yaacob
B. Sc. (Hons.) (UKM)
M. Sc. (UiTM)

Tan Ai Lee
B. Sc. (Hons.), M. Sc. (UKM)

Noor Syaheera Mohd Yunus
B. Sc. (Hons.) (UKM)

Khairul Kamilah Abd. Kadir
B. Sc. (Hons.) (UPM)

Izanudin Zakaria
B. Sc. (Hons.), M. Biotech (UM)

Siswazah Bantuan Penyelidikan Graduate Research Assistantship

Zunoliza Abdullah
B. Sc. (Hons.) (UM)
M. Sc. (UM)

Siti Humeirah Abd. Ghani
B. Sc. (Hons.) (UMS)

Christine Tan Hooi Poay
B. Sc. (Hons.) (UM)

Penolong Pegawai Penyelidik Assistant Research Officers

Abdull Rashih Ahmad

Mohd. Radzi Ahmad
Dip. MLT (UKM)

Khairuddin Kamaruddin, PPT

Nuziah Hashim
Dip. Ind. Chem. (UiTM)

Salbiah Man
Dip. Ind. Chem. (UiTM)

Rohana Sahdan
Dip. Microbio. (UiTM)

Mazurah Mohamed Isa
Dip. Microbio. (UiTM)

Abdul Majid Jalil
Dip. Chem. Eng. (UTM)

Penolong Pegawai Penyelidik Kontrak
Contract Assistant Research Officer

Abu Said Ahmad

Siti Norhana Jasmani
Dip. Off. Mgmt. Tech. (UiTM)

Program Bioteknologi and Farmaseutikal
Biotechnology and Pharmaceutical Programme

Pengarah/Director

Dr. Marzalina Mansor
B. Sc. (Hons.) (Carlton)
Ph. D. (UKM)
MBA (UiTM)
(Sehingga/*until* 30 Jun)

Dr Norwati Muhammad
B. Sc. (Hons), M. Sc. (UKM)
Ph. D. (Reading)
(Dari/*From* 1 Julai)

Pegawai Penyelidik/Research Officers

Dr Lee Soon Leong
B. Sc. (Hons.) (UKM)
M. Phil. (UM)
Ph. D. (UKM)

Dr Mohd. Ilham Adenan
B. Sc. (Hons.), M. Phil. (UM)
Ph. D. (Okayama)

Mohd. Rosli Haron
B. Sc. (Hons.) (UM)
M. Sc. (UKM)

Asiah Osman
B. Sc. (UPM)
M. Sc. (UKM)

Dr Norwati Adnan
B. Sc. (Hons.) (UM)
M. Sc. (UPM), Ph. D. (UKM)

Dr Fadhilah Zainudin
B. Sc. (UPM), M. Sc. (UKM)
Ph. D. (Birmingham, UK)

Haliza Ismail
B. Sc. (Hons.) (UM)
M. Sc. (UPM)

Dr Kevin Ng Kit Siong
B. Sc. (Hons.) (UMS)
Ph. D. (UM)

Lee Chai Ting
B. Sc. (Hons.) (UKM)
M. Sc. (UKM)

Nashatul Zaimah Noor Azman
B. Sc. (Hons.) (USM)
M. Sc. (London)

Nor Asmah Hassan
B. Sc. (Hons.), M. Sc. (UKM)

Nor Hasnida Hassan
B. Sc. (Hons.), M. Sc., Ph. D. (UKM)

Dr Norlia Basherudin
B. Sc., M. Sc., Ph. D. (UPM)

Nurhanan Murni Yunos
B. Sc. (Hons.) (Sheffield)
M. Sc. (UKM)

Siti Salwana Hj. Hashim
B. Sc. (Hons.) (UPM)

Dr Getha Krishnasamy
B. Sc. (UKM)
M. Phil. (UM)
Ph. D. (UM)

Dr Ng Chin Hong
B. Sc. (Hons.), M. Sc., Ph. D. (UKM)

Dr Kodi Isparan Kandasamy
B. Sc. (UKM),
M. Sc., Ph. D. (London)

Lili Sahira Husin
B. Sc. (UPM)

Noraliza Alias
B. Sc. (UPM)

Norhayati Ismail
B. Sc.(Hons.) (UPM)

Dr Wan Tarmeze Wan Ariffin
B. Eng. (Portland)
M. Sc. (UPM)
Ph. D. (Birmingham)

Siti Syarifah Mohd Mutalip
B. Sc. (Hons.) UPM

Nadiah Salmi Nadzri
B. Sc. (Hons.) (UKM)

Rosilah Ab. Aziz
B. Sc. (UMS). M. Sc. (UPM)
(Sehingga/Until 31 Julai)

Pegawai Penyelidik Kontrak
Contract Research Officers

Nor Datiakma Mat Amin
B. (Hons.) (UMS)

Anee Suryani Sued
B. Sc. (Hons.) (UKM)

Mohd Zairus Rizal Razali
B. Sc. (Hons.) UPM

Muhammad Haffiz Jauri
B. Sc., M. Sc. (UTM)

Mohd. Fadzli Ahmad
B. Sc., M. Sc. (UKM)

Mohd Ridzwan Zanul Abidin
B. Sc., M. Sc. (UKM)
(Sehingga/Until 31 August)

Penolong Pegawai Penyelidik
Assistant Research Officers

Ang Khoon Cheng

Azril Deenor Md. Dan
Dip. Microbio. (UiTM)
(Sehingga/Until 31 September)

Siswazah Penyelidikan
Graduate Research Assistantship

Sun Wan Fong
B. Sc. (UTM)

Yap Jing Wei
B. Sc. (Monash)
B. Sc. (Hons.) (Tasmania)

Roshan Jahn Mohd Salim
B. Eng. (Hons.) (UIA)

Nurul Zamzurina Osman
B. Sc. (UM)

Program Hutan Ladang
Forest Plantations Programme

Pengarah/Director

Dr Ahmad Zuhaidi Yahya, AMN
Dip. For. (ITM/For. College, Kepong)
B. Sc. (UPM)
M. Sc. (Aberdeen)
Ph. D. (Irish U. Dublin)

Pegawai Penyelidik/Research Officers

Dr Ab. Rasip Ab. Ghani, AMP
Dip. Agric. (UPM)
B. Sc., M. Sc. Agric. (SHSU, Texas)
Ph. D. (UKM)

Dr Aminah Hamzah
B. Sc. (UPM), M.Sc. (Goettingen)
Ph. D. (Edinburgh)

Dr Hashim Mohd. Nor, AMP
B. Sc., M. Sc. (UPM)
Ph. D. (Wales)

Dr Ang Lai Hoe
B. Sc. (UPM), M. Sc. (UPLB)
Ph. D. (Aberdeen)

Dr Wan Rasidah Wan Abdul Kadir
B. Sc. (Hons), M. Sc. (UKM)
Ph. D. (Ghent)

Dr Mohd. Noor Mahat
B. Sc. (Hons.) (UKM)
M. Sc., Ph. D. (UPM)

Mohd. Lokmal Ngah
B. Sc. (Hons.) (UM)
M. Sc. (UKM)

Lok Eng Hai
Dip. For., B. Sc, M. Sc. (UPM)

Mohd. Zaki Abdullah
Dip. Agric., B. Sc., M. Sc. (UPM)

Rosdi Koter
Dip. For., B. Sc. For. (UPM)
M. Sc. (UPM)

Ahmad Fauzi Mohd. Shariff
Dip. Agric., B. Sc. (UPM)

Mohd. Ghazali Hassan
Dip. Agric., B. Agric., M. Agric. (UPM)

Dr Ho Wai Mun
B. Env. Sc. (UMS)
M. Env. Mgmt. (UKM)
Ph. D. (SNU, Seoul)

Farah Fazwa Mohd. Arif
B. Sc., M. Sc. (UKM)

V. Jeyanny Vijayanathan
B. Sc., M. Sc. (UPM)

Rozita Ahmad
Dip. Ind. Chem. (UiTM)
B. Sc. (Hons) (USM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Esther Hui Ting Fui
B. Sc. (Utah State)

Siswazah Penyelidikan
Graduate Research Assistantship

Adi Fadzly Abd. Khalid
B. Sc. (UM)

Dasrul Iskandar Darus
Dip. Plant. (UiTM)
B. Sc. (UMS)

Penolong Pegawai Penyelidik
Assistant Research Officers

Suhaimi Wan Chik
Dip. Agric. (UPM)

Amir Saiffuddin Kassim
Dip. Agric. (UPM)
B. Acc. (UiTM)

Penolong Pegawai Penyelidik Kontrak
Contract Assistant Research Officers

Mohd Jaffar Sharri

Tang Lai Kuen
B. Sc. (TARC)

Penolong Pegawai Taman/ Ladang
Assistant Garden/Plantation Officer

Mohd. Ramly Mohd. Saleh
Dip. Agric. (UPM)

BAHAGIAN PENGURUSAN PENYELIDIKAN & EKONOMI
RESEARCH MANAGEMENT & ECONOMIC DIVISION

Pengarah/Director

Dr Norini Haron AMN
Dip. For. (UiTM)
B. Sc. Res. Econ. (UPM)
M. Sc. (Michigan)
Ph. D. (Aberystwyth, Wales)

Pegawai Penyelidik/Research Officers

Norhara Hussein
B. Sc. (Hons.) (USM)

Dr Ahmad Fauzi Puasa, AMN
Dip. Agric., B. Sc. (UPM)
M. Sc. (UNE, Armadel, Australia)
Ph. D. (UPM)

Nor Azman Hussein
Dip. Agric. (UPM)
B. Sc. (Louisiana)
M. Sc. (West Virginia)

Mohamad Zaki Mohd. Isa
Post-Grad. Dip. Lib. Sc. (UiTM)
B. Sc. (Guelph)
M. Sc. (UIA)

Dr Ismariah Hj. Ahmad
Dip. For. (UiTM), B. Sc. (UPM)
M. Sc. (Michigan)
Ph. D. (Washington)

Ho Yuen Foon
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