

LAPORAN TAHUNAN MFRDB FRIM

MFRDB FRIM ANNUAL REPORT



2011



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



Rasional kulit depan Cover page rational

Grafik gelombang yang dilihat merentangi laporan tahunan menunjukkan momentum yang dijana oleh FRIM ke arah mencapai matlamat dan objektifnya. Citra suasana semula jadi, pencinta alam dan hutan melambangkan urusan utama yang dijalankan oleh FRIM.

Graphical swerves harmonizing across the annual report represents the momentum FRIM has generated towards achieving its goals and objectives throughout its years of establishment. Images of natural ambience, children experiencing the splendors of nature, and serene forests symbolize FRIM's nature of business.

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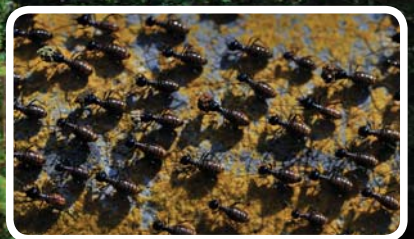
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**LEMBAGA PENYELIDIKAN DAN
PEMBANGUNAN PERHUTANAN MALAYSIA
MALAYSIAN FORESTRY RESEARCH AND
DEVELOPMENT BOARD (MFRDB)**



Selaku Pengerusi Lembaga Penyelidikan dan Pembangunan Penyelidikan Malaysia (MFRDB) bagi penggal kedua, saya menganggap ini sebagai satu penghormatan untuk berkongsi kegembiraan dan kebanggaan saya di atas prestasi cemerlang serta pelbagai pencapaian FRIM pada 2011. Pertamanya ingin dikongsikan di sini bahawa pada sepanjang tahun 2011, Mesyuarat Lembaga dan Mesyuarat Jawatankuasa Kecil Lembaga—Projek Kerjasama dengan Agensi Luar telah diadakan sebanyak empat kali iaitu pada 28 Februari, 26 Mei, 22 Ogos dan 29 Disember. Mesyuarat Jawatankuasa Kewangan dan Perjawatan (JKKP) juga diadakan sebanyak empat kali iaitu pada 28 Februari, 21 April, 15 Julai dan 29 Disember manakala Mesyuarat Jawatankuasa Audit sebanyak dua kali iaitu pada 4 Mei dan 10 November. Ini bermakna Ahli Lembaga Penasihat telah menepati keperluan di bawah peraturan FRIM untuk mengadakan mesyuarat sekurang-kurangnya empat kali setahun.

It is a privilege as Chairperson of The Malaysian Forestry Research and Development Board (MFRDB) for the second term, to share with all, my profound joy and pride in the excellent performance and many achievements of FRIM in 2011. First of all, I would like to share here that in 2011, four meetings of the Board and four meetings of the Committee on Collaborative Project with Other Agencies were held on 28 February, 26 May, 22 August and 29 December. Meetings of the Committee on Finance and Establishment (JKKP) were also held four times, i.e. on 28 February, 21 April, 15 July and 29 December whereas the Audit Committee met twice, i.e. on 4 May and 10 November. As such, the Members' Advisory Board has fulfilled FRIM's requirement to meet at least four times yearly.

Sorotan prestasi

Walaupun melalui masa yang sukar, 2011 merupakan tahun yang amat produktif bagi FRIM. Pelbagai kejayaan penting telah dicapai walaupun terpaksa menghadapi iklim ekonomi dunia yang tidak menentu serta dana dari agensi-agensi penaja untuk aktiviti penyelidikan dan pembangunan (R&D) yang berkurangan. Sejumlah 26 projek baharu R&D yang berjumlah RM4.6 juta telah diperoleh daripada pelbagai agensi penaja di dalam dan di luar negara. Empat projek R&D berjumlah RM767 260 berjaya memperoleh dana ScienceFund dari Kementerian Sains, Teknologi dan Inovasi (MOSTI), satu projek di bawah Kementerian Pertanian dan Industri Asas Tani (MOA) bernilai RM80 000; 13 projek Geran Penyelidikan, Prakomersialisasi dan Penerbitan (RPP) yang dibiayai oleh Lembaga berjumlah RM225 000; serta lima projek bernilai RM3.5 juta yang dibiayai oleh pelbagai agensi kerajaan dan swasta. Dana tertinggi yang diterima berjumlah RM1.8 juta ialah sumbangan daripada International Timber Trade Organizations (ITTO) bagi projek “Reducing forest degradation and emission through SFM in Peninsular Malaysia”.

Saya cukup berbangga dengan penglibatan penyelidik FRIM dalam 47 projek perundingan pada tahun 2011. Ini membuktikan bahawa pihak industri bukan sahaja merujuk kepakaran penyelidik FRIM, malah merupakan satu ukuran dari segi kepentingan penyelidik dalam menghadapi isu-isu semasa yang dihadapi oleh pihak industri. Pihak MFRDB menggalakkan penglibatan pegawai-pegawai penyelidik FRIM dalam pelbagai cabaran bidang teknikal yang dihadapi oleh pihak industri dan dengan itu diharap dapat diterjemahkan menerusi projek-projek penyelidikan yang lebih baik pada masa hadapan.

Penyebaran hasil-hasil R&D merupakan satu aspek penting yang telah diusahakan oleh FRIM. Sebanyak 41 aktiviti melibatkan pihak-pihak yang berkepentingan menerusi seminar, bengkel, ceramah berkaitan teknologi, persidangan dan kursus telah dijalankan oleh FRIM. Menerusi aktiviti yang melibatkan pihak-pihak berkepentingan inilah, hasil-hasil R&D dapat diguna pakai dalam pembangunan sektor perhutanan. Pada masa yang sama, projek-projek penyelidikan yang relevan dapat dirumuskan bagi memenuhi keperluan pihak-pihak berkepentingan tepat pada masanya serta berkesan. Selain itu, dalam usaha untuk menyebarkan hasil-hasil penyelidikan FRIM kepada pihak berkepentingan dan juga orang awam, lebih daripada 350 kertas teknikal telah diterbitkan di dalam jurnal, buku teknikal dan separa teknikal (termasuk buku panduan, prosiding, laporan institusi, e-penerbitan dan surat berita), serta 142 kertas teknikal telah dibentangkan di pelbagai seminar dan persidangan. Jilid kedua siri Seed Plant dan jilid ketiga Flora of Peninsular Malaysia (revised) Apocynaceae yang merupakan famili yang kelima terbesar di Semenanjung Malaysia dengan 112 spesies daripada 35 genera turut diterbitkan. Senarai spesies pokok terancam yang

Performance review

2011 was a very tough but productive year for FRIM. Many significant achievements were made despite unfavourable economic conditions and low financial contributions for R&D projects by funding agencies. A total of 26 new R&D projects amounting to RM4.6 million were approved by various national and international funding agencies. Four R&D projects of RM767 260 were funded under the ScienceFund by the Ministry of Science, Technology and Innovation (MOSTI); one project under the Ministry of Agriculture and Agro-Based Industry (MOA) totalling RM80 000; 13 Research, Pre-Commercialization and Publication Grants (RPP) projects funded by the Board totalling RM225 000; as well as five projects amounting to RM3.5 million funded by other various government and private agencies. The largest fund, i.e. RM1.8 million, was received from the International Timber Trade Organization (ITTO) for a project entitled “Reducing forest degradation and emission through SFM in Peninsular Malaysia”.

It was commendable that FRIM research officers were involved in 47 consultancy projects. This goes to show not only their expertise that was required by the industries but also a gauge of their relevance to practical issues faced by the industries. The Board encourages the involvements of research officers in actual technical challenges in the industries and hopes that these will be translated into better research projects to be undertaken in the future.

Communicating R&D outputs is an important aspect of FRIM's hard work. Forty-one engagements with various stakeholders through seminars/workshops/technology talks/conferences/courses were conducted. It was through these stakeholder engagements that R&D results could be successfully applied for the development of the forestry and forest products sectors. At the same time, relevant research projects could be formulated to address the needs of the stakeholders in a more timely manner and effectively. Other than that, more than 350 technical papers were published in the form of journal, technical and semi-technical books (including guidelines, proceedings, institutional reports, e-publications and newsletters) and 142 technical presentations were delivered in seminars and conferences. The second volume of the Seed Plant Series and third for the Flora of Peninsular Malaysia revised Apocynaceae, the fifth largest family in Peninsular Malaysia with 112 species from 35 genera were also published. The list of threatened tree species planted in FRIM is presented in “Forest Research Institute Malaysia: A Sanctuary for Threatened Trees”. Relevant details are provided for each of the 73 species—of these, 13 are Critically Endangered, 25 Endangered and 35 Vulnerable. Many of the 73 species mentioned have been planted in the grounds of the Kepong Botanic Gardens in addition to the Dipterocarp Arboretum. This is some of the ex-situ effort by FRIM in conserving the critically endangered, endangered and

ditanam di FRIM diterbitkan dalam Forest Research Institute Malaysia: A Sanctuary for Threatened Trees. Maklumat terperinci bagi setiap 73 spesies—daripada 73 spesies, 13 merupakan spesies Terancam Teruk, 25 Terancam dan 35 Musnah. Banyak daripada spesies ini telah ditanam di kawasan Taman Botani Kepong sebagai tambahan kepada Arboretum Dipterokarpa. Bagi membolehkan penyebaran hasil-hasil R&D diperluas kepada lebih ramai orang, FRIM telah menerbitkan beberapa buku mewah.

Saya juga ingin menyampaikan sekalung tahniah kepada semua warga FRIM di atas penerimaan pelbagai anugerah termasuklah The BrandLaureate Awards 2010–2011 dan the International Socrates Award for Best Enterprise (Applied Research and Scientific Achievements) Award 2011 daripada the European Business Assembly (EBA) semasa The Oxford Summit of Leaders. Lembaga juga mengucapkan tahniah kepada Ketua Pengarah FRIM, Y Bhg Dato' Dr Abd Latif Mohmod yang telah dianugerahi European Manager of the Year Award 2011 oleh the European Business Assembly.

Pembangunan

Sebagai memenuhi hasrat pihak industri, Lembaga menggalakkan makmal-makmal penyelidikan FRIM, di samping menjalankan R&D, perlulah juga berusaha untuk mendapatkan akreditasi bagi kemudahan-kemudahan ujian agar memenuhi piawaian antarabangsa. Lembaga memperakui kejayaan FRIM merasmikan Makmal Ujian Californian Air Board Standard (CARB), sebuah makmal yang dibina khusus untuk ujian pelepasan formaldehid. Makmal ini akan meneruskan skim akreditasi yang sesuai bagi menyediakan khidmat ujian produk-produk kayu dalam memenuhi keperluan pelanggan pada tahun-tahun yang akan datang. Bersama-sama 10 makmal yang telah memperoleh akreditasi ISO/IEC 17025 yang lain, FRIM mampu memenuhi keperluan khidmat ujian industri pemrosesan kayu-kayan dengan lebih berkesan. Di samping itu, makmal-makmal ini juga akan mengambil tindakan sewajarnya bagi meningkatkan skop ujian dengan memasukkan ujian-ujian lain sebagai mematuhi keperluan seperti CE *marking*, Lacey Act dan lain-lain.

Kini terdapat enam makmal dari Bahagian Bioteknologi Hutan dan Bahagian Hasil Semula Jadi yang telah memperoleh akreditasi status BioNexus Partners (BNP). Makmal-makmal tersebut ialah Makmal Kultur Tisu, Makmal Genetik, Makmal Fitokimia, Makmal Pembangunan Produk Herba, Makmal Farmakognosi dan Makmal Teknologi Herba. Program BNP bertujuan untuk menyokong keperluan industri bioteknologi Malaysia dalam menyediakan kemudahan-kemudahan penyelidikan berteknologi tinggi, prasarana dan juga keupayaannya. Satu Sesi Jaringan Bionexus Partners (BNP) tentang Pertanian dan Bioteknologi Perindustrian bertajuk "Science to Business : FRIM's Contributions" anjuran bersama FRIM dan Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) telah diadakan pada

vulnerable species. To reach out to more people, several subjects were published in the form of coffee table books that would have greater appeal. -

I would like to congratulate FRIM for the various awards received particularly: The BrandLaureate Awards 2010–2011 for the Best Brand in Forestry—Environment Conservation; the Celebrity Education Award 2011 in recognition of the institute's continuous efforts in sharing knowledge and experience, and in promoting public awareness of the importance of natural forest and environment conservation; and the International Socrates Award for Best Enterprise (Applied Research and Scientific Achievements) Category 2011 from the European Business Assembly (EBA) at The Oxford Summit of Leaders. The Board would like to applaud FRIM's Director General, Y Bhg Dato' Dr Abd Latif Mohmod, for having been given the European Manager of the Year Award 2011 also by the European Business Assembly.

Development

To serve the forest-based industries, the Board encourages the research laboratories, besides conducting R&D, to accredit their testing facilities to meet the respective international standards. The Board acknowledges the successful launching of the Californian Air Resources Board (CARB) Testing Laboratory, a purpose-built laboratory for testing formaldehyde emission based on the Californian Air Board Standard. This laboratory shall be pursuing the necessary accreditation scheme for the necessary testing of wooden products to meet the customers' requirements in the years to come. Together with the other ten ISO 17025 accredited laboratories, FRIM will be able to serve the testing needs of the timber processing industries more effectively. In addition, these laboratories will also take the necessary actions to increase their testing scopes to include other tests to meet the increasing requirements or compliance such as the CE marking and the Lacey Act.

There are now six laboratories have been accredited the BioNexus Partners (BNP) status. The laboratories are Tissue Culture Laboratory and Genetic Laboratory (Forestry Biotechnology Division) and Phytochemistry Laboratory, Herbal Product Development Laboratory, Pharmacognosy Laboratory and Herbal Technology Laboratory (Natural Product Division). The BNP programme is aimed at supporting the needs of Malaysia's biotechnology industry for high-end research facilities, infrastructure and capabilities. A BioNexus Partners (BNP) Networking Session on Agricultural and Industrial Biotechnology themed "Science to Business: FRIM's Contributions" was jointly held by FRIM and Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) on 26 July in FRIM. Among the

26 Julai di FRIM. Antara objektif sesi jaringan ini adalah untuk mewujudkan platform bagi menyebarkan maklumat tentang perkhidmatan, peralatan, kemudahan yang terdapat di makmal-makmal BNP, untuk meningkatkan penggunaannya serta menggalakkan kerjasama antara industri dan makmal-makmal BNP FRIM serta potensi komersialisasi produk bioteknologi.

Hala tuju masa depan

Pihak Lembaga, bersama-sama dengan pihak Pengurusan, sentiasa melangkah ke hadapan seiring dengan perkembangan semasa bagi memastikan aktiviti R&D adalah relevan dengan isu-isu dan keperluan pihak-pihak berkepentingan. Isu perubahan iklim pula perlulah diambil perhatian dalam merancang aktiviti-aktiviti R&D baik hulu mahupun hiliran. Potensi penggunaan biojisim daripada pengusahaan hutan/perladangan, bahan buangan industri kayu dan produk berasaskan kayu yang dijadikan produk komposit bernilai tambah, produk tenaga dan bio-bahan api (biofuel) merupakan antara perkembangan teknologi hijau yang membanggakan untuk mengurangkan pelepasan karbon dioksida. Penghijauan produk-produk kayu adalah penting bagi menyelesaikan masalah tersebut.

Pada bulan April, satu Panel Penasihat Teknikal (TAP) telah dilantik bagi menilai aktiviti penyelidikan dan memberi cadangan-cadangan hala tuju penyelidikan ke atas Bahagian Perhutanan dan Alam Sekitar. Laporan TAP telah diteliti dan diterima oleh Lembaga. Antara syor TAP kepada Bahagian ini adalah untuk meningkatkan teknik pengusahaan yang mengurangkan kesan bagi meningkatkan penerimaan di kalangan pembalok serta pengusaha-pengusaha di lapangan; untuk menilai kesan perubahan iklim ke atas regim-regim hidrologi serta pengaruh fenomena hidrologi yang ekstrem tetapi jarang-jarang berlaku ke atas alam sekitar dan manusia dengan menggunakan data hidrologi dan meteorologi sedia ada (>20 tahun) yang diperoleh di Bukit Tarek Experimental Watershed; untuk meningkatkan skala penemuan penyelidikan yang diperoleh daripada petak-petak penyelidikan atau kawasan tadahan kecil kepada kawasan tadahan yang lebih besar menggunakan teknologi GIS; serta untuk meneroka potensi *unmanned aerial vehicle* (UAV) bagi penyelidikan dalam penderiaan jauh menerusi kerjasama dengan Agensi Penderiaan Jauh Malaysia dan universiti.

Penghargaan

Pertamanya saya ingin merakamkan ucapan terima kasih yang tulus ikhlas kepada YB Dato Sri Douglas Uggah Embas, Menteri NRE di atas pelantikan semula saya sebagai Pengerusi Lembaga untuk penggal kedua. Saya harap dengan sokongan padu dan komitmen yang tinggi daripada semua ahli Lembaga, kita mampu untuk memacu FRIM ke arah yang lebih baik.

objectives of this Networking Session were to create a platform to disseminate information on the services, equipment, facilities available in these BNP laboratories; to increase the utilization of these services, equipment, facilities, and to encourage R&D collaborations between the industry and FRIM's BNP laboratories and potential commercialization of biotechnology products.

Future direction

The Board, together with the management, has always striven to ensure that FRIM's R&D activities are relevant to emerging issues and demands from its stakeholders. Responding to the issue on climate change, both the upstream and downstream R&D should be geared towards addressing this concern. The potential utilization of biomass from forest/plantation harvesting, timber industry wastes and decommissioned timber-based products for value-added composite products, energy products and bio-fuel is a remarkable green technology development to reduce carbon dioxide emission. Greener and greening of timber products are important to provide the edge and to realise the premium for timber from sustainably managed Malaysian forests and plantations.

In April, a Technical Advisory Panel (TAP) was also organized. The meeting was held to assess the research activities and provide suggestions on the way forward for the Forestry and Environment Division. The report of the TAP was reviewed and accepted by the Board. Among its recommendations was for the division to fine-tune the reduced impact harvesting technique so as to increase the acceptance among loggers and operators in the field; to evaluate the impacts of climate change on the hydrological regimes and the influence of extreme but rare hydrological events on the environment and human beings using the existing long term (>20 years) hydrological and meteorological data collected at Bukit Tarek Experimental Watershed; to upscale research findings obtained from small plots or catchments to a larger watershed by incorporating GIS technology; and to explore the potential of Unmanned Aerial Vehicle (UAV) for remote sensing research in collaboration with the Agency of Remote Sensing Malaysia (ARSM) and universities.

Acknowledgement

First and foremost, I wish to express my sincere gratitude to YB Datuk Douglas Uggah Embas, Minister of NRE, for re-appointing me as Chairperson of the Board for a second term. I hope with the full support and commitment from all the Board members, we will be able to steer FRIM towards greater heights.

Selaku Pengerusi Lembaga, saya ingin menyampaikan ucapan terima kasih kepada Datuk Azyiah Mohamed, Dato' Razani Ujang, Dr Chan Heun Yin, Datu Hj Len Talif Salleh dan Tuan Hj Mohd Daud Tampokong yang telah memberikan komitmen yang tinggi dan kerjasama yang padu semasa menjadi ahli MFRDB. Pada masa yang sama, saya mengalu-alukan pelantikan ahli-ahli Lembaga yang baharu iaitu Dato' Dr Hj Abdul Rahman Hj Abdul Rahim, Tuan Hj Ali Yusop, En Gregory Mosigil dan Dato' Dr Mohd Nazlee Kamal. Dengan gabungan ahli-ahli Lembaga yang baru dilantik serta ahli yang dilantik semula, Lembaga akan terus memacu serta menyokong FRIM menjadi institusi penyelidikan hutan tropika yang terunggul di dunia.

Bagi pihak Lembaga, saya ingin mengucapkan tahniah kepada pihak pengurusan serta para penjawat awam FRIM di atas pencapaiannya pada tahun ini serta ucapan terima kasih saya di atas komitmen dan usaha yang tidak berbelah bagi yang telah ditunjukkan menerusi prestasi yang sungguh memberangsangkan.

As Chairperson of the Board, I wish to thank YB Dato' Dr James Dawos Mamit, En Wan Farisan Wan Sulaiman, Puan Adena Ahmad, Dato' Razani Ujang, Tuan Hj Osman Hj Kasim, En Choong Kian Kee, Dr Chan Heun Yin, Tuan Hj Mohd Daud Tampokong, Datu Hj Len Talif Salleh and Dr Rita Manurung for their commitment and close cooperation extended during their tenure as members of the Board. At the same time, I wish to welcome the appointment of new Board members: Dato' Dr Hj Abdul Rahman Hj Abdul Rahim, Dato' Masran Md. Salleh, Pn Hj Norchahaya Hashim, En Teoh Tian Wen, En Gregory Mosigil and Tuan Hj Ali Yusop. With these newly appointed and re-appointed members, the Board will guide and support FRIM in its endeavour to be the premier tropical forest research institution in the world.

On behalf of the Board, I would like to congratulate the management and staff of FRIM for this year's accomplishments and extend my thanks for their commitment and exceptional efforts shown in their outstanding performance.



YB PUAN/MADAM HAJAH NANCY HJ SHUKRI
KMN, AMN
PENGERUSI/CHAIRPERSON, MFRDB

Pengerusi/Chairman

YB PUAN/MDM HAJAH NANCY HJ SHUKRI
KMN, AMN

Ahli dan Ahli Silih Ganti

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EN/MR WAN FARISAN WAN SULAIMAN
Ahli silih ganti/Alternate member)

Jabatan Perhutanan Semenanjung Malaysia (JPSM) Forestry Department of Peninsular Malaysia

DATO' RAZANI UJANG
DIMP, SSA
(Sehingga 31 Ogos 2011)
(Until 31 August 2011)

DATO' DR HJ ABDUL RAHMAN HJ ABDUL RAHIM
DIMP, ANS
(Dari 1 Oktober 2011)
(From 1 October 2011)

DATO' MASRAN MD SALLEH
BSK, BCM, ANS, DPMP, AMN
(Dari 1 Oktober 2011)
(From 1 October 2011)
(Ahli silih ganti/Alternate member)

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PROF MADYA/ASSOC PROF DR JALALUDDIN HARUN

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(Sehingga 31 Ogos 2011)
(Until 31 August 2011)
(Ahli silih ganti/Alternate member)

PUAN/MDM HJH NORCHAHAYA HASHIM
(Dari 1 Oktober 2011)
(From 1 October 2011)
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Malaysian Panel-Products Manufacturer's Association (MPMA)

DATO' SHEIKH OTHMAN SHEIKH ABDUL RAHMAN
DIMP, JP

EN/MR CHOONG KIAN KEE
(Sehingga 30 September 2011)
(Until 30 September 2011)
(Ahli silih ganti /Alternate member)

EN/MR TEOH TIAN WEN
(Dari 1 Oktober 2011)
(From 1 October 2011)
(Ahli silih ganti /Alternate member)

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Persatuan Pengusaha Kayu-Kayan dan Perabot Bumiputera Malaysia (PEKA)

Association of Malaysian Bumiputera Timber and Furniture Entrepreneurs

TUAN/MR HJ IR WAHID JAAFAR

TUAN/MR HJ HANAFEE YUSOFF, SMK
(Ahli silih ganti/Alternate member)

Lembaga Getah Malaysia (LGM) Malaysian Rubber Board

DR CHAN HEUN YIN
JSM
(Sehingga 30 September 2011)
(Until 30 September 2011)

Kementerian Sains, Teknologi dan Inovasi

Ministry of Science, Technology and Innovation (MOSTI)

PROF DATO' DR MOHAMED ISA ABD MAJID
DSPN

Pejabat Pembangunan Negeri Selangor
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DATUK HJ ABDUL GHANI SALLEH
DMSM, KMN, SMS, AMS, PPT

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia (FRIM)

DATO' DR ABD LATIF MOHMOD
DIMP, JSM, KMN, AMN

Yayasan Sabah
Sabah Foundation

TUAN/MR HJ MOHD DAUD TAMPOKONG
(Sehingga 28 Februari 2011)
(Until 28 February 2011)

EN/MR GREGORY MOSIGIL
(Dari 1 Oktober 2011)
(From 1 October 2011)

Jabatan Perhutanan Sarawak
Sarawak Forestry Department

DATU HJ LEN TALIF SALLEH
DJBS, PPB, PBK
(Sehingga 31 Mac 2011)
(Until 31 Mac 2011)

TUAN HJ ALI YUSOP
PPC, PBK, PPB, PPS
(Dari 1 Oktober 2011)
(From 1 October 2011)

EN/MR ABANG MOHD MOHTAR ABANG PAWOZAN
(Ahli silih ganti/Alternate member)

Pejabat Setiausaha Kerajaan Negeri Selangor
Selangor State Secretary Office

DATO' NOORDIN SULAIMAN
DPMS, SIS

Pusat Kepelbagaian Biologi Sarawak
Sarawak Biodiversity Centre (SBC)

DR RITA MANURUNG
PPB, PBK

Malaysian Technology Corporation Sdn Bhd

DATO' DR MOHD NAZLEE KAMAL
DIMP
(Dari 15 Disember 2011)
(From 15 December 2011)



Pengerusi/Chairman

YB PUAN/MDM HAJAH NANCY HJ SHUKRI
KMN, AMN



DATUK AZIYAH MOHAMED
PMW, DNS, ANS, DBNS



EN/MR ZURAIDI HUSAIN



DATO' DR HJ ABDUL
RAHMAN HJ ABDUL RAHIM
DIMP, ANS



PROF MADYA/ASSOC PROF
DR JALALUDDIN HARUN



DATO' SHEIKH OTHMAN
SHEIKH ABDUL RAHMAN
DIMP, JP



EN/MR NG KAY YIP



TUAN/MR HJ IR WAHID
JAAFAR



DR CHAN HEUN YIN
JSM



PROF DATO' DR MOHAMED
ISA ABD MAJID
DSPN



DATUK HJ ABDUL GHANI
SALLEH
DMSM, KMN, SMS, AMS, PPT



EN/MR GREGORY MOSIGIL



TUAN HJ ALI YUSOP
PPC, PBK, PPB, PPS



DATO' NOORDIN SULAIMAN
DPMS, SIS



DR RITA MANURUNG
PPB, PBK



DATO' DR MOHD
NAZLEE KAMAL
DIMP



DATO' DR ABD LATIF MOHMOD
DIMP, JSM, KMN, AMN

JAWATANKUASA KEWANGAN DAN PERJAWATAN (JKKP)

FINANCE AND ESTABLISHMENT COMMITTEE

Pengerusi Chairman

YB PUAN/MDM HAJAH NANCY HJ SHUKRI
KMN, AMN

Ahli dan Ahli Silih Ganti Members and Alternate Members

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

DATUK AZIYAH MOHAMED
PMW, DNS, ANS, DBNS

PUAN/MDM ZURINAH PAWANTEH
(Ahli silih ganti/Alternate member)

Kementerian Kewangan Ministry of Finance (MOF)

EN/MR ZURAIMI HUSAIN

EN/MR WAN FARISAN WAN SULAIMAN
(Ahli silih ganti/Alternate member)

Jabatan Perhutanan Semenanjung Malaysia (JPMS) Forestry Department of Peninsular Malaysia

DATO' RAZANI UJANG
DIMP, SSA
(Sehingga 31 Ogos 2011)
(Until 31 August 2011)

DATO' DR HJ ABDUL RAHMAN HJ ABDUL RAHIM
DIMP, ANS
(Dari 1 Oktober 2011)
(From 1 October 2011)

DATO' MASRAN MD SALLEH
BSK, BCM, ANS, DPMP, AMN
(Dari 1 Oktober 2011)
(From 1 October 2011)
(Ahli silih ganti/Alternate member)

Persatuan Industri Kayu-Kayan Malaysia Malaysian Wood Industries Association (MWIA)

EN/MR NG KAY YIP

EN/MR PON CHIA HWEE
(Ahli silih ganti/Alternate member)

Lembaga Getah Malaysia (LGM) Malaysian Rubber Board

DR CHAN HEUN YIN
JSM
(Sehingga 30 September 2011)
(Until 30 September 2011)

Institut Penyelidikan Perhutanan Malaysia Forest Research Institute Malaysia (FRIM)

DATO' DR ABD LATIF MOHMOD
DIMP, JSM, KMN, AMN

Pengerusi/Chairman

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

DATUK AZIYAH MOHAMED
PMW, DNS, ANS, DBNS

PUAN/MDM ZURINAH PAWANTEH
(Ahli silih ganti/Alternate member)

Ahli dan Ahli Silih Ganti
Members and Alternate Members

Kementerian Kewangan
Ministry of Finance (MOF)

EN/MR ZURAIDI HUSAIN

EN/MR WAN FARISAN WAN SULAIMAN
(Ahli silih ganti/Alternate member)

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industry Board (MTIB)

PROF MADYA/ASSOC PROF DR JALALUDDIN HARUN

TUAN/MR HJ OSMAN HJ KASIM
(Sehingga 31 Ogos 2011)
(Until 31 August 2011)
(Ahli silih ganti/Alternate member)

PN/MDM HJH NORCAHAYA HASHIM
(Dari 1 Oktober 2011)
(From 1 October 2011)
(Ahli silih ganti/Alternate member)

Persatuan Pekilang Panel Malaysia
Malaysian Panel-Products Manufacturers' Association
(MPMA)

DATO' SHEIKH OTHMAN SHEIKH ABDUL RAHMAN
DIMP, JP

EN/MR CHOONG KIAN KEE
(Sehingga 30 September 2011)
(Until 30 September 2011)
(Silih ganti/Alternate member)

EN/MR TEOH TIAN WEN
(Dari 1 Oktober 2011)
(From 1 October 2011)
(Ahli silih ganti/Alternate member)

Pejabat Pembangunan Negeri Selangor
Selangor State Development Office

DATUK HJ ABDUL GHANI SALLEH
DMSM, KMN, SMS, AMS, PPT

Pejabat Setiausaha Kerajaan Negeri Selangor
Selangor State Secretary Office

DATO' NOORDIN SULAIMAN
DPMS, SIS



**INSTITUT PENYELIDIKAN PERHUTANAN
MALAYSIA
FOREST RESEARCH INSTITUTE MALAYSIA
(FRIM)**



2011 merupakan tahun pencapaian yang memberangsangkan bagi FRIM baik di peringkat kebangsaan mahupun antarabangsa. Tahun lepas merupakan tahun yang penuh dengan pelbagai cabaran, penemuan dan pengiktirafan terhadap FRIM dalam usaha mengekalkan status sebagai salah sebuah institusi penyelidikan hutan tropika yang bertaraf dunia.

Pada suku pertama tahun tersebut, FRIM berbangga kerana terpilih sebagai penerima anugerah The BrandLaureate 2010–2011 bagi Penjenamaan Terbaik dalam Perhutanan–Pemuliharaan Alam Sekitar di atas ketekalan prestasi dan pencapaiannya. Pada 12 Disember, FRIM turut dianugerahi *International Socrates Award* bagi *Best Enterprise (Applied Research and Scientific Achievements) Award 2011* daripada the *Europe Business Assembly (EBA)* di *The Oxford Summit of Leaders* di atas kebolehpercayaan, ketekalan dan kecemerlangan pencapaian serta profesionalisme dalam melaksanakan penyelidikan dan pembangunan bidang

2011 was marked by another year of significant moments for FRIM at both international and national platforms. It has been a year of challenge, discovery and recognition for FRIM in pursuit of becoming a world-class research institution in tropical forestry.

In the first quarter of the year, FRIM was honoured to be the recipient of the BrandLaureate Awards 2010–2011 for the Best Brand in Forestry—Environment Conservation, for its consistent performance and achievements. On 12 December, FRIM also was rewarded with the 2011 International Socrates Award for Best Enterprise (Applied Research and Scientific Achievements) from the Europe Business Assembly (EBA) at The Oxford Summit of Leaders for its reliability, consistency and excellence of achievement as well as professionalism in conducting tropical forestry and forest products research and development. For its efforts in promoting public awareness of the importance of natural forest and environment conservation, FRIM was presented with the Celebrity Brand Award for Celebrity Education on 25 November.

perhutanan tropika dan hasil hutan. Usaha-usaha FRIM dalam menggalakkan kesedaran awam terhadap kepentingan pemuliharaan hutan semula jadi dan alam sekitar diiktiraf menerusi *Celebrity Brand Award* bagi kategori *Celebrity Education* pada 25 November.

FRIM telah dilantik oleh PT Mutuagung Lestari, Indonesia sebagai *Californian Air Resource Board (CARB)-approved third-party certifier* bagi khidmat ujian pelepasan formaldehid. Sehubungan dengan itu, satu memorandum persefahaman (MoU) telah ditandatangani antara MFRDB dan PT Mutuagung Lestari ke arah mendapatkan pensijilan antarabangsa, memastikan pengharmonian prosedur piawai pengujian serta silang-periksa antara makmal-makmal bagi meningkatkan mutu perkhidmatan dan pembinaan keupayaan antara kedua-dua belah pihak. Dengan sebuah lagi makmal—Makmal Mikologi Kayu menyertai sembilan makmal di FRIM berjaya memperoleh akreditasi MS ISO/IEC 17025 pada 2011, FRIM dipacu ke arah membantu industri perkayuan Malaysia dalam memastikan pematuhan produk bagi pasaran tempatan dan luar negara. Pusat Kecemerlangan Bionexus Partners (BNP) di FRIM yang dilancarkan bagi pembangunan produk semula jadi mengandungi enam makmal dan unit khusus dalam penyelidikan dan pembangunan produk berasaskan herba dan bioteknologi perhutanan. Makmal-makmal dan unit-unit yang terpilih ini akan menjadi sumber rujukan dan pusat setempat bagi industri dengan kelengkapan, prasarana dan perkhidmatan penyelidikan berteknologi tinggi.

Sebagai sebuah institusi penyelidikan, FRIM terus menggalakkan para penyelidiknya untuk melahirkan idea-idea dan reka cipta baharu. Saya ingin menyampaikan penghargaan kepada semua yang telah berusaha keras dan berjaya mendapat sejumlah 35 pendedahan reka cipta, 10 pemfailan paten, empat reka bentuk industri dan satu perjanjian pelesenan. FRIM turut memenangi pingat-pingat di Pameran Reka Cipta, Inovasi dan Teknologi (ITEX) Antarabangsa ke-22 dan Ekspo Teknologi Malaysia ke-10 (MTE). Di ITEX, FRIM berjaya memperoleh empat pingat emas dan satu pingat perak. Inovasi yang menang termasuklah “Development of *Ocimum basilicum* Leaf Standardized Extract”, “Development of *Ocimum sanctum* Leaf Standardized Extract”, “High Combustion Rice Straw Pellet”, “Entertainment-ready Arbor Seat” dan “Cardiac Glycoside Constituents from *Rauvolfioideae* with Novel Anti-Ovarian Cancer Property”. Di MTE, inovasi yang memenangi satu pingat emas, dua perak dan empat gangsa ialah “Potential Biocides from Local Weeds”, “Combating Superbug from *Fagaceae* sp.”, “Improvement of Old Corrugated Carton via Mechanical Treatment”, “Acoustical Arbor Seat”, “Pelletizing of Rice Straws – Potential Solid Fuel from Agricultural Residues”, “Versatile Charcoal Briquetting Machine” dan “Intelligent Classification System for Agarwood Using k-NN”.

FRIM has been appointed by PT Mutuagung Lestari, Indonesia, as a Californian Air Resource Board (CARB)-approved third-party certifier to provide formaldehyde release testing services. In conjunction with this, a Memorandum of Understanding (MOU) was signed between FRIM and PT Mutuagung Lestari towards obtaining international certification, ensuring harmonization of the standard testing procedures, cross-checking between laboratories to increase service quality and capacity building between both parties. With five more laboratories, namely Wood Lamination, Furniture Testing, Timber Engineering, Wood Drying, and Wood Finishing, being accredited with MS ISO/IEC 17025, FRIM is geared towards further assisting the Malaysian wood industry in ensuring product compliance for local and overseas markets. The BioNexus Partners (BNP) Centre of Excellence in FRIM that was launched for the development of natural product consists of six laboratories and units specializing in the research and development (R&D) of herbal-based products. These selected laboratories and units will become the reference and one-stop centre for the industry with high-end research facilities, infrastructure and services.

As a research institution, FRIM constantly encourages its researchers to conceive new ideas and inventions. I would like to express my appreciation to all those who have endeavoured in this quest that led to a total of 35 invention disclosures, 10 patents filing, four (4) industrial designs granted and one licensing agreement. Medals were also won in the 22nd International Invention, Innovation and Technology Exhibition (ITEX), and the 10th Malaysia Technology Expo (MTE). In the ITEX, FRIM clinched four (4) gold medals and one (1) silver medal. The winning products were “Development of *Ocimum basilicum* Leaf Standardized Extract”, “Development of *Ocimum sanctum* Leaf Standardized Extract”, “High Combustion Rice Straw Pellet”, “Entertainment-ready Arbor Seat” and “Cardiac Glycoside Constituents from *Rauvolfioideae* with Novel Anti-Ovarian Cancer Property”. For the MTE, the works that won one gold, two silver and four bronze medals were “Potential Biocides from Local Weeds”, “Combating Superbug from *Fagaceae* sp.”, “Improvement of Old Corrugated Carton via Mechanical Treatment”, “Acoustical Arbor Seat”, “Pelletizing of Rice Straws – Potential Solid Fuel from Agricultural Residues”, “Versatile Charcoal Briquetting Machine” and “Intelligent Classification System for Agarwood Using k-NN”.

In May, FRIM received the Consolation Prize of the National Intellectual Property Award (AHIN)—an award that accords recognition to inventors for their contributions to the socio-economic development of the country. In addition, FRIM was credited for achieving the 5-Star ranking in the Malaysian Government Portals and Websites Assessment (MGPWA), besides emerging

Pada bulan Mei, FRIM menerima Hadiah Sagu Hati bagi Anugerah Harta Intelek Negara—anugerah yang memberi pengiktirafan kepada para pereka cipta yang telah menyumbang kepada pembangunan sosioekonomi negara. FRIM turut memperoleh lima bintang dalam Penilaian Portal dan Laman Sesawang Kerajaan Malaysia, di samping muncul sebagai pemenang Penarafan Bintang peringkat NRE berdasarkan kriteria Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU) dalam mengukur prestasi agensi sektor awam.

Pada tahun ini, FRIM berjaya memperoleh sejumlah RM4.6 juta dengan 26 projek R&D baharu daripada agensi-agensi penaja dari dalam dan luar negara untuk meningkatkan lagi pengetahuan serta bidang sains perhutanan. Dengan adanya penyelidik yang berkebolehan dan berpengalaman, FRIM terus membuktikan kepentingan kewujudannya dalam industri berkaitan hutan. Kepakaran penyelidikannya diiktiraf di seluruh negara oleh pihak-pihak yang berkepentingan dari agensi kerajaan dan sektor swasta menerusi 47 khidmat perundingan bernilai hampir RM2 juta. Kerjasama dengan pihak-pihak berkepentingan merupakan laluan yang paling penting ke arah meningkatkan aktiviti R&D. Sebanyak 18 kerjasama penyelidikan telah ditandatangani (12 memorandum persefahaman, lima perjanjian dan satu surat nyata hasrat) antara MFRDB dan pelbagai pihak berkepentingan bagi memenuhi keperluan semasa pihak industri; dalam masa yang sama memperkasa keupayaan R&D.

Kerjasama penyelidikan bukan sahaja membolehkan pelaksanaan program pemindahan teknologi malah juga merupakan satu platform ke arah jalinan kerjasama yang dapat menggalakkan persefahaman dan perhubungan yang lebih baik di kalangan pihak-pihak berkepentingan. Stesen Penyelidikan FRIM (SPF) Pasoh telah menarik minat para penyelidik dalam ekologi hutan tanah pamah tropika seawal tahun 1970-an kerana kekayaan dan ciri kepelbagaian flora semula jadinya. Dua kajian jangka panjang yang telah dijalankan di Pasoh ialah Projek Kerjasama Penyelidikan FRIM/STRI/CTFS-AA (sejak 1985) dan Projek Kerjasama Penyelidikan FRIM/NIES/UPM/FDPM/UTM (sejak 1991). Usaha menjalankan kerjasama penyelidikan yang pertama bertujuan untuk mengumpul data jangka panjang mengenai pokok hutan bagi memahami dengan lebih mendalam tentang dinamik ekologi hutan tropika, manakala projek kedua bertujuan untuk memahami impak semula jadi dan antropogen perubahan iklim terhadap sumber-sumber hutan tropika. FRIM berjaya mendapatkan tiga lagi projek kerjasama antarabangsa pada 2011 setelah menamatkan dengan jayanya projek tajaan ITTO-CITES tentang Penderiaan Jauh Hiperspektra bagi Pemetaan *Gonystylus bancanus* (ramin) pada 2010. Ketiga-tiga projek tersebut bernilai melebihi RM 1 juta dijangka akan disempurnakan pada tahun 2014 dengan fokus kepada isu-isu REDD+ (Reducing Emissions from Deforestation and Forest Degradation), anggaran biojisim, penilaian stok karbon dan perubahan iklim. Kolaborator dan

as the winner of the Ministry of Natural Resources and Environment's (NRE) Star Rating based on the Malaysian Administrative Modernization and Management Planning Unit (MAMPU) criteria for measuring the performance of public sector agencies.

This year, FRIM secured a total to RM4.6 million with 26 new R&D projects approved by various national and international funding agencies for the advancement of knowledge and science in forestry. With knowledgeable and experienced researchers, FRIM has continued to demonstrate its relevance to forest-related industries. The expertise of its researchers was recognized nationwide by stakeholders from government agencies and the private sector with 47 consultancies being conducted worth close to RM2 million. As 'No man is an island', so collaboration with stakeholders is an essential pathway for the enhancement of R&D activities. There were 18 research collaborations signed (12 MoUs, five agreements and one letter of intent) by MFRDB and various stakeholders to meet the current needs of the industry while strengthening R&D capacities.

Research collaborations not only allow the transfer of technology but also provide an excellent platform for networking that promotes better understanding and friendship among the stakeholders. The Pasoh Research Forest (SPF) has attracted a lot of interest in lowland tropical ecology research since the early 1970s due to its rich and natural floristic diversity. Two long-term collaborative studies being carried out at Pasoh are the FRIM/STRI/CTFS-AA Joint Research Project (since 1985) and the FRIM/NIES/UPM/FDPM/UTM Joint Research Project (since 1991). The former collaboration effort strives to collect long-term data on forest trees (growth, mortality, recruitment) in order to better understand the ecological dynamics of tropical forests, whereas the latter aims to understand the natural and anthropogenic impacts of climate changes on tropical forest resources. FRIM had successfully obtained another three international collaboration projects in 2011 upon successful completion of the international ITTO-CITES funded project on hyperpectral remote sensing for *Gonystylus bancanus* (ramin) mapping in 2010. The three projects, worth more than RM1 million, are to be completed in 2014 with focus on REDD+ (Reducing Emissions from Deforestation and Forest Degradation), biomass estimation, carbon stock assessment and climate change issues. The international collaborators and donor agencies are the Forestry and Forest Products Research Institute (FFPRI), Japan, the Asia Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet), Institute of Forest Resource Information Techniques, Chinese Academy of Forestry (IFRIT), China, and the Japan Aerospace Exploration Agency (JAXA).

agensi penaja antarabangsa termasuklah Forestry and Forest Product Research Institute (FFPRI), Jepun, the Asia Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet), Institute of Forest Resource Information Techniques (IFRIT), Chinese Academy of Forestry (CAF), China dan the Japan Aerospace Exploration Agency (JAXA).

FRIM memainkan peranan penting dalam perhubungan dan penyebaran hasil-hasil R&D berkaitan perhutanan kepada pihak-pihak berkepentingan termasuklah kepada orang awam. FRIM menyalurkan maklumat-maklumat tersebut menerusi pelbagai seminar, persidangan, kursus, dialog, ceramah teknologi dan lain-lain. Salah satu daripadanya ialah the International Symposium on Cost and Benefits of REDD Plus yang bertema "What, Who, How and When?". Bersempena dengan seminar tersebut, FRIM dan Hiroshima University telah menandatangani satu MoU untuk penyelidikan dan kerjasama jangka panjang. Sesi Jaringan Kerjasama BioNexus Partners (BNP) tentang Pertanian dan Bioteknologi Perindustrian yang bertema "Science to Business: FRIM's Contributions" juga telah dianjurkan oleh FRIM dan Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) khusus untuk mempromosi makmal BNP FRIM.

Seminar lain anjuran FRIM termasuklah Seminar Kebangsaan bagi Projek-Projek Penyelidikan dan Pembangunan di Hutan Pesisir Pantai Malaysia yang diadakan pada 7–8 Jun. Seminar ini menekankan mengenai dapatan daripada projek ini dalam pengumpulan dan penyebaran maklumat baharu tentang hutan bakau, penemuan terkini yang boleh diguna pakai di lapangan serta mengenal pasti masalah-masalah dalam melaksana dan menentukan hala tuju masa depan R&D. Kursus tentang "Technology for Standardization of Medicinal Plants and Quality Enhancement of Herbal Products 2011" merupakan salah satu cara untuk memperkenalkan kepakaran, kaedah baharu, penemuan saintifik dan teknologi FRIM dengan memberi kesedaran bagi meningkatkan mutu produk herba tempatan yang berpotensi untuk menembusi pasaran dunia.

Untuk perkongsian ilmu dengan lebih ramai peserta, FRIM telah menyertai 25 pameran yang diadakan di dalam negara. Gerai pameran FRIM memenangi tempat kedua dalam "Malaysian International Commodity Conference and Showcase (MICCOS) 2011" dan juga Anugerah Reka Bentuk dan Hiasan Gerai Pameran bersempena dengan pertandingan Hiasan Kreatif dan Gerai Terbaik NRE. FRIM turut mendapat liputan meluas daripada pihak media bukan sahaja dalam perkongsian hasil-hasil penyelidikan malah juga cabaran-cabaran dalam usahanya mencapai kejayaan. Dengan perhubungan yang baik dengan pihak media, bilangan artikel/laporan berita dan rencana tentang FRIM dalam media cetak dan penyiaran pada 2011 berjumlah 186, dengan anggaran Nilai Perhubungan Awam RM5.6 juta.

FRIM plays an important role in communicating and disseminating R&D findings to its stakeholders including the general public on all forestry matters. FRIM has therefore channelled such knowledge through numerous seminars, conferences, courses, dialogues, technology talk and others. One of these was the International Symposium on Cost and Benefits of REDD Plus themed "What, Who, How and When?". In conjunction with the seminar, FRIM and Hiroshima University signed a MoU for the purpose of long-term research and collaboration. Meanwhile, the BioNexus Partners (BNP) Networking Session on Agricultural and Industrial Biotechnology themed "Science to Business: FRIM's Contributions" was jointly organized by FRIM and Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) mainly to promote FRIM's BNP laboratories. Other seminars that were hosted by FRIM included the National Seminar on Research & Development (R&D) Projects for Coastal Forests in Malaysia which was held on 7–8 June. The seminar emphasized the results of this project in the collection and dissemination of new information on mangrove forest, current findings that can be applied in the field, and identified problems in implementing and determining the direction of future R&D. There was also a course on "Technology for Standardization of Medicinal Plants and Quality Enhancement of Herbal Products 2011" which acted as an avenue to introduce FRIM's expertise, new methods, scientific discoveries and technologies by bringing awareness of improving the quality of local herbal products that can potentially penetrate the global market.

In view of knowledge sharing, FRIM has also participated in 25 exhibitions that were held locally to capture a larger audience. FRIM won second prize in the Malaysian International Commodity Conference and Showcase (MICCOS) 2011 and was runner-up in the Booth Design and Decoration Award in conjunction with the Natural Resources and Environment Ministry (NRE) for creative decoration and best booth competition. FRIM has earned itself substantial media coverage not only by sharing its research findings but also challenges in its attempts towards success. With enhanced relationship with the media, the number of news and feature articles/reports about FRIM from the print and broadcast media in 2011 totalled 186, with an estimated Public Relations Value of RM5.6 million.

There were also a number of activities planned to encourage public participation in appreciating and conserving the forest while enjoying its benefits. Tree planting has shown to be a popular event with the public having a total of 2427 trees planted by 22 corporate bodies. Cleaning activities, or *gotong royong*, was also a favourite activity especially among institutions of higher learning as well as non-governmental organizations (NGOs). A photography competition entitled "FRIM Natural Heritage Site" was held in conjunction with the International Year of Forests. It was aimed to enhance

Pelbagai aktiviti dirancang untuk menggalakkan penyertaan orang awam dalam menghargai dan memulihara hutan di samping menikmati faedah yang diperoleh daripadanya. Penanaman pokok merupakan acara yang popular di kalangan orang awam dengan sejumlah 2427 pokok ditanam oleh 22 badan korporat. Aktiviti pembersihan atau gotong-royong juga merupakan aktiviti yang paling digemari terutama di kalangan institusi pengajian tinggi serta badan bukan kerajaan. Satu pertandingan fotografi bertajuk Tapak Warisan Semula Jadi FRIM diadakan sempena dengan Tahun Hutan Antarabangsa. Program ini bertujuan untuk meningkatkan kesedaran awam ke atas FRIM bukan sahaja sebagai sebuah institusi yang menyumbang kepada pemuliharaan hutan di rantau ini malah juga sebagai tapak warisan semula jadi negara. Pertandingan fotografi berjaya menarik sebanyak 317 peserta yang menghantar sejumlah 1304 gambar.

Pada 2011, FRIM menerbitkan sejumlah 37 judul baharu bagi menyebarkan hasil-hasil penyelidikannya kepada pihak-pihak berkepentingan dan orang awam. Antaranya ialah empat keluaran *Journal of Tropical Forest Science* (JTFS), empat keluaran *FRIM in Focus* dan Jilid kedua bagi Siri Buku Tumbuhan Berbiji dan terbitan ketiga bagi Flora Semenanjung Malaysia (semakan semula) Apocynaceae, iaitu famili kelima terbesar di Semenanjung Malaysia dengan 112 spesies daripada 35 genus. Faktor impak JTFS telah meningkat daripada 0.323 pada 2010 kepada 0.519 pada 2011, menunjukkan lebih ramai pembaca dan mereka yang berminat dengan jurnal ini. Dua buku mewah yang diterbitkan termasuklah *FRIM Through the Lenses* dan *FRIM in the Media—Celebrating 25 years of Excellence*. Buku mewah yang bertajuk *Wild Orchids of Peninsular Malaysia* mendapat sambutan yang sungguh menggalakkan kerana memaparkan gambar-gambar yang sungguh menarik serta isi kandungan yang informatif. Turut dihasilkan ialah buku *Sistem Arahan Pengurusan dan Pentadbiran FRIM* yang menjadi rujukan khusus terutamanya bagi penjawat awam FRIM. Menyahut kempen “Katakan Tidak kepada Plastik dan Polisterina”, mulai 2 Januari Kedai Buku FRIM tidak lagi menyediakan beg plastik kepada pelanggannya. Sebaliknya pelanggan diberikan sebuah beg kecil yang cantik bagi pembelian RM100 ke atas. Sejak dari itu juga Cawangan Penerbitan menggunakan sampul surat dan kotak kertas bagi khidmat pengeposannya.

Selaku Pengerusi Asia Pacific Association of Forestry Research Institutions (APAFRI), saya sangat berpuas hati dengan pelbagai pencapaian serta aktiviti yang telah dijalankan sepanjang tahun. Dengan pengalamannya dalam mengurus dan melaksanakan beberapa projek multinasional dan multi-institusi, APAFRI mengemukakan cadangan untuk mewujudkan program berkembar kepada institusi yang menjadi ahlinya terutamanya dalam penyelidikan dan pembangunan, pendidikan dan lain-lain yang berkaitan dengan perhutanan. Dana untuk projek tentang Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) telah

public awareness of FRIM both as an institution that contributes to forest conservation in the region and also as the nation's natural heritage site. The photography competition had attracted 317 participants who submitted a total of 1304 photographs.

In 2011, FRIM published a total of 37 new titles to disseminate its research findings to its stakeholders and the general public. Among these were four issues of the *Journal of Tropical Forest Science* (JTFS), four issues of *FRIM in Focus*, the second volume of the *Seed Plant Series* and third for the *Flora of Peninsular Malaysia* revised Apocynaceae, the fifth largest family in Peninsular Malaysia with 112 species from 35 genera. The impact factor of JTFS has increased from 0.323 in 2010 to 0.519 in 2011, indicating a growing interest and a larger audience. *FRIM in Focus* is a newsletter detailing the research works at FRIM in simple language. The two coffee-table books published were *FRIM through the Lenses* and *FRIM in the Media—Celebrating 25 years of Excellence*. The book entitled *Wild Orchids of Peninsular Malaysia* received an encouraging response due to not only its attractive photographs but also its informative contents. “*FRIM's Management and Administration Directive System*” was also produced as a reference especially for the staff members. Following the “No to Plastics and Polystyrene” campaign, FRIM bookstore no longer provides plastic bags to customers effective 2 January 2011. Instead customers are given free tote bag for purchases above RM100. The Publications Branch has since switched to paper envelopes and boxes for postal services.

As the Chairman of the Asia Pacific Association of Forestry Research Institutions (APAFRI), I am pleased with the achievements and activities held throughout the year. Having the experiences of managing and implementing a number of multi-national and multi-institutional projects, APAFRI proposed to establish Twinning Programmes for its member institutions primarily for forestry research and development, education, and other forestry related matters. Funding for a project on Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) has been approved and will be carried out for two years by APAFRI and Renmin University of China, Beijing. In one of its many efforts to strengthen regional collaboration, APAFRI has signed a MoU with the Korea Forest Research Institute (KFRI), Seoul with commitments that include carrying out specified projects of mutual interest and publish results of joint projects. In December, APAFRI organized an Asia Pacific workshop in Guangzhou, China where over 60 forestry researchers and academicians from 12 Asian countries participated.

Dr Lee Su See has continued to be a pride of FRIM excelling internationally and serving actively in IUFRO. Recently, in recognition of her expertise, she has been appointed as a member of a four-person panel to conduct a review of the Department of Forest Sciences, Faculty of Forestry, University of British Columbia (UBC), Vancouver,

diluluskan dan akan dijalankan oleh APAFRI dan Renmin University of China, Beijing selama dua tahun. Dalam usahanya untuk memperkasa kerjasama serantau, APAFRI telah menandatangani satu MoU dengan Korea Forest Research Institute (KFRI), Seoul untuk menjalankan projek-projek kepentingan bersama dan seterusnya menerbitkan hasil penemuan daripada projek berkenaan. Pada Disember, APAFRI menganjurkan satu bengkel Asia Pasifik di Guangzhou, China yang berjaya menarik penyertaan lebih daripada 60 penyelidik dan ahli akademik bidang perhutanan dari 12 negara Asia.

Dr Lee Su See terus mengharumkan nama FRIM dengan bergiat secara aktif di peringkat antarabangsa dan juga dalam aktiviti IUFRO. Saya juga ingin menyampaikan sekalung penghargaan kepada Dr Samsudin Musa yang mewakili Malaysia sebagai ahli kumpulan perunding (negotiation team) tentang isu-isu perhutanan di Persidangan ke-17 Parti-Parti UNFCCC, Durban, Afrika Selatan.

FRIM turut berbangga dengan pemilihan sembilan orang penyelidiknnya sebagai Expert Evaluating Panel bagi menilai Permohonan Dana R, D&C di bawah Kementerian Sains, Teknologi dan Inovasi (MOSTI). Mereka terdiri daripada Dr Khali Aziz Hamzah, Dr Ismail Harun, Dr Norwati Muhammad, Dr Ismariah Ahmad, Dr Lilian Chua, Dr Gan Kee Seng, Dr Hamdan Husin, Dato' Dr Marzalina Mansor dan Dr Lim Hin Fui. Tahniah kepada Dr Nik Musa'adah Mustapha, yang memenangi tempat kedua bagi Anugerah Pembentangan Lisan Terbaik di 10th Continuing Professional Development (CPD) Series: "Diabetes Asia 2011" Conference and Workshop di atas pembentangan yang menarik bertajuk "Protective effects of *Gynura procumbens* against glucose-induced toxicity in early diabetic retinopathy". Saya juga mengucapkan tahniah kepada Dr Khairul Awang kerana berjaya memenangi hadiah Cabaran PEMUDAH.

Dalam usaha pembinaan keupayaan penjawat awamnya, FRIM terus berusaha untuk menghasilkan penyelidik yang berkelayakan tinggi menerusi program pendidikan lepasan ijazah. Sepanjang tahun 2011, seramai 14 pegawai berjaya menamatkan pengajian dari universiti dalam dan luar negara, iaitu sembilan pemegang ijazah PhD dan lima MSc. Tahniah kepada Mastura Mohtar (Universiti Kebangsaan Malaysia), Mohd Tamizi Mustafa (Universiti Sains Malaysia), Rafeadah Rusli (University of Manchester), Mohd Rosli Haron (Universiti Putra Malaysia), Roszaini Kadir (University of Wales), Samsudin Musa (Universiti Kebangsaan Malaysia), Zaihan Jalaludin (University of Wales), Suffian Misran (University of Wales) dan Siti Aisah Shamsuddin (Universiti Teknologi Malaysia) yang berjaya menamatkan ijazah kedoktoran, dan Nor Haliyan Tan Syilan (Universiti Teknologi Mara), Suhana Rafidah Md Yusof (Universiti Kebangsaan Malaysia), Nada Badrudin (Universiti Malaya), Rafidah Abd Rahman (Universiti Malaya) dan Mohd Parid Mamat (Universiti Putra Malaysia) memperoleh ijazah sarjana.

Canada, from 9 to 11 May 2012. My appreciation goes to Dr Samsudin Musa who represented Malaysia as part of the negotiation team on forestry issues at the UNFCCC 17th Conference of Parties, Durban, South Africa.

Nine researchers have also made FRIM proud by being elected to the Expert Evaluating Panel for Evaluation of R, D & C Funding Application under the Ministry of Science, Technology and Innovation (MOSTI). They are Dr Khali Aziz Hamzah, Dr Ismail Harun, Dr Norwati Muhammad, Dr Ismariah Ahmad, Dr Lilian Chua, Dr Gan Kee Seng, Dr Hamdan Husin, Dato Marzalina Mansor and Dr Lim Hin Fui. To Dr Nik Musa'adah Mustapha, congratulations for winning the second place for the Best Oral Presentation Award at the 10th Continuing Professional Development (CPD) Series: "Diabetes Asia 2011" Conference and Workshop with her outstanding presentation on "Protective effects of *Gynura procumbens* against glucose-induced toxicity in early diabetic retinopathy". I would also like to congratulate Dr Khairul Awang for his winning entry in the PEMUDAH Challenge.

In its relentless effort in capacity building, FRIM continuously ensures well-qualified researchers are produced by pursuing post-graduate studies. Throughout the year, 14 officers successfully completed their studies from local and overseas universities. The degrees included nine PhD and five MSc holders. Congratulations to Mastura Mohtar (Universiti Kebangsaan Malaysia), Mohd Tamizi Mustafa (Universiti Sains Malaysia), Rafeadah Rusli (University of Manchester), Mohd Rosli Haron (Mohd Rosli Haron), Roszaini Kadir (University of Wales), Samsudin Musa (Universiti Kebangsaan Malaysia), Zaihan Jalaludin (University of Wales), Suffian Misran (University of Wales) and Siti Aisah Shamsuddin (Universiti Teknologi Malaysia) for obtaining their doctorate degrees, and Nor Haliyan Tan Syilan (Universiti Teknologi Mara), Suhana Rafidah Md Yusof (Universiti Kebangsaan Malaysia), Nada Badrudin (Universiti Malaya), Rafidah Abd Rahman (Universiti Malaya) and Mohd Parid Mamat (Universiti Putra Malaysia) for completing their Master's degrees.

FRIM is committed to conducting effective research and related supporting services for all clients. The institute has once again maintained the certification for MS ISO 9001:2008 and QE/5S. As part of its strategy to boost the effectiveness of related systems, a total of eight trainings which including quality and technical requirements were conducted.

After 26 years of research in tropical forestry and forest products, FRIM has emerged as an outstanding research institution gaining national and worldwide recognitions. This is proven when FRIM's ranking took an abrupt leap from 1129 in 2010 to 813 in 2011 among 4000 world-renowned research institutions according to the Ranking Web of World Research Centres. The three other Malaysian research institutions listed were World Fish Centre Pulau Pinang, Malaysia Agriculture Research and

FRIM komited untuk menjalankan penyelidikan dan khidmat sokongan berkaitan yang berkesan kepada pelanggannya. Sekali lagi institut berjaya mengekalkan pensijilan MS ISO 9001: 2008 dan QE/5S. Sebagai salah satu strategi untuk meningkatkan keberkesanannya dalam pelaksanaan sistem kualiti tersebut, sejumlah lapan latihan termasuklah latihan kualiti dan keperluan teknikal telah dijalankan.

Selepas 26 tahun menjalankan penyelidikan dalam bidang perhutanan tropika dan hasil hutan, FRIM terus muncul sebagai sebuah institusi penyelidikan terunggul yang diiktiraf di peringkat nasional dan juga antarabangsa. Ini terbukti apabila kedudukan FRIM melonjak daripada tangga 1129 pada 2010 kepada 813 daripada 4000 institusi penyelidikan terkemuka dunia yang tersenarai di dalam ranking *Web of World Research Centres* pada 2011. Sebagai perbandingan juga, WorldFish Centre Pulau Pinang berada di kedudukan 1066, MARDI tersenarai di kedudukan 2595; manakala Agensi Nuklear Malaysia (Institute of Nuclear Technology Research) berada di tempat 3908. Hanya empat (4) institusi penyelidikan di Malaysia berada di dalam senarai tersebut. Secara umumnya ini bermakna, di kalangan institusi penyelidikan perhutanan tropika, FRIM berada di kedudukan pertama di Asia dan dunia.

Penemuan-penemuan terbaharu dalam penyelidikan juga bukan sahaja telah menyumbang kepada pemuliharaan malah juga meningkatkan nilai dan faedah hutan kepada semua. FRIM akan terus menghayun langkah dengan visi bersama ke arah pengekalan sebuah institusi penyelidikan hutan tropika bertaraf dunia sebagai sebuah keluarga besar kerana “bersatu kita teguh, bercerai kita roboh”.

Development Institute (MARDI) and Institute of Nuclear Technology Malaysia ranked at 1066, 2595 and 3908 respectively. In other words, FRIM ranked first among all tropical research institutions in Asia as well as in the world. Recent research findings have not only contributed to the conservation of forest but also augmenting the values and benefits of forest. FRIM will continue to strive with a vision towards becoming a world class tropical forest research institution as a big family because “In union there is strength”.

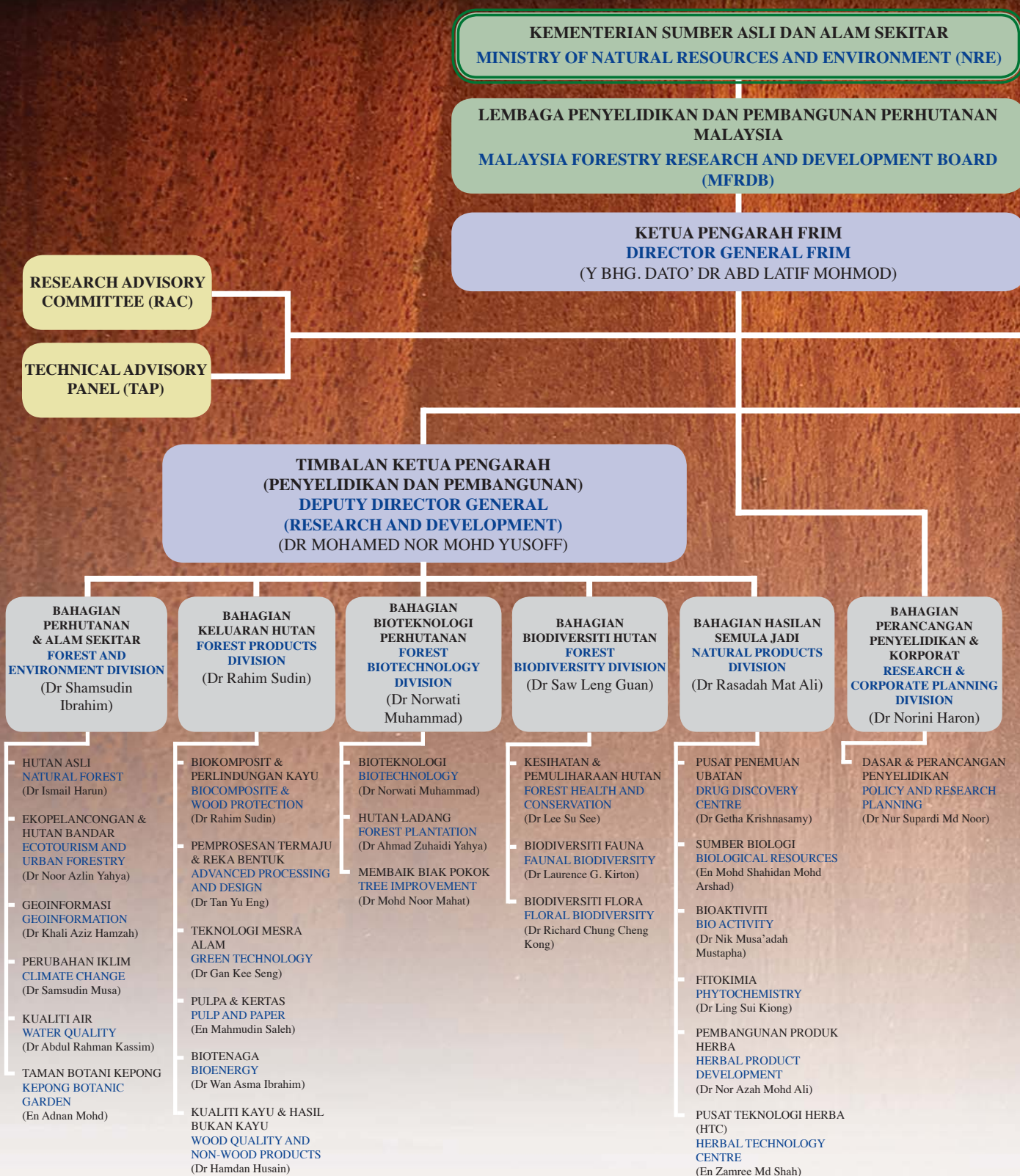


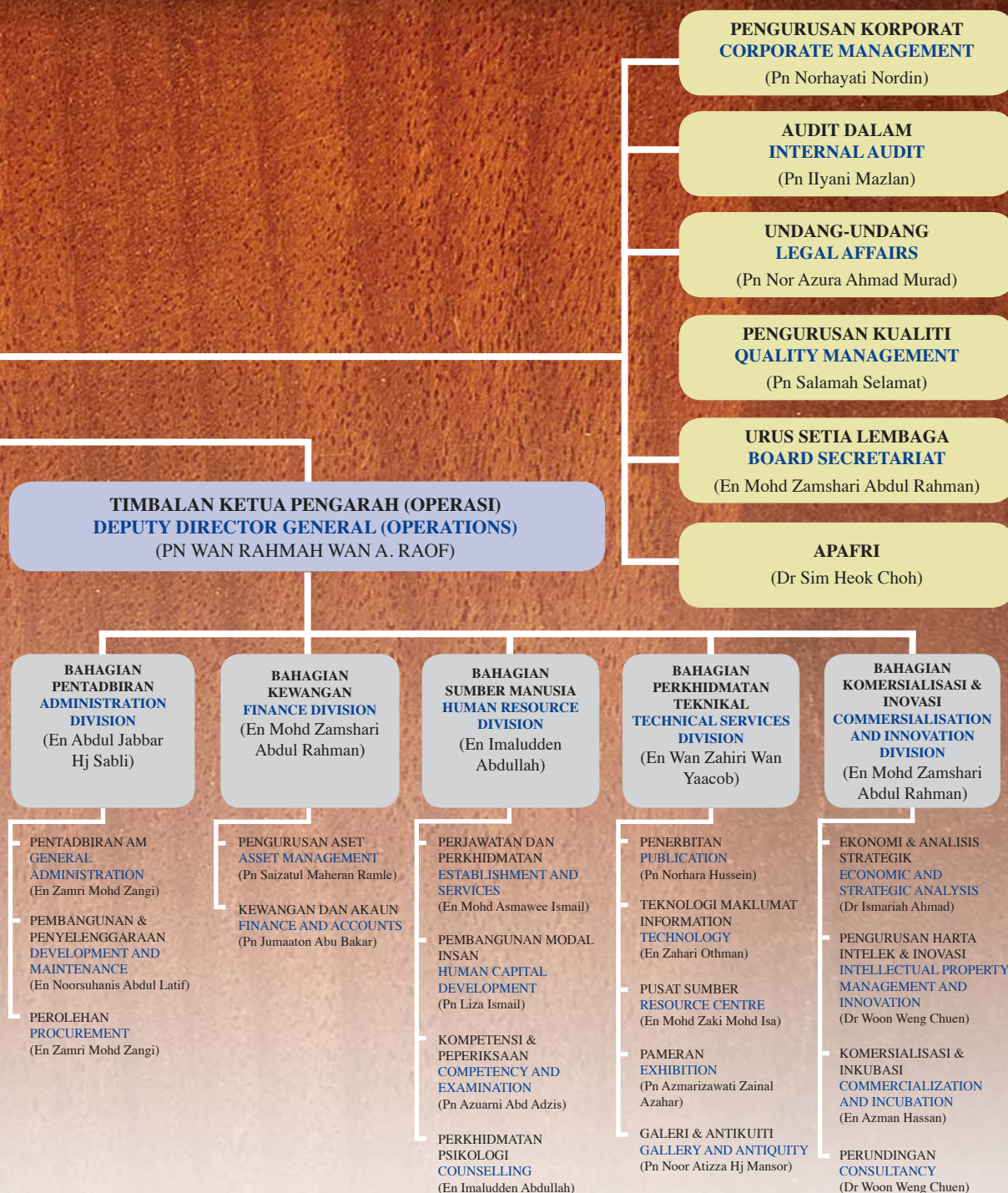
DATO' DR ABD LATIF MOHMOD
DIMP, JSM, KMN, AMN
KETUA PENGARAH/DIRECTOR GENERAL
FRIM



CARTA ORGANISASI FRIM 2011

FRIM 2011 ORGANIZATIONAL CHART





Visi

Menjadikan FRIM sebuah institusi penyelidikan hutan tropika yang bertaraf dunia

Misi

Mencapai kecemerlangan dalam penyelidikan saintifik, pembangunan dan perkhidmatan sektor perhutanan

OBJEKTIF

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

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

VISION

To make FRIM a world-class tropical forest research institute

MISION

To make FRIM a world-class tropical forest research institute

OBJECTIVES

General Objectives:

- To generate scientific knowledge for the understanding, management, conservation and use of forest resources
- To achieve excellence in research and development through the use of the latest scientific equipment
- To study biodiversity to produce useful products through intensive research and development
- To develop related technology to fulfill the needs of the forestry industry
- To package research and development findings for dissemination to clients
- To commercialize research and development findings through technology transfer to all interested parties
- To provide excellent service to fulfill client needs
- To create strategic cooperation with local and international agencies
- To raise public awareness regarding the importance of the environment and the conservation of forest biodiversity

Operational Objectives:

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

FUNGSI

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

PIAGAM PELANGGAN

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:-

- Menghasilkan 15 teknologi setahun yang berpotensi untuk ditingkatkan skala, diperintis, dikomersial atau diterima pakai bagi menyelesaikan masalah pengurusan perhutanan dan mempertingkatkan nilai ekonomi penggunaan hasil hutan
- Menghasilkan sekurang-kurangnya 85 artikel di dalam jurnal dan 20 daripadanya di dalam jurnal yang mempunyai faktor impak
- Memastikan 95% penyerahan laporan perkhidmatan kepada pelanggan dan pembayaran bil/tuntutan mengikut tempoh yang ditetapkan
- Memberi maklum balas sekurang-kurangnya 90% daripada aduan kepada pelanggan dalam tempoh lima hari bekerja dari tarikh aduan diterima
- Menjalankan 35 khidmat perundingan dan usahasama pintar dengan pihak industri dan perdagangan bagi kepakaran dan teknologi yang dimiliki
- Memastikan 11 makmal menepati standard antarabangsa dan menjadi makmal rujukan yang berwibawa (MS ISO/ IEC 17025/ Bionexus/ FIRA/ ift)

DASAR KUALITI

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.

SLOGAN KUALITI

Kualiti teras kecemerlangan
Inovasi kunci keunggulan

SLOGAN QE

Persekitaran berkualiti pemangkin kecemerlangan produktiviti

FUNCTIONS

The main functions of FRIM are:

- To plan and implement research for the development of the forestry sector and conservation of forest resources
- To obtain and disseminate research information to enhance forest management and the use of forest products
- To establish joint research and joint forest development with other bodies within and outside Malaysia

CLIENTS' CHARTER

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 undertake to:

- Produce each year 15 technologies with potential for upscaling to be pioneered, commercialized and accepted in resolving forestry management related problems and increasing the economic value of forest products utilization
- Produce at least 85 articles in journals including 20 articles in impact factor journals
- Ensure 95% submission of reports to clients for services rendered and payments of bills/claims according to the specified duration
- Respond to at least 90% of complaints from clients within five working days from the date of receipt
- Conduct 35 consultancy service assignments and smart partnerships with the trade and industrial sector in areas where we have the expertise and technologies
- Ensure 11 laboratories adhere to the international standards and serve as trusted reference laboratories (MS ISO/ IEC 17025/ Bionexus/ FIRA/ ift)

QUALITY POLICY

FRIM is committed to providing effective research and related supporting services to fulfill its 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.

QUALITY SLOGAN

Quality is the pillar for excellence
Innovation is the key to preeminence

QE SLOGAN

Quality environment as catalyst to excellence in productivity



Ketua Pengarah/Director General

DATO' DR ABD. LATIF MOHMOD
DIMP, JSM, KMN, AMN



**Timbalan Ketua Pengarah
(Penyelidikan dan Pembangunan)
Deputy director general (Research
and Development)**

DATO' DR ABDUL RASHID AB.
MALIK, DIMP
(Sehingga/Until September)



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

DR MOHD NOR MOHD YUSOFF,
KMN
(Mulai/From September)



**Timbalan Ketua Pengarah
(Operasi)
Deputy Director General
(Operational)**

DATUK DR ABDUL RAHIM H.J. NIK,
KMN, AMN, JSM, PMW
(Sehingga/Until April)



**Timbalan Ketua Pengarah
(Operasi)
Deputy Director General
(Operational)**

PUAN/MDM WAN RAHMAH
WAN A. RAOF, KMN
(Mulai Mei/From May)



**Pengarah Bahagian
Perhutanan dan Alam Sekitar
Director Forestry and
Environment Division**

DR SHAMSUDIN IBRAHIM, AMN



**Pengarah Bahagian
Biodiversiti Hutan
Director Forest Biodiversity
Division**

DR SAW LENG GUAN



**Pengarah Bahagian Perancangan
Penyelidikan dan Korporat
Director Research Planning and
Corporate Division**

DR NORINI HARON, AMN



**Pengarah Bahagian Hasil
Semula Jadi**
Director Natural Products Division
DR RASADAH MAT ALI, AMP



Pengarah Bahagian Keluaran Hutan
Director Forest Products Division
DR RAHIM SUDIN



**Pengarah Bahagian Kewangan dan
Pengarah Bahagian Inovasi dan
Komersialisasi**
**Director Finance Division and
Director Innovation and
Commercialization Division**
EN/MR MOHD ZAMSHARI ABD RAHMAN



**Pengarah Bahagian
Bioteknologi Perhutanan**
**Director Forest Biotechnology
Division**
DR NORWATI MUHAMMAD



**Pengarah Bahagian
Pentadbiran dan
Penyelenggaraan**
**Director Administration and
Maintenance Division**
EN/MR ABDUL JABBAR HJ
SABLI



**Pengarah Bahagian
Perkhidmatan Teknikal**
**Director Technical Services
Division**
EN/MR WAN ZAHIRI WAN
YAACOB



**Pengarah Bahagian Sumber
Manusia**
**Director Human Resource
Division**
EN/MR IMALUDEEN
MOHAMAD

R&D HULUAN

Pengenalan

R&D huluan merupakan asas dan inti pati dalam proses penyelidikan gunaan dan penghasilan. Sudah tentulah FRIM terus menumpukan pada projek-projek R&D dalam bidang ini di samping projek-projek yang dapat memenuhi kehendak pasaran. Projek Tree Flora of Sabah and Sarawak dan Flora of Peninsular Malaysia dilaksanakan bagi mendokumenkan biodiversiti dengan menyediakan maklumat yang boleh dipercayai dan tepat mengenai famili tumbuh-tumbuhan di Malaysia masing-masing sejak 1991 dan 2005. Jilid kedua *Seed Plant Series for the Flora of Peninsular Malaysia* menyemak 112 spesies famili Apocynaceae dan jilid ketujuh *Tree Flora of Sabah and Sarawak* menyemak 313 spesies dari famili Lamiaceae, Myrtaceae dan Sterculiaceae. *The Forest Research Institute Malaysia: A Sanctuary for Threatened Trees* memaparkan rujukan bergambar bagi 73 spesies pokok terancam yang terdapat di FRIM. Pelan tindakan bagi membaik pulih Tasik Chini telah bermula di bawah Rancangan Malaysia ke-9 yang meliputi kawasan tanaman bermula dari gigi air sehingga 10 m ke darat di sepanjang Sg Chini ditanam dengan pokok dan buluh. Dengan kemajuan dalam teknologi penderiaan jauh dan kewujudan pelbagai sistem baharu satelit udara dan angkasa lepas yang mempunyai resolusi ruang dan spektra yang baik, penyelidik FRIM telah membuktikan bahawa penderiaan jauh merupakan kaedah yang berdaya maju bagi inventori hutan serta menjimatkan dalam membantu pengurusan dan perlindungan kawasan hutan; di samping menyediakan maklumat bagi membantu dalam penyiasatan di atas tanah. Gaharu merupakan salah satu produk bukan-kayu yang bernilai dan sangat dikehendaki di rantau Asia Tenggara dan Asia. Teknik pengaruhan bagi pengeluaran gaharu untuk pokok *Aquilaria malaccensis* yang tumbuh dijangka akan tamat pada Mei 2013. Berikut ialah beberapa aktiviti penyelidikan utama bagi R&D huluan:

TEKNIK PENGARUHAN BAGI PENGELUARAN GAHARU UNTUK *AQUILARIA MALACCENSIS* DI MALAYSIA

Projek teknik-teknik pengaruhan telah bermula sejak Mei 2011 di bawah tajaan Techno-Fund daripada Kementerian Sains, Teknologi dan Inovasi (MOSTI). Objektif utama adalah untuk mengkaji teknik-teknik penghasilan gaharu yang terdapat di pasaran. Projek ini ialah susulan kejayaan penggunaan teknik pengaruhan yang dipatenkan, kit CA dari Vietnam, hasil kerjasama dengan Prof Robert A Blanchette dari University of Minnesota. Gaharu merupakan produk bukan kayu yang paling berharga di rantau Asia Tenggara dan Asia. Teknik-teknik aplikasi yang betul dan efektif akan menjamin penghasilan yang ekonomi, mampan dan berkualiti dalam masa yang singkat. Namun, sehingga hari ini, tiada kaedah saintifik bioteknologi atau teknik singkat yang teruji didapati untuk

Upstream R&D

Introduction

Upstream R&D is the foundation and essence of applied research and production processes. As sure, FRIM continues to focus on R&D projects on these areas as well as those that meet current market demands. The Tree Flora of Sabah and Sarawak and Flora of Peninsular Malaysia Projects were initiated to document biodiversity by providing reliable and accurate accounts of plant families in Malaysia since 1991 and 2005, respectively. The second volume of the Seed Plant Series for the Flora of Peninsular Malaysia revised 112 species of family Apocynaceae and the seventh volume of the Tree Flora of Sabah and Sarawak revised 313 species of families Lamiaceae, Myrtaceae and Sterculiaceae. The Forest Research Institute Malaysia: A Sanctuary for Threatened Trees presented a pictorial reference to the 73 threatened-tree species established at the institute. The workplan for the restoration of Tasik Chini was started under the Ninth Malaysian Plan and the restoration areas include the water edge up to 10 m upland along the Sg. Chini river bank were planted with trees and bamboos. With the advancements in remote sensing technology and increasing availability of many new airborne or space borne satellite systems having fine spatial and spectral resolutions, FRIM researchers have demonstrated that remote sensing can be a viable method for forest inventory and can be used economically to assist the modern management and protection of forest areas. Agarwood is today's one of the most sought after and valued non-wood products in the Southeast Asia and Asia regions. The on-going inducement technique for agarwood or gaharu production in Malaysian grown *Aquilaria malaccensis* is expected to be completed by May 2013. The following are some of research highlights for the upstream R&D category.

INDUCEMENT TECHNIQUES FOR GAHARU PRODUCTION IN MALAYSIAN GROWN *AQUILARIA MALACCENSIS*

The ongoing project on inducement techniques was initially started in May 2011 under the Techno-Fund from the Ministry of Science, Technology and Inovation (MOSTI). Its main objective was to study agarwood or gaharu production techniques that are locally available and commercially used in the market. The project was carried out following the successful application of the patented inducement technique called CA kit from Vietnam and in collaboration with Prof Robert A Blanchette from the University of Minnesota. Agarwood is today's one of the most sought-after and valued non-wood products in Southeast Asia and Asia. The applications of proper and effective inducement techniques will ensure the production of economic, sustainable and good quality grade within a short

penghasilan gaharu atau minyak gaharu. Projek ini telah mendapat sambutan lima peserta yang telah mendakwa berjaya menghasilkan gaharu dan minyaknya dalam masa singkat. Aplikasi induksi telah dijalankan ke atas 1000 pokok milik swasta berumur lapan tahun di Kuala Lipis, Pahang. Sehingga kini, pokok-pokok tersebut telah dipilih dan ditanda untuk para peserta. Setiap peserta diberikan 100 pokok dan teknik-teknik aplikasi berbeza digunakan untuk dua aktiviti berdasarkan pemerhatian. Projek ini dijangka akan mengenal pasti teknik yang efektif dan akan disiapkan sebelum awal bulan Mei 2013. Ini akan memberikan masa yang secukupnya bagi teknik-teknik induksi, pembentukan gaharu dan analisis kandungan biokimia gaharu dan penghasilan minyak gaharu oleh Makmal Minyak Pati di FRIM.

PENANDA DNA UNTUK PERLINDUNGAN HAK MILIK TUMBUHAN DAN PENGURUSAN GERMLASMA BAGI TUMBUHAN UBATAN YANG PENTING DI MALAYSIA

Pengenalpastian varieti tumbuhan/klon elit yang tepat, cepat, dan menjimatkan kos adalah penting dalam agro-perhutanan, pembiakbakaan dan perlindungan hak milik tumbuhan. Secara tradisinya, pengenalpastian varieti tumbuhan/klon ialah berdasarkan penilaian ciri morfologi. Walaupun cara ini menjimatkan kos, penilaian dari segi ciri morfologi mempunyai kekurangan yang tertentu, antaranya ialah (i) variasi yang tidak mencukupi, (ii) subjektiviti dalam analisis, (iii) pengaruh daripada alam sekitar, dan (iv) sesetengah ciri hanya diungkap pada peringkat pertumbuhan yang tertentu sahaja. Maka, teknik penanda DNA boleh digunakan untuk menyelesaikan beberapa isu yang berkaitan dengan identiti individu, antaranya termasuk perlindungan hak milik tumbuhan dan pengurusan germplasma.

Tongkat ali (*Eurycoma longifolia*), kacip fatimah (*Labisia pumila*) dan mas cotek (*Ficus deltoidea*) merupakan tumbuhan ubatan yang paling penting dalam industri herba di Malaysia. Tumbuhan ini telah banyak digunakan sebagai ubat tradisi untuk merawat pelbagai jenis penyakit secara turun-temurun. Oleh sebab potensinya, pengeluaran kultivar dan koleksi germplasma untuk ketiga-tiga tumbuhan ini telah banyak dijalankan oleh institut penyelidikan dan industri di Malaysia.

Kajian ini bertujuan untuk membangun dan mencirikan penanda mikrosatelit untuk ketiga-tiga tumbuhan ubatan ini. Secara keseluruhannya, sebanyak 18, 10 dan 19 penanda mikrosatelit yang sangat polimorfik dan berinformasi telah dibangunkan untuk tongkat ali, kacip fatimah dan mas cotek. Penanda ini akan digunakan sebagai penanda DNA dalam pemprofilan DNA, terutamanya dalam konteks pengenalpastian kultivar dan pengurusan germplasma. Di samping itu, penanda ini juga boleh digunakan untuk menyimpulkan kepelbagaian genetik dan struktur populasi genetik, yang akan membekalkan maklumat penting dalam penyediaan strategi pemuliharaan.

duration. There is, however, till today no known scientific biotechnology method or any proven short-cut technique used for the production of agarwood or agarwood oil. The project has attracted at least five private interested participants who have successfully claimed to produce agarwood and oil within a short time. The inducement applications were conducted on a 1000 privately owned trees which were about eight years old and located at Kuala Lipis, Pahang. To date, these trees have been selected, demarcated and marked for the participants. Each of the participants has been allocated about 100 trees and based on observations different application techniques were being used. It is therefore anticipated that the project will indicate the effective technique available and expected to be completed by early May 2013. This will provide sufficient time for the completion of the inducement techniques, agarwood formation and analysis of the biochemistry contents on the agarwood and oil production by FRIM's Essential Oil Laboratory.

DNA MARKERS FOR PLANT PROPRIETARY RIGHTS PROTECTION AND GERMLASM MANAGEMENT OF IMPORTANT MEDICINAL PLANTS IN MALAYSIA

The precise, fast, cost-effective, and reliable identification of important plant varieties/elite clones is essential in agro-forestry as well as for practical breeding purposes and related areas such as plant proprietary rights protection. Traditionally, identification of plant varieties/clones is based on the evaluation of sets of morphological characteristics. Although they are cost-effective, morphological evaluations have their limitations such as (i) insufficient variation, (ii) subjectivity in the analysis, (iii) influence of the environment, and (iv) expression of some characters only in certain developmental stages. DNA marker techniques can be used to resolve several issues of individual identity, including plant varietal protection, and investigate alleged parentage in open-pollinated breeding systems (germplasm management).

Tongkat ali (*Eurycoma longifolia*), kacip fatimah (*Labisia pumila*) and mas cotek (*Ficus deltoidea*) are three most important medicinal plants in the herbal industry of Malaysia. They have been traditionally used as medicine to treat various kinds of ailments. Due to their potential, cultivar production and germplasm collections of these three medicinal plants have been extensively undertaken by research organizations and industries in Malaysia.

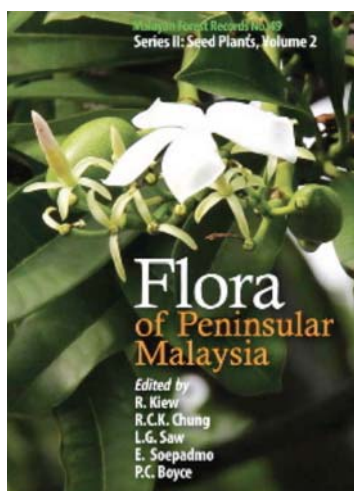
The present study was aimed at developing and characterizing microsatellite markers for these three important medicinal plants. Taken together, 18, 10 and 19 highly polymorphic and informative microsatellite markers were developed for tongkat ali, kacip fatimah and mas cotek respectively. These markers would serve as a useful tool for DNA profiling, especially in the contexts of cultivar identification and germplasm management. In addition, these markers can also be employed to deduce genetic diversity and population genetic structure of the species, which would provide important information for the formulation of conservation strategies.

THE FLORA OF PENINSULAR MALAYSIA SERIES II SEED PLANTS VOLUME TWO

Jilid kedua bagi Siri Buku Tumbuhan Berbiji bagi Flora Semenanjung Malaysia menyemak semula Apocynaceae, iaitu famili kelima terbesar di Semenanjung Malaysia dengan 112 spesies daripada 35 genus telah diterbitkan. Rujukan ini menyediakan kekunci pengecaman, penerangan terperinci dan status pemuliharaan untuk setiap takson, peta taburan pula diberi bagi kebanyakan spesies, manakala setiap genus digambarkan dengan satu atau lebih lukisan garisan serta gambar berwarna. Famili ini dicirikan oleh getah putih yang dikeluarkan dengan banyaknya daripada bahagian yang tercedera. Malahan beberapa genera pemanjat berkayu seperti *Chonemorpha*, *Leuconotis*, *Melodinus* dan *Urceola* pernah digunakan sebagai bahan pengganti getah pada awal tahun 1900-an. Ciri-ciri pengecaman lain yang berguna ialah folikel buahnya yang berpasangan dan bijinya yang mempunyai bulu berumbai, walaupun beberapa genera liana berkayu seperti *Willughbeia* menghasilkan buah jenis beri yang boleh dimakan. Genus yang paling kaya dengan spesies ialah *Kopsia* dengan sejumlah 11 spesies, di samping mempunyai kadar spesies endemik yang tertinggi, yang mana enam daripada sembilan spesies yang endemik kepada Semenanjung Malaysia dalam famili ini ialah daripada genus *Kopsia*. Famili ini juga kaya dengan genera pokok kayu balak komersial (contohnya *Alstonia*, *Dyera* dan *Wrightia*), pokok hiasan tepian jalan (contohnya genus *Cerbera*) dan spesies eksotik yang terkenal sebagai *Allamanda* dan pokok bunga tapak dara. Sesetengah spesies pula boleh dijadikan ubat, seperti genera *Hunteria*, *Rauvolfia* dan *Tabernaemontana*, yang digunakan untuk merawat bermacam-macam penyakit; daripada ketidakselesaan kecil kepada masalah-masalah serius. Penilaian ancaman yang dijalankan ke atas semua spesies menunjukkan 17 spesies didapati tergolong dalam kategori Terancam secara Kritikal, 13 taksa adalah Terancam dan 50 taksa atau 45% dianggap mengalami ancaman tertentu.

THE FLORA OF PENINSULAR MALAYSIA SERIES II SEED PLANTS VOLUME TWO

The second volume of the Seed Plant Series for the Flora of Peninsular Malaysia is devoted to Apocynaceae, the fifth largest family in Peninsular Malaysia with 112 species from 35 genera was published. The account provides identification keys, detailed descriptions and conservation status for each taxon, distribution maps are included for most species, while each genus is illustrated by one or more line drawings augmented with colour plates. The family is characterized by the copious white latex from injured parts. Some woody climber genera of *Chonemorpha*, *Leuconotis*, *Melodinus* and *Urceola* have been recorded as substitutes for rubber in the early 1900s. Other useful spot characters are the paired fruit follicles and seeds with tufted hairs, although some genera like the woody lianas *Willughbeia* produces edible berries. The most species-rich genus is *Kopsia* with 11 species, which also has the highest endemism rate; six out of the nine species endemic to Peninsular Malaysia in the family come from this genus. The family also consists of commercial timber tree genera (e.g. *Alstonia*, *Dyera* and *Wrightia*), common wayside tress (e.g. the genus *Cerbera*) and well-known exotics such as the allamanda and Madagascar periwinkle. Some species possess medicinal properties, such as those from the genera of *Hunteria*, *Rauvolfia* and *Tabernaemontana*, which are used to treat multifarious ailments from minor discomforts to serious problems. From threat assessments carried out for all the indigenous species, 17 species are listed as Critically Endangered, 14 taxa Endangered and 50 taxa or 45% are considered threatened to some extent.



BUKU “FOREST RESEARCH INSTITUTE MALAYSIA: A SANCTUARY FOR THREATENED TREES”

The Forest Research Institute Malaysia: A Sanctuary for Threatened Trees mengandungi 73 spesies pokok terancam yang ditanam di sekitar FRIM. Buku itu mengandungi maklumat setiap spesies tersebut. Tiga belas spesies daripada 73 spesies tersebut dikategorikan dalam kategori Sangat Terancam (CR), 25 Terancam (EN) dan 35 Terjejas (VU). FRIM merupakan salah satu repositori spesies tumbuhan yang utama di Malaysia. Sehingga kini, FRIM mempunyai koleksi 354 spesies tumbuhan yang terdiri daripada 149 genera dan 48 famili dalam tujuh arboreta. Arboreta Dipterokarpa dan Bukan Dipterokarpa ditubuhkan pada 1929 merupakan dua arboreta terawal yang ditubuhkan. Selepas itu, lima lagi arboreta ditubuhkan iaitu Taman Monokot, Pokok Buah-buahan Arboretum, Koniferatum, Bambusetum dan Taman Etnobotani, untuk menempatkan spesies daripada kumpulan tumbuhan yang lain. Pada akhir 1990-an, FRIM telah mewujudkan Taman Botani Kepong seluas 80 ha. Sejajar dengan visi FRIM, Taman Botani ini bertujuan untuk menyediakan pusat kecemerlangan untuk pendidikan dan penyelidikan dalam bidang botani, hortikultur dan landskap, mempromosi perlindungan dan pemuliharaan flora dan habitatnya di Malaysia, mewujudkan kesedaran umum mengenai peranan dan kepentingan tumbuhan dan hutan dalam pengurusan diversiti biologi serta menyediakan peluang rekreasi dalam persekitaran taman botani kepada masyarakat umum. Pemuliharaan germplasma secara *ex situ* mula dijalankan apabila projek *Conservation Monitoring System for Threatened Plants* dan *Safeguarding the Forest Plant Diversity of Peninsular Malaysia: Conservation Monitoring of Rare and Threatened Plants of Peninsular Malaysia* dimulakan. Kedua-dua projek telah menyumbang kepada penubuhan tapak germplasma *ex situ* di Malaysia. Usaha ini menyumbang kepada Sasaran 9 dalam Strategi Malaysia untuk Pemuliharaan Tumbuhan iaitu “60% daripada spesies terancam ditempatkan dalam koleksi *ex situ* di dalam negara, dan 10% daripadanya dimasukkan dalam program restorasi”.

PELAKSANAAN PELAN TINDAKAN USAHA PEMELIHARAAN TASIK CHINI

Kawasan Tasik Chini telah diwartakan sebagai Rizab Awam bagi maksud pelancongan mengikut Seksyen 62(1) Kanun Tanah Negara pada 4 November 1989. Pada tahun 2009 pula diwartakan sebagai kawasan Rizab Manusia dan Biosfera (MAB) di bawah UNESCO. Keseluruhan kawasan yang terlibat adalah seluas 5085 ha termasuk kawasan tasik seluas 396 ha. Di dalamnya terdapat Sungai Chini yang menghubungkan Sungai Pahang dan Tasik Chini. Panjang sungai ini ialah 3.9 km dan lebarnya 8–10 m. Sungai Chini dijadikan laluan utama bot-bot nelayan dan penduduk setempat yang dipercayai merupakan salah satu faktor utama menyebabkan hakisan tebing yang telah diperhatikan di beberapa lokasi di sepanjang Sungai Chini.

FOREST RESEARCH INSTITUTE MALAYSIA: A SANCTUARY FOR THREATENED TREES

Forest Research Institute Malaysia: A Sanctuary for Threatened Trees presents a list of threatened tree species planted in FRIM. Relevant details are provided for each of the 73 species—of these, 13 are Critically Endangered, 25 Endangered and 35 Vulnerable. The Forest Research Institute Malaysia (FRIM) is one of the country's major repositories of plant species. To date, FRIM has a collection of 354 plant species in 149 genera and 48 families in its seven arboreta. The Dipterocarp and Non-Dipterocarp Arboreta are the earliest arboreta, formed in 1929. Another five arboreta, namely the Monocot Garden, Fruit Tree Arboretum, Coniferatum, Bambusetum, and Ethnobotanical Garden, were subsequently established to cater for species in other plant groups. In the late 1990s, FRIM initiated the Kepong Botanic Gardens covering an area of 80 ha. In line with FRIM's vision, the Gardens aim to establish a centre of excellence for education and research in the fields of botany, horticulture and landscape, promote the protection and conservation of flora and their habitats in Malaysia, create public awareness of the role and importance of plants and forests in the maintenance of biological diversity and provide recreational opportunities for the public within the environment of a botanic garden. Many of the 73 species mentioned above have been planted in the grounds of the Kepong Botanic Gardens in addition to the Dipterocarp Arboretum. The *ex-situ* germplasm conservation of rare and threatened plant species began with the initiation of the project on “Conservation Monitoring System for Threatened Plants” and its sister project “Safeguarding the Forest Plant Diversity of Peninsular Malaysia: Conservation Monitoring of Rare and Threatened Plants of Peninsular Malaysia”. This effort contributes to Target 9 of the Malaysian Strategy for Plant Conservation with “60% of threatened species in *ex-situ* collections within the country, and 10% of them included in recovery and restoration programmes”.

WORKPLAN FOR THE RESTORATION OF TASIK CHINI

Tasik Chini area was gazetted as a Public Reserve for tourism under Section 62(1) Enactment of Country Land on 4 November 1989. In 2009, it was recognized as a Man and Biosphere Reserve (MAB) site of UNESCO. The area covers 5085 ha including 396 ha of waterbody (lake). The Sungai Chini river (3.9 km long and 8–10 m wide) connects the Sungai Pahang river to Lake Chini. It is frequently used by locals for transportation, which is believed to be the contributing factor causing erosion on the river banks observed at several areas along Sungai Chini.

FRIM dan Jabatan Perhutanan Semenanjung Malaysia (JPSM) telah diamanahkan oleh NRE untuk menanam pokok penampan seperti buluh, ara dan spesies yang sesuai bagi pengukuhan tebing Sungai Chini. Kawasan tanaman bermula dari gigi air sehingga 10 m ke darat di sepanjang sungai tersebut melalui program pelan jangka pendek menangani hakisan tebing Sungai Chini. Peruntukan sebanyak RM710 000 diterima daripada NRE di bawah Rancangan Malaysia ke-9 (RMK9).

Jawatankuasa Penyelaras Pelaksanaan Pelan Tindakan Usaha-Usaha Memulihara Tasik Chini ditubuhkan untuk menyelaras aktiviti-aktiviti di bawah projek ini yang melibatkan tiga agensi iaitu FRIM, JPSM dan Jabatan Pengairan dan Saliran (JPS). Jawatankuasa ini dipengerusikan oleh JPSM dan dianggotai oleh Ibu Pejabat JPSM, Pejabat Hutan Negeri Pahang, FRIM dan JPS. Objektif utama projek ini adalah untuk 1) mengumpul data kadar hakisan tebing Sungai Chini, 2) menanam pokok dan tumbuhan asal yang boleh mengurangkan kadar hakisan tebing sungai dan 3) mengumpul sampel tumbuhan akuatik untuk ditanam di dalam salah satu kolam Taman Botani Kepong (KBG) FRIM sebagai pusat pemuliharaan *ex-situ* tumbuhan.

Pemerhatian awal menunjukkan bahawa kombinasi arus sungai yang deras, profil tanah dengan kandungan liat yang tinggi (35–65%) dan struktur tanah yang lemah menyumbang kepada peningkatan kadar hakisan tebing Sungai Chini. Maka kerja-kerja penanaman pokok dijalankan bagi menangani fenomena ini. Sebanyak 390 pokok pelbagai spesies termasuk dua spesies buluh telah ditanam menggunakan kaedah konvensional di atas tebing sungai manakala kaedah 'pre-planted coir-log' digunakan bagi penanaman di tebing sungai.

Sebanyak 29 anak liar daripada pelbagai spesies tumbuhan akuatik berjaya dikutip bagi tujuan pemuliharaan *ex-situ*. Koleksi kutipan tumbuhan akuatik diambil daripada empat kategori habitat iaitu tenggelam, terapung, daun terapung dan muncul di permukaan air.

INVENTORI HUTAN TROPIKA MENGGUNAKAN PELBAGAI SATELIT PENDERIAAN JAUH

Beberapa penyelidikan telah dijalankan untuk membanci hutan tropika menggunakan imej satelit. Tahap terperinci, metodologi dan skop inventori berbeza-beza antara satu sama lain, bergantung pada objektif kajian. Walau bagaimanapun, kebanyakan kajian yang melibatkan hutan tropika menunjukkan bahawa penggunaan imej satelit adalah terhad kerana struktur hutan yang kompleks. Kajian ini dijalankan untuk melihat keupayaan pelbagai sistem satelit dalam menerbitkan beberapa parameter hutan untuk tujuan inventori. Dua set imej satelit telah digunakan, iaitu *Polarimetric phased array L-band synthetic aperture radar* (PALSAR) yang dibawa oleh *Japanese advanced land observing satellite* (ALOS) dan *WorldView-2* daripada DigitalGlobe Amerika Syarikat.

The Forest Research Institute Malaysia (FRIM) and the Forestry Department of Peninsular Malaysia (FDPM) were given the responsibility by the Ministry of Natural Resources and Environment (NRE) to plant buffer trees such as bamboo, figs and other suitable species to stabilize the river bank. The planting efforts include areas from the water edge up to 10 meters upland along the river in a short-term plan to stabilize the Sungai Chini river bank. This project was allocated a total of RM710 000 under the Ninth Malaysia Plan (RMK9).

A taskforce to monitor and coordinate efforts to rehabilitate Tasik Chini was formed and includes members from three agencies: FRIM, FDPM and the Department of Drainage and Irrigation (DID). This taskforce is chaired by FDPM and supported by the Pahang State Forest Department, FRIM and DID. The main objectives of this project are to 1) collect data on Sungai Chini bank erosion rate, 2) plant native tree species to reduce the bank erosion rate, and 3) collect samples of aquatic plants for planting at Kepong Botanic Garden (KBG), FRIM, as *ex-situ* plant conservation. Preliminary observations have indicated that the combination of the fast-flowing river, high clay content (35–65%) with weak soil structure contributed to the erosion of Sungai Chini bank. Tree planting along these affected areas was conducted as a mitigation measure to counter this phenomenon.

A total of 390 trees of various species including two species of bamboo have been planted. Trees on the river bank were planted using the conventional method while the pre-planted coir-log method was used for planting on the river tooth. A total of 29 species of aquatic plant wildings were also collected for *ex-situ* conservation measures. Collection was made based on four habitat categories, viz. submerged, floating, floating leaves, and emerging to the water surface.

MULTI-REMOTE-SENSING-SATELLITES FOR TROPICAL FOREST INVENTORY

There are numerous researches that have been carried out to inventory tropical forests using satellite images. The level of details, methods and scopes of those inventories may vary from one to another depending on the objectives of the studies. However, studies that have been carried out in tropical forest indicated that the uses of satellite image in many cases are rather limited due to the complexity of forest structures. This study was carried out to discover the capabilities of different satellite systems in deriving several forest parameters for inventory purposes. Two sets of satellite images were used, which are polarimetric Phased Array L-band Synthetic Aperture Radar (PALSAR) by the Japanese Advanced Land Observing Satellite (ALOS)

Imej PALSAR digunakan untuk menilai tiga parameter dirian yang utama iaitu i) isi padu, ii) biojisim dan iii) stok karbon, manakala imej *WorldView-2* pula digunakan untuk pengiraan kanopi dirian. Kampus FRIM yang meliputi keluasan 420 ha kawasan berhutan dipilih sebagai kawasan kajian. Lebih 30 sampel petak telah ditubuhkan untuk menghasilkan perhubungan empirik antara isyarat daripada satelit dengan parameter yang diukur di atas tanah.

Biojisim atas tanah yang dianggarkan di dalam kawasan kajian mempunyai julat antara 25.9 dan 569.3 t ha⁻¹. Taburannya dikelaskan kepada empat kategori dengan mengambil kira tahap tumbesaran hutan. Kuantiti biojisim tertinggi didapati tertumpu di dalam kawasan yang mempunyai dirian yang matang dan sangat padat, ber julat antara 427 dan 569 t ha⁻¹ dan merangkumi 4% daripada keseluruhan kawasan kajian. Manakala kawasan yang mempunyai dirian yang matang dan padat meliputi 51% kawasan dengan julat biojisim antara 168 hingga 414 t ha⁻¹. Pokok di dalam kawasan ini terletak di dalam petak ekologi jangka panjang dan berusia lebih daripada 40 tahun. Dua lagi kategori iaitu pokok kecil dan sedang membesar serta pokok matang dan kecil yang bercampur, masing-masing meliputi 28% dan 17% kawasan kajian. Kedua-dua kategori ini terdiri daripada dirian pokok yang baru ditanam, berusia dalam lingkungan 5–30 tahun. Jumlah keseluruhan biojisim atas tanah di dalam kawasan kajian juga telah dikira iaitu 113 749.8 t. Ralat anggaran bagi kesemua hasil tersebut dikira dalam lingkungan ± 10.9 t ha⁻¹.

Setelah biojisim ditentukan, stok karbon boleh juga dikira dengan hanya menggunakan faktor penukaran. Oleh kerana faktor penukaran ini berbeza-beza mengikut bahagian-bahagian pokok, spesies dan juga tempat, faktor penukaran global yang lazim telah digunakan iaitu 50%, sebagaimana disarankan oleh *Intergovernmental Panel on Climate Change* (IPCC). Oleh yang demikian, jumlah stok karbon adalah separuh daripada jumlah biojisim, iaitu 56 874.9 t C, dengan julat antara 12.95 $\pm$ 5.45 dan 284.65 $\pm$ 5.45 t C ha⁻¹ dan purata 96.80 t C ha⁻¹.

Bagi parameter isi padu dirian pula, hasil kajian menunjukkan bahawa isi padu yang boleh diniaga dalam kawasan kajian adalah antara 8.69 hingga 442.00 m³ ha⁻¹ dengan purata 161.21 m³ ha⁻¹. Jumlah keseluruhan isi padu ialah 96,100.72 m³ tanpa mengambil kira spesies pokok dan kategori kayu. Ketepatan anggaran ialah sekitar 94% dengan ralat ± 17.37 m³ ha⁻¹.

Setelah ALOS digunakan untuk menilai stok hutan, *WorldView-2* pula digunakan untuk pengiraan kanopi hutan. Proses segmentasi telah dikenakan kepada imej satelit *WorldView-2* dan menunjukkan hanya kanopi pokok kapur (*Dryobalanops sumatrana*) sahaja yang boleh dipisahkan dengan jayanya dan terhad untuk spesies-spesies yang lain. Walaupun keupayaannya terhad di dalam kawasan hutan asli, bilangan kanopi pokok masih

and *WorldView-2* from DigitalGlobe of the United States of America. While PALSAR image was used to quantify three main forest stand parameters, namely i) volume, ii) biomass, and iii) carbon stocks, the *WorldView-2* was used to count tree canopies. The Forest Research Institute Malaysia (FRIM) campus consisting of about 420 ha of forested land was selected as the study area. More than 30 sampling plots were established in the study to produce empirical relationships between satellite signals and ground measurement data of these parameters.

The estimated above-ground biomass in the study area ranged from 25.9 to 569.3 t ha⁻¹. The distributions were categorized into four categories with respect to the different levels of forest growth. The highest quantity of biomass was found in mature and very dense stands, ranging 427–569 t ha⁻¹ and occupying about 4% of the study area. Mature and dense stands had the most area coverage, i.e. about 51%, with biomass ranging 168–414 t ha⁻¹. The trees in this category were within long-term ecological plots and were more than 40 years old. The other two categories, namely small and growing as well as mixed small and mature stands occupied an area of about 28% and 17% respectively. These categories consisted mostly of newly planted trees, five to 30 years old. The total above-ground biomass within the study area was also calculated and it was 113 749.8 t. The estimation error of these results was calculated at ± 10.9 t ha⁻¹.

Once the biomass has been quantified, carbon stocks within the study area were calculated using a conversion factor. As the conversion factor may vary according to plant parts, species and site, the global default conversion factor of 50% was used as recommended by the Intergovernmental Panel on Climate Change (IPCC). Therefore, the total carbon stocks in the study area are equal to half of the 113 749.8 t of biomass, i.e. 56 874.9 t C, within a range between 12.95 $\pm$ 5.45 and 284.65 $\pm$ 5.45 t C ha⁻¹ and the mean of 96.80 t C ha⁻¹.

For the stand volume parameter the results indicated that the merchantable volumes of standing forest in the study area ranged from 8.69 to 442.00 m³ ha⁻¹ with the average of 161.21 m³ ha⁻¹. The total volume was 96 100.72 m³ regardless of tree species and wood categories. The estimation accuracy was observed at about 94% with the standard error of ± 17.37 m³ ha⁻¹.

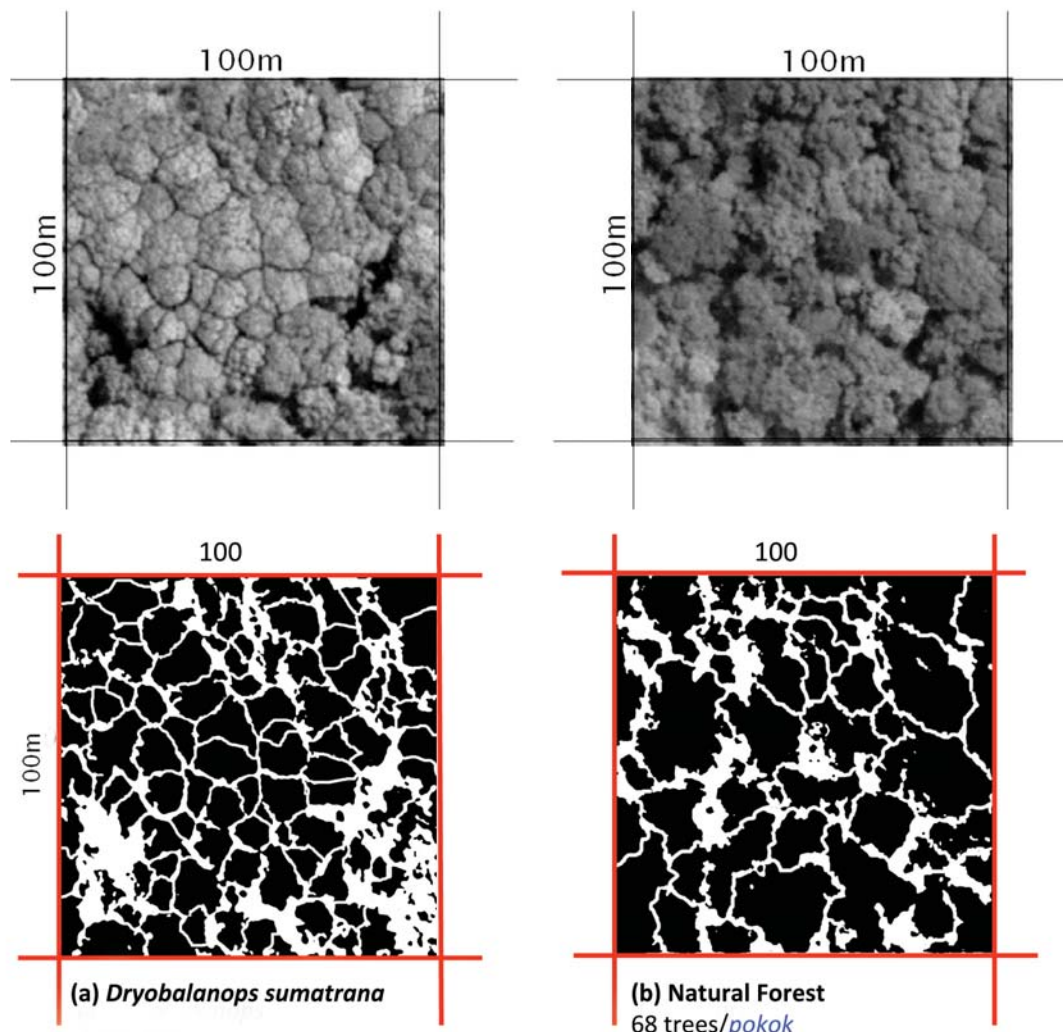
While ALOS worked best for forest stocking assessments, *WorldView-2* was used to count the canopy of the forest. Segmentation process was applied to the *WorldView-2* image and indicated that tree crowns could be delineated successfully for *Dryobalanops sumatrana* (kapur), but there were some limitations for the other tree species. Despite the limitations in delineating tree crowns in natural forests, the number of tree crowns could still be estimated, with allowable accuracy. It was found that the total number of trees in the study area was 81 029 with an average of 208.6 stands per hectare. The diameters of the crowns

boleh dianggarkan, dengan ketepatan yang dibenarkan. Secara keseluruhannya, didapati sebanyak 81 029 dirian pokok di dalam kawasan kajian dengan purata 208.6 dirian per ha. Ukur lilit kanopi adalah antara 3.9 hingga 38.5 m. Ketepatan anggaran ialah 86.5% dengan ralat sebanyak ± 4.7 pokok per ha.

Kajian ini menunjukkan bahawa penderiaan jauh boleh dijadikan sebagai salah satu teknik untuk membanci hutan dan boleh membantu dalam pengurusan dan perlindungan hutan secara moden, di samping menyediakan maklumat untuk membantu dalam pemeriksaan di lapangan. Dengan kemajuan dalam teknologi penderiaan jauh dan kepelbagaian sistem satelit yang mempunyai resolusi ruang dan spektra tinggi, penderiaan jauh diharap dapat menjadi satu teknologi yang sesuai dalam kajian perhutanan yang boleh membantu membuat keputusan dan memastikan bahawa pengurusan hutan secara berkekalan diamalkan.

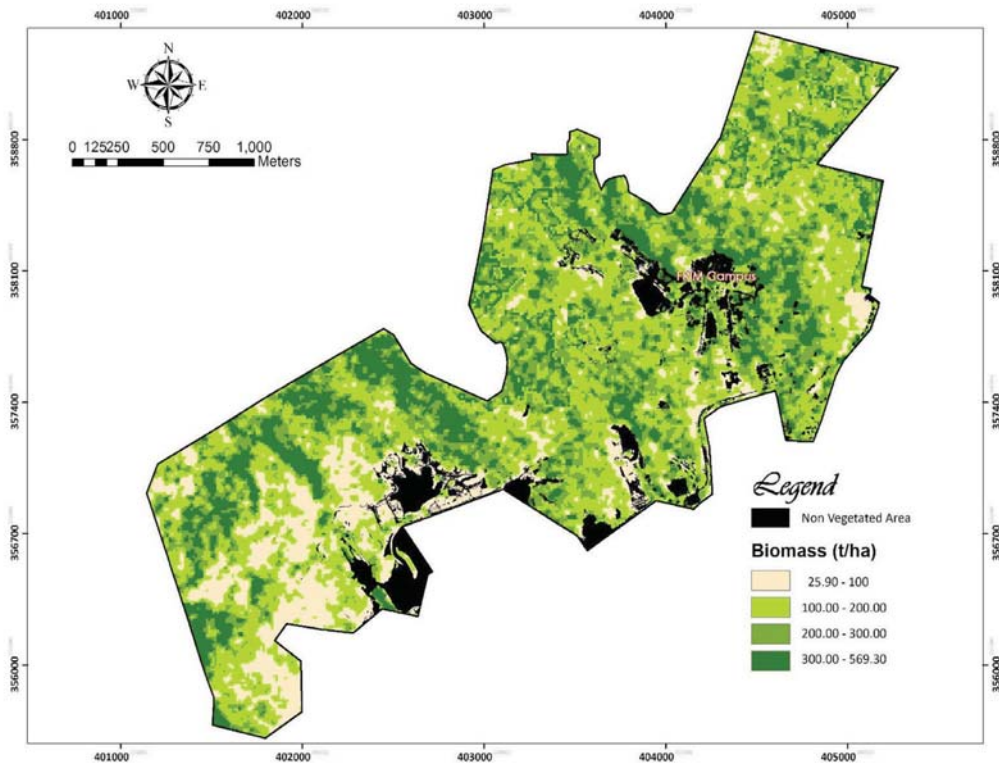
ranged from 3.9 to 38.5 m. An overall accuracy of this estimation was calculated to be 86.5% with a standard error of ± 4.7 trees per hectare.

In conclusion, this study demonstrated that remote sensing can be a viable method for forest inventory and can be used economically to assist the modern management and protection of forest areas. It also provides information to facilitate ground-based investigations. With the advancements in remote sensing technology and increasing availability of many new airborne or space-borne satellite systems having fine spatial and spectral resolutions, it is becoming increasingly suitable for forestry studies that can support decision-making and ensuring sustainable forest management.

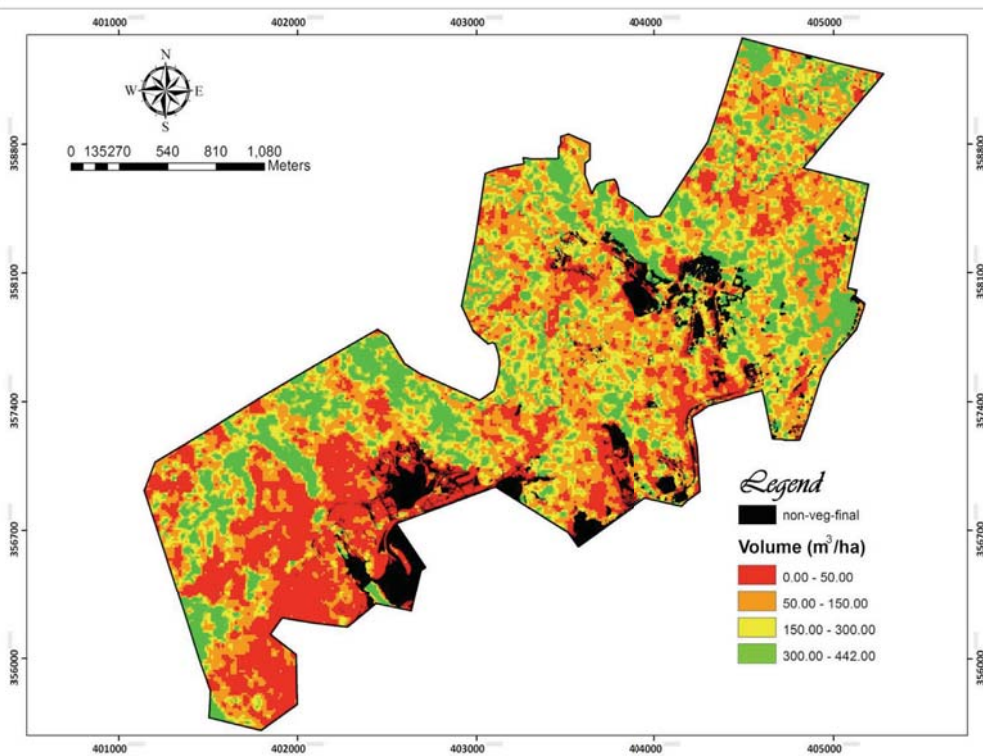


Kanopi hutan yang dapat dilihat dari imej satelit WorldView-2 (atas) dan kanopi yang telah disegmen digunakan untuk pengiraan pokok (bawah)

Forest canopies as appear on WorldView-2 satellite image (top) and segmented canopies used for tree counting (bottom)



Corak taburan biojisim dan stok karbon atas tanah dalam kawasan kajian
Pattern of aboveground biomass and carbon stock distribution in the study area



Corak taburan isipadu dirian pokok dalam kawasan kajian
Pattern of stand volume distribution in the study area

R&D HILIRAN

Pengenalan

Hutan di Malaysia mengeluarkan pelbagai jenis spesies kayu yang menyumbang kepada industri berasaskan kayu. Bagaimanapun, bagi pengeluaran perabot, sektor ini sangat bergantung pada kayu yang ditanam secara ladang seperti kayu getah dan akhir-akhir ini pula ialah *Acacia mangium*. Bagi menggalakkan pengeluaran produk akhir yang bernilai tambah, ladang-ladang hutan dengan bekalan balak yang tekal dan berkualiti sangat diperlukan. Selaras dengan kemajuan dalam program perladangan, spesies yang berpotensi ditanam dinilai dari segi kualiti kayu dan ciri-ciri pemrosesannya.

FRIM juga terlibat secara aktif dalam bioprospekting tumbuhan ubatan dan membangunkan program penemuan ubatan hasil-hasil semula jadi yang menumpukan bukan sahaja untuk memenuhi keperluan negara malah juga permintaan di peringkat global. Kekayaan kepelbagaian flora Malaysia menunjukkan bahawa kita dapat menjangkakan struktur kimia daripada metabolit sekundernya sebagai pilihan ubat terbaik bagi penyaringan penyakit yang disasarkan. Matlamat utama R&D dalam produk semula jadi ialah dalam penemuan bahan kimia baharu dari biodiversiti Malaysia untuk kegunaan industri herba dan farmaseutikal. Berikut ialah R&D utama dalam kategori hiliran:

SIFAT ANATOMI, FIZIKAL DAN MEKANIKAL KOLON KAYU SESENDUK (*ENDOSPERMUM MALACCENSE*) BERUSIA 12 TAHUN

Sesenduk (*Endospermum malaccense*) ialah salah satu spesies yang telah dipromosikan sebagai spesies ladang hutan di Malaysia. Spesies ini ialah kayu keras ringan yang mempunyai ketumpatan 305–655 kg m⁻³ dan sesuai untuk kegunaan papan lapis, kayu laminasi dan perabot. Sesenduk juga adalah sebagai bahan alternatif untuk mengatasi masalah kenaikan harga kayu getah. Ini kerana sesenduk mudah untuk diawet menggunakan bahan kimia, mempunyai sifat memaku yang baik dan warna yang cantik. Spesies ini boleh ditanam menggunakan biji benih atau secara pembiakan tampang (kultur tisul atau keratan pengakar).

Di FRIM, spesies ini ditanam menggunakan teknik kultur tisul. Selepas pemerhatian selama 12 tahun, pokok yang ditanam secara kultur tisul menunjukkan tumbesaran yang berbeza iaitu pokok daripada pokok induk menunjukkan tumbesaran yang baik dan lebih sekata berbanding pokok yang ditanam secara biji benih. Selain tumbesaran, maklumat mengenai sifat-sifat kayu yang ditanam secara kultur tisul diperlukan. Usaha dijalankan untuk mengkaji sifat anatomi, fizikal dan mekanikal sesenduk klon (FRIMsrp001) berusia 12 tahun yang ditanam daripada kultur tisul.

DOWNSTREAM R&D

Introduction

The Malaysian forest produces a wide variety of timber species that feed the wood-based industries. However, for furniture production, the sector relies heavily on plantation timber such as rubberwood and lately *Acacia mangium*. To further encourage the development of value-added production of finished products, plantation timber of consistent supply and quality is needed in the future. In line with development in the plantation programme, potential planted species are evaluated in terms of both wood quality and processing characteristics.

FRIM is also actively involved in bioprospecting of medicinal plants and developing a natural products drug discovery programme which focuses not only on the national needs but also on global demands. The rich diversity of the Malaysian flora means that we can expect well diverse chemical structures from their secondary metabolites as excellent drug candidates for disease target screening. The ultimate aim of the natural products R&D is in discovering new chemicals from Malaysian biodiversity for use in the herbal and pharmaceutical industries.

WOOD ANATOMICAL, PHYSICAL AND MECHANICAL PROPERTIES OF 12-YEAR-OLD SESENDUK (*ENDOSPERMUM MALACCENSE*) CLONES

Sesenduk (*Endospermum malaccense*) is one of the species that has been promoted as a plantation tree in Malaysia. This species is a light hardwood with a density of 305–655 kg m⁻³ and the timber is suitable for plywood, particleboard, wood lamination and furniture. Sesenduk has been discovered as an alternative species to overcome the increasing price of rubberwood. This was due to sesenduk being extremely easy to be treated with chemicals (fire retardants or wood preservatives); it has excellent nailing and working properties and astonishing wood colour. Young plants of this species can be grown from seed or by vegetative propagation (tissue culture or rooted cuttings).

At FRIM this species was planted via tissue culture technique. When observed after 12 year, the trees planted by tissue culture showed different growth rates, i.e the trees from the superior mother trees showed better growth rate and more uniformity than the trees planted from seed. Besides growth performance, information on the properties of the wood cut from trees planted by tissue culture is needed. So, effort was carried out to study the anatomical, physical and mechanical properties of 12-year-old sesenduk clone (FRIMsrp001) which had been planted from tissue culture.

Struktur anatomi kayu menunjukkan sel salur yang sederhana besar, sebahagian sel salur adalah tunggal, biasanya sel salur tersusun secara radial berpasangan dalam dua ke tujuh barisan, terdapat tilosis dan deposit. Terdapat parenkima apotrakeal dan jelas kelihatan. Panjang gentian, diameter gentian, diameter lumen gentian, ketebalan dinding gentian, diameter dan ketumpatan sel salur bagi klon sesenduk berusia 12 tahun ialah 1966 μm , 43 μm , 34 μm , 4.5 μm , 228 μm , 6 mm^2 . Sifat anatomi menunjukkan peningkatan dari bahagian teras ke bahagian luar kayu kecuali diameter lumen gentian dan diameter sel salur yang menunjukkan variasi menurun ke bahagian luar kayu. Selain itu, sifat anatomi kayu menunjukkan peningkatan ke bahagian atas pokok. Walau bagaimanapun, ketumpatan sel salur menunjukkan variasi yang menurun ke bahagian atas dan tiada perbezaan bererti ($p \leq 0.05$) bagi diameter gentian di sepanjang ketinggian pokok.

Kandungan lembapan, ketumpatan, pengecutan tangen, pengecutan radial, MOR, MOE, mampatan dan kekuatan ricihan ialah 103 %, 323 kg m^{-3} , 2.5 %, 1.8 %, 48.2 N mm^{-2} , 5618 N mm^{-2} , 24.2 N mm^{-2} , 6.1 N mm^{-2} . Hasil menunjukkan kandungan lembapan meningkat daripada bahagian bawah ke atas pokok manakala ketumpatan, pengecutan tangen dan pengecutan radial menunjukkan variasi menurun ke atas. MOR dan MOE menunjukkan nilai yang tinggi di bahagian atas, manakala variasi menurun dilihat pada kekuatan ricihan tetapi tiada perbezaan bererti pada mampatan di sepanjang ketinggian pokok.

Hasil menunjukkan penanaman secara kultur tisu boleh dijadikan alternatif bagi penanaman sesenduk selain menggunakan biji benih. Teknik kultur tisu boleh memberikan hasil yang berterusan dan membolehkan sifat terbaik dipilih. Walau bagaimanapun, kajian selanjutnya perlu dijalankan terhadap sesenduk matang yang ditanam secara kultur tisu kerana pada usia 12 tahun sesenduk klon adalah muda dan mempunyai sifat yang berbeza berbanding kayu yang matang. Berdasarkan hasil kajian, pada usia 12 tahun sesenduk klon sesuai untuk kegunaan ringan seperti perabot, papan lapis, barangan kraftangan dan kayu laminasi. Walau bagaimanapun, kayu daripada pokok yang matang lebih berpotensi untuk kegunaan yang lebih meluas.

The wood anatomical structure on transverse section shows vessels with simple perforation, moderately large in size, few in number, few as solitary, predominantly in radial pairs and multiples of two to seven in a series and occasional clusters, and with tyloses and deposits absent. Wood parenchyma as regularly spaced apotracheal bands is visible to the naked eye. Fibre length, fibre diameter, fibre-lumen diameter, fibre wall thickness, vessel diameter and vessel density of the 12-y-old sesenduk clone were 1966 μm , 43 μm , 34 μm , 4.5 μm , 228 μm , and 6 mm^2 respectively. In terms of radial variation the anatomical properties showed an increasing trend from the pith towards the bark with the exception of fibre-lumen diameter and vessel diameter where the trend decreased outwards. On the other hand, the anatomical properties increased towards the top of the tree. However, the vessel density showed a decreasing trend upwards and there was no significant difference at ($p \leq 0.05$) in fibre diameter along the tree height.

The moisture content, density, tangential shrinkage, radial shrinkage, MOR, MOE, compression and shear were 103%, 323 kg m^{-3} , 2.5%, 1.8%, 48.2 N mm^{-2} , 5618 N mm^{-2} , 24.2 N mm^{-2} , and 6.1 N mm^{-2} respectively. The results showed that the moisture content increased from the bottom towards the top of the tree whereas the density, tangential shrinkage and radial shrinkage decreased upwards. The MOR and MOE showed the highest values at the top portion whereas a decreasing trend was observed in shear but there was no significant difference at $p \leq 0.05$ in compression along the tree height.

As conclusion, the wood properties derived from sesenduk clone planted from tissue culture seem to be promising and have a tendency to increase as the tree ages. This indicates that tissue culture can be an alternative propagation technique for sesenduk in forest plantation besides propagation by seed. Tissue culture technique can provide a regular supply of planting stock, with the ability to select the characteristics the plantation desires and having the standardized material in quantity. However, further research should be done to determine the wood properties of mature sesenduk trees propagated from tissue culture since at 12 years the sesenduk clone is considered juvenile, possibly with different wood properties. Based on the results, at the age of 12 years sesenduk clone is suitable for light duty purposes such as furniture, panelling, veneer, plywood, joinery work and souvenirs items. However, wood from matured trees would have higher potential for a wider scope of usage.

PENDOKUMENTASIAN PENGETAHUAN TRADISI ORANG ASLI DI SEMENANJUNG MALAYSIA

Pada tahun 2011, di bawah *Rolling Plan* Rancangan Malaysia ke-10 (RMK-10), satu projek bertajuk “Pangkalan Data Pengetahuan Tradisi Orang Asli di Semenanjung Malaysia” telah dijalankan dan memberi fokus kepada tumbuhan ubatan dan beraroma yang digunakan oleh tiga komuniti Orang Asli iaitu Jahut, Jakun dan Temuan. Projek ini merupakan sambungan kepada Rancangan Malaysia ke-9 (2006–2010) dan FRIM diberi tanggungjawab oleh NRE untuk melaksanakannya dengan peruntukan sebanyak RM400 000 pada tahun 2011.

Seperti kebiasaannya, proses pendokumentasian Pengetahuan Tradisi (PT) melibatkan beberapa aktiviti merangkumi lawatan dan kajian cepat (*rapid rural appraisal*), penganjuran bengkel kesedaran, pelaksanaan survei sosio-ekonomi dan bengkel latihan pengutipan dan pendokumentasian (fasa 1 dan 2). Selain itu, Jawatankuasa Teknikal berkaitan Memorandum Persefahaman (MoU) yang diwujudkan melibatkan wakil dari NRE, Jabatan Kemajuan Orang Asli (JAKOA), FRIM dan Batin dari tujuh komuniti yang dikaji. Keahlian jawatankuasa ini bertambah setiap tahun sebagai tambahan bagi setiap komuniti yang dikaji. Jawatankuasa Teknikal turut bertanggungjawab memastikan projek berjalan sepertimana dirancang dan segala keputusan dibuat melalui persetujuan bersama.

Dalam bengkel kesedaran pengetahuan Tradisi (PT) yang dijalankan di bawah projek ini, seramai 40 hingga 50 orang penduduk kampung menyertai aktiviti ini yang turut mendapat sokongan daripada JAKOA di peringkat daerah. Hasil daripada bengkel yang dijalankan, didapati peserta yang hadir mula sedar mengenai kepentingan untuk memulihara dan membangunkan PT mereka untuk kepentingan tempatan dan negara.

Survei sosioekonomi di kalangan isi rumah turut dijalankan bagi melihat tahap pengetahuan dan penggunaan tumbuhan ubatan dan beraroma yang digunakan dalam kehidupan seharian mereka. Daripada survei yang dijalankan, setiap komuniti menggunakan sejumlah 110–138 tumbuhan ubatan dan beraroma untuk merawat penyakit.

Bengkel latihan pendokumentasian dan pengutipan sampel (Fasa 1) melibatkan 20 hingga 25 orang peserta dari setiap komuniti dan mereka diajar untuk mendokumen pengetahuan mereka secara saintifik. Sejumlah 376 spesimen telah dikutip merangkumi 128 spesimen dari komuniti Temuan, 110 spesimen dari komuniti Jahut dan 138 spesimen dari komuniti Jakun.

Latihan pendokumentasian dan pengutipan sampel (Fasa 2) turut disertai oleh peserta yang sama. Dalam latihan ini, tiga hingga empat spesies tumbuhan terpilih dikutip daripada setiap komuniti untuk tujuan penyaringan

DOCUMENTING TRADITIONAL KNOWLEDGE OF THE ORANG ASLI IN PENINSULAR MALAYSIA

In 2011, under the first rolling plan of the Tenth Malaysia Plan, a project entitled “Database on Traditional Knowledge (TK) of the Orang Asli Community in Peninsular Malaysia” was carried out, focusing on the traditional medicinal and aromatic plants used by three Orang Asli communities (namely Jahut, Jakun and Temuan). In a continuation of the Ninth Malaysia Plan’s (mid-2007-2010) TK project, FRIM again was entrusted with the responsibility by NRE to continue this project with an allocation of another RM400,000 for 2011.

As usual, the process of documenting TK involved several activities, which included rapid rural appraisal (RRA), awareness workshops, socio-economic surveys, and documentation and specimen collection workshops (phases 1 and 2). Besides these activities, the existing Technical Committee on Memorandum of Understanding (MoU) which consisted of representatives from the NRE, Department of Orang Asli Development (in short, JAKOA), FRIM, and Tok Batin of the seven subethnic groups continued. The membership of the said committee grew each year as additional subethnic groups were being studied. The Technical Committee is responsible for ensuring that the project takes off as planned and that any decisions made are through consensus.

TK awareness workshops were organized, each attended by 40 to 50 villagers. The workshops were fully supported not only by villages but also the JAKOA at the district level. It was observed that, as a result of these workshops, each subethnic group seemed more aware of the importance of continued conservation and development of their TK, either for local or national purposes.

Socio-economic surveys were conducted to examine the extent of knowledge and use of medicinal plants in daily life. The survey revealed that each subethnic group used between 110 and 138 species of medicinal and aromatic plants as remedies for common illnesses.

A training workshop on documentation and specimen collection (Phase 1) involved 20 to 25 participants from each subethnic group. They were taught how to document their TK in a scientific way. A total of 376 specimens were collected, comprising 128 specimens from the Temuan, 110 specimens from the Jahut, and 138 specimens from the Jakun subethnic groups.

Another training workshop on documentation and specimen collection (Phase 2) was attended by the same number of participants. In this training, three to four selected species were collected from each subethnic group for phytochemical and bioactivity screening to assess their potential as therapeutic and cosmeceutical agents. In the future, the development of prototype

fitokimia dan bioaktiviti bagi mengenal pasti potensi spesies tersebut sebagai agen terapeutik dan kosmetik. Pada masa hadapan, pembangunan produk prototaip yang mampu dikomersialkan dijangka dapat memberi faedah pendapatan melalui mekanisme perkongsian faedah.

Projek PT ini telah meningkatkan imej Malaysia, NRE dan FRIM di peringkat antarabangsa. Projek ini dijalankan mengikut garis panduan Konvensyen Kepelbagaian Biologi (CBD) yang ditandatangani oleh Malaysia. Pada masa akan datang, Malaysia mampu menjadi model dunia dalam membuka satu hala tuju baharu berdasarkan objektif CBD iaitu “pemuliharaan kepelbagaian sumber biologi, penggunaan sumber secara mapan dan perkongsian faedah secara adil dan saksama hasil daripada pembangunan produk sumber genetik”.

KAJIAN PROFIL PROTEIN BAKTERIA

Kajian proteomik telah dimulakan di FRIM bagi mengkaji mod tindakan sebatian tumbuhan yang aktif bagi penyakit tertentu. Usaha untuk menjalankan pemetaan proteom telah dijalankan terhadap kuman *Staphylococcus aureus* yang rintang terhadap methicillin (MRSA).

Daripada kajian yang dijalankan, profil proteome MRSA dibangunkan dan digunakan sebagai peta rujukan untuk mengkaji keupayaan MRSA melawan tindakan agen antibakteria. Profil proteome ini dibandingkan dengan ekspresi proteome MRSA yang dirawat dengan ekstrak tumbuhan (*Quercus infectoria*). Perbezaan ekspresi protein dalam imej-imej janaan 2D-PAGE menunjukkan maklumat yang bersifat kuantitatif dan juga kualitatif berkenaan mod tindakan *Q. infectoria*. Perubahan corak yang amat ketara dalam MRSA dengan kehadiran *Q. infectoria* menunjukkan fungsi protein dalam MRSA yang telah direncat. Perubahan tersebut menunjukkan tindak balas global terhadap kerosakan yang berlaku di dalam sel MRSA. Hal ini mungkin dapat merungkai tanda-tanda rangkaian interaksi protein yang kompleks, termasuk maklumat berkaitan pengubahsuaian, kerosakan, penurunan, penempatan dan penyasaran protein.

Kajian lanjut bagi mengenal pasti ekspresi protein yang terhasil melalui 2D-PAGE ini amat berguna untuk memahami bagaimana *Q. infectoria* bertindak terhadap MRSA. Protein yang akan dikenal pasti kemungkinan terlibat dalam pelbagai fungsi selular bermula daripada transkripsi dan translasi, kitaran asid trikarboksilik (TCC), glikolisis dan juga laluan penapaian kepada laluan biosintetik bagi nukleotida, asid lemak dan juga komponen-komponen dinding sel. Keputusan pengesanan protein yang diperolehi tersebut dapat digunakan untuk meramal mod tindakan agen antibakteria terhadap MRSA.

products (potential products) for commercialization is expected to enhance each subethnic group's income through the establishment of a benefit-sharing mechanism.

This TK project has enhanced the image of Malaysia, the NRE and FRIM at the international level. Project implementation follows the requirements of the Convention of Biodiversity (CBD), of which Malaysia is a signatory. Charting and embarking on this new path, Malaysia could become a world model in implementing the CBD's objectives of conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the utilization of genetic resources.

PROTEIN PROFILING OF BACTERIA

Proteomics research has been initiated in FRIM to study the mode of action of potential phyto-compounds on certain diseases. An effort to map the proteome was conducted on methicillin resistant *Staphylococcus aureus* (MRSA). MRSA is a human pathogenic bacteria responsible for a wide variety of diseases ranging from wound infection to endocarditis, osteomyelitis and sepsis. The infection often complicates the therapy and could double the mortality rate among patients.

From studies conducted previously, profiles of MRSA proteome were developed and used as a reference map to study the pathogenicity of MRSA. The proteome profile was compared with the proteome expression of MRSA treated with plant extract (*Quercus infectoria*). The differential expressed proteins in the 2D-PAGE images indicate the quantitative and qualitative information about the mode of action of *Q. infectoria*. The massive protein changes in MRSA in the presence of *Q. infectoria* show that some functions of proteins in MRSA were being knocked down. The changes indicate a wholesome response towards the damage in the MRSA cells. This may indicate the complex protein interaction networks in cell which includes information on protein modification, damage, degradation, localization and target.

Further studies on the identification of proteins expressed in 2D-PAGE will be very useful to understand how *Q. infectoria* works on MRSA. The identified proteins may be associated with a variety of cellular functions ranging from the transcriptional and translational machinery, tricarboxylic acid cycle (TCC), glycolysis, and fermentation pathways to biosynthetic pathways of nucleotides, fatty acids, and cell wall components. The results obtained can be used to predict the mode of action of anti-bacterial agents against MRSA.



(a)



(b)

(a) Antara sistem 2D-PAGE yang diguna pakai di FRIM dan (b) kaedah mengeluarkan gel akrilamida daripada “glass cassette”

(a) One of 2D-PAGE system that being used in FRIM and (b) technique to remove acrylamide gel from glass cassette

KAJIAN TERHADAP *BAECKEA FRUTESCENS* DAN *TETRACERA MAINGAYI* KE ARAH PEMBANGUNAN PERSEDIAAN HERBA ANTIRADANG

Keradangan ialah sebahagian daripada tindak balas kompleks biologi tisu vaskular kepada rangsangan yang berbahaya, seperti patogen, sel-sel yang rosak atau jangkitan. Keradangan merupakan satu usaha perlindungan oleh organisma untuk menghapuskan rangsangan yang memudaratkan dan untuk memulakan proses penyembuhan. Tanpa keradangan, luka dan jangkitan tidak akan sembuh. Walau bagaimanapun, keradangan yang berlarutan atau kronik boleh membawa kepada pelbagai penyakit seperti demam alergi, periodontitis, aterosklerosis, artritis reumatoid dan kanser.

Tiga asai *in-vitro* berasaskan enzim (asai lipoxigenase, asai xanthine oxidase, asai hyaluronidase) yang membawa kepada penyakit sasar yang berbeza telah dibangunkan untuk ujian aktiviti antiradang. Asai ini juga ditawarkan sebagai perkhidmatan teknikal kepada industri herba.

Dalam asai Lipoxigenase, enzim lipoxidase memangkin pengoksidaan asid lemak tidak bergabung (asid linoleik) yang mengandungi *cis*, *cis*-1,4-pentadiene untuk membentuk hydroperoxides. Dalam asai xanthine oxidase, enzim xanthine oxidase menukarkan hypoxanthine kepada xanthine dan akhirnya asid urik. Asid urik yang terkumpul akan menyebabkan hiperuricaemia atau gout yang juga bertanggungjawab dalam kerosakan oksidatif kepada tisu hidup. Dalam asai hyaluronidase pula, enzim hyaluronidase bertindak dengan kehadiran asid hyaluronik sebagai substrat. Ia sering dikaitkan dalam kesan-kesan alergi, inflamasi topikal dan juga menyebabkan peningkatan dalam kebolehtelapan sistem vaskular.

STUDIES ON *BAECKEA FRUTESCENS* AND *TETRACERA MAINGAYI* TOWARDS DEVELOPMENT OF ANTI-INFLAMMATORY HERBAL PREPARATION

Inflammation is part of the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells, or irritants. Inflammation is a protective attempt by the organism to remove the injurious stimuli and to initiate the healing process. Without inflammation, wounds and infections would never heal. However, chronic inflammation can lead to a host of diseases, such as hay fever, periodontitis, atherosclerosis, rheumatoid arthritis, and even cancer.

Three *in-vitro* enzymatic assays (Lipoxygenase Assay, Xanthine Oxidase Assay, and Hyaluronidase Assay) for evaluating the anti-inflammatory properties of selected plant species that lead to treating different target diseases have been established and are currently offered to the herbal industries.

In Lipoxygenase Assay, lipoxidase catalyzes the oxidation of polyunsaturated fatty acids (linoleic acid) containing *cis*, *cis*-1,4-pentadiene systems to form hydroperoxides. In Xanthine Oxidase Assay, xanthine oxidase converts hypoxanthine to xanthine and finally to uric acid, and the accumulated uric acid causes hyperuricaemia associated with gout and is also responsible for oxidative damage to living tissues. In Hyaluronidase Assay, hyaluronidase degrades the hyaluronic acid, is known to be involved in allergic effects and topical inflammation and also causes an increase in the permeability of the vascular system.

Dengan ini, *Baeckea frutescens* dan *Tetracera maingayi* dipilih sebagai spesies yang berpotensi untuk dibangunkan sebagai persediaan herba antiradang. *Baeckea frutescens* atau dikenali sebagai cucur atap ialah pokok renek atau kecil dari famili Myrtaceae. *Tetracera maingayi* pula ialah spesies dari famili Dilleniaceae, juga pokok renek, memanjat yang dikenali sebagai mempelas atau akar mempelas.

Kajian yang dijalankan di FRIM terhadap *B. frutescens* menunjukkan aktiviti antiradang terutamanya pada perencatan enzim xanthine oxidase dalam kedua-dua ekstrak daun dan batang. Kajian fitokimia lanjut telah membawa kepada pemencilan empat sebatian utama daripada kumpulan flavonoid. BF 6322 yang terpencil daripada *B. frutescens* menunjukkan potensi yang signifikan terhadap asai antigout (xanthine oxidase). Kepekatan perencatan pada kadar 50% yang direkodkan ialah sebanyak 3.584 $\mu\text{g ml}^{-1}$. Penilaian tahap keselamatan terhadap dua sel normal juga menunjukkan $\text{IC}_{50} \geq 20\mu\text{g ml}^{-1}$ dan dianggap sebagai kurang toksik.

Kajian ke atas *T. Maingayi* pula menunjukkan ekstrak daunnya mempunyai aktiviti antiradang yang tinggi serta tidak memberi kesan sitotoksik pada sel normal daripada hati buah pinggang. Ekstrak aktif antiradang terdiri daripada campuran sebatian yang terdiri daripada kumpulan flavonoid, flavonoid glikosida dan terpenes. Beberapa sebatian telah berjaya dipencilkan dan dikenal pasti daripada fraksi aktif tersebut. Dua sebatian yang dikenal pasti menunjukkan perencatan yang tinggi (>90%) terhadap asai xanthine oxidase dan asai lipoxigenase.

Pendekatan secara sistematik telah dijalankan untuk mendapatkan ekstrak piawai aktif antiradang daripada kedua-dua spesies. Kesan parameter pengekstrakan seperti suhu, masa pengekstrakan dan nisbah pelarut serta aktiviti antiradang diambil kira dan dikaji. Hasilnya, ekstrak antiradang yang sangat aktif dengan memberikan perencatan > 90% dalam semua asai yang dikaji. Penyediaan formulasi bahan aktif telah dibangunkan untuk bertindak sebagai bahan aktif dalam penyediaan herba yang lebih berkualiti, berkesan dan selamat digunakan.

In this study, *Baeckea frutescens* and *Tetracera maingayi* were selected as potential species to be developed as anti-inflammatory herbal preparation. *Baeckea frutescens* (cucur atap) is a shrub or small tree of the Myrtaceae family. *Tetracera maingayi*, a species from the Dilleniaceae family, is also a shrub, sometimes a straggling plant or liana, locally known as mempelas or akar mempelas. A study on *B. frutescens* has reported its anti-inflammatory properties mainly on xanthine oxidase inhibition in both leaf and stem extracts. Further phytochemical work has led to the isolation of four major compounds from the flavonoid group. BF 6322 isolated from *B. frutescens* showed potential anti-gout properties. The xanthine Oxidase Assay showed IC_{50} of 3.584 $\mu\text{g ml}^{-1}$. In addition cytotoxicity evaluation against two normal cell lines showed $\text{IC}_{50} \geq 20 \mu\text{g ml}^{-1}$ and were considered as less toxic.

On the other hand, *T. maingayi* leaf extracts showed potent anti-inflammatory activity but with no cytotoxic effect on normal liver and kidney cells. The bioactive extract was found to be a mixture of compounds comprising mainly flavonoids, flavonoid glycoside and terpenes. Several compounds have been successfully isolated and identified from the active fraction. Two of the identified compounds showed high inhibition towards xanthine oxidase and lipoxidase.

Systematic attempts are currently being carried out to develop standardized extracts with anti-inflammatory properties from both plants. Effects of extraction parameters such as temperature, extraction time and solvent ratio as well as their anti-inflammatory properties have been investigated. On this basis, highly active anti-inflammatory extracts giving inhibition >90% in all assays tested have been obtained. Formulations of active solutions have been developed and are suitable to be incorporated as 'active ingredients' in potential and affordable herbal preparations.

PENGURUSAN PENYELIDIKAN DAN **PEMBANGUNAN**

MANAGEMENT OF RESEARCH AND DEVELOPMENT

PENGURUSAN PENYELIDIKAN DAN PEMBANGUNAN

Pada 2011, sebanyak 26 projek R&D baharu berjumlah RM4.6 juta yang dikemukakan oleh FRIM telah diluluskan oleh pelbagai agensi penaja kebangsaan dan antarabangsa. Daripada jumlah tersebut, empat projek berjumlah RM767 260 merupakan projek ScienceFund di bawah Kementerian Sains Teknologi dan Inovasi (MOSTI); satu projek di bawah Kementerian Pertanian dan Industri Asas Tani (MOA) bernilai RM80 000; 13 projek Geran Penyelidikan, Prakomersialisasi dan Penerbitan (RPP) di bawah MFRDB berjumlah RM225 000; serta lima projek berjumlah kira-kira RM3.5 juta dibiayai oleh agensi-agensi lain.

Jumlah dana terbesar iaitu sebanyak RM1.8 juta diperoleh daripada International Timber Trade Organizations (ITTO) bagi membiayai projek yang bertajuk “Reducing forest degradation and emission through SFM in Peninsular Malaysia” yang diketuai oleh Dr Samsudin Musa. Satu lagi projek yang bertajuk “Research on development of forest carbon monitoring methodologies for REDD + in Malaysia” oleh Dr Khali Aziz Hamzah mendapat pembiayaan berjumlah RM600 852 daripada *Forestry and Forest Products Research Institute* (FFPRI).

Mesyuarat Jawatankuasa Penilaian Institut (JPI) FRIM diadakan sebanyak enam kali (17–18 Februari, 11–13 Mei, 8 Juli, 21 Oktober dan 20 Disember) dan telah menilai sebanyak 65 cadangan penyelidikan sebelum dihantar kepada pihak penaja.

Seperti tahun-tahun sebelumnya, Bengkel Penilaian dan Pemantauan Projek (PEM) FRIM telah diadakan sebanyak dua kali iaitu pada 25 dan 27 April serta 13–15 Disember untuk menilai projek-projek R&D yang sedang dilaksanakan menerusi sesi viva dan seminar.

MANAGEMENT OF RESEARCH AND DEVELOPMENT

In 2011, a total of 26 new R&D projects amounting to RM4.6 million were approved by various national and international funding agencies. Four R&D projects of RM767 260 were funded under the ScienceFund of the Ministry of Science, Technology and Innovation (MOSTI), one project under the Ministry of Agriculture and Agro-Based Industry (MOA) totalling RM80 000; 13 Research, Pre-commercialization and Publication Grant (RPP) projects by the MFRDB totalling RM225 000, and five projects amounting to RM3.5 million by other various government and private agencies.

The largest fund, i.e. RM 1.8 million was received from the International Timber Trade Organization (ITTO) for a project entitled “Reducing forest degradation and emission through SFM in Peninsular Malaysia” led by Dr Samsudin Musa. Another R&D project, “Research on development of forest carbon monitoring methodologies for REDD + in Malaysia”, which was led by Dr Khali Aziz Hamzah, received a total of RM600 852 from the Forestry and Forest Products Research Institute (FFPRI).

The Institute Evaluation Committee (JPI) met six times and evaluated a total of 65 research proposals before submitting them to funding agencies.

Like in previous years, Project Evaluation and Monitoring (PEM) workshops were organized twice, on 25 and 27 April and 13–15 December, and evaluated ongoing R&D projects through viva and seminar sessions.

PROJEK YANG DILULUSKAN PADA 2011
PROJECTS APPROVED IN 2011

BIL. NO.	TAJUK PROJEK PROJECT TITLE	KETUA PROJEK PROJECT LEADER	DANA FUND (RM)	GERAN/PENAJA GRANT/FUNDING AGENCY
1	Improving the recovery of rubberwood dimension stocks from saw-dry-rip (DSR) process, incorporating high temperature drying	Dr Sik Huei Shing	192,600	ScienceFund/MOSTI
2	Determination of conversion factor from small clear specimens to EN408 strength values for Malaysian timbers	Mohd Jamil Abdul Wahab	235,160	
3	Impact of selective logging on tree diversity, soil properties, carbon stock and sustainability of key timber species population in an upper hill dipterocarp forest, Peninsular Malaysia	Dr Abd Rahman Kassim	119,000	
4	Development of moulded laminated bamboo veneer as components for selected furniture design	Abdul Hamid Salleh	220,500	
JUMLAH/TOTAL			767,260	
5	Development of microsatellite markers for begonias of Peninsular Malaysia for population genetic studies	Chan Yoke Mui	80,000	ScienceFund/MOA
JUMLAH/TOTAL			80,000	
6	Surface modification of activated carbon derived from bamboo for supercapacitors application	Mahanim Sarif @ Mohd Ali	20,000	RPP/MFRDB
7	Development of fungal strain FRIM550 as a potential anti-MRSA drug candidate: methods to optimize production of active compound P1 (and its analog/s)	Muhammad Syamil Azahar	20,000	
8	Inventory and mapping of fireflies in FRIM for potential ecotourism development	Nada Badruddin	20,000	
9	Authenticated references of bamboo occurring in FRIM	Nordahlia Abdullah Siam	20,000	
10	A preliminary study on the potential of ants as a biological enhancer of gaharu production	Nur Zati Akma Mustafa	5,000	
11	Determination of optimized lamination processes to produce good bonding performances of thermal wood	Ong Chee Beng	20,000	
12	Development of protein extraction and solubilization parameters for methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	Nor Datiakma Mat Amin	20,000	
13	Assessment of carbon stock changes in Peninsular Malaysia forest from the national forest inventory (NFI) datasets	Salleh Mat	6,000	

BIL. NO.	TAJUK PROJEK PROJECT TITLE	KETUA PROJEK PROJECT LEADER	DANA FUND (RM)	GERAN/PENAJA GRANT/FUNDING AGENCY
14	Documenting natural nectar plants and nectaring behavior of birdwings for an open concept butterfly garden in FRIM	Phon Chooi Kim	20,000	RPP/MFRDB
15	Inhibitory activity of novel codonopsinine derivatives against methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	Saiful Azmi Johari	20,000	
16	A laboratory-scale treatment of water source in FRIM campus using filtration method	Saiful Iskandar Khalit	20,000	
17	Development of molecular tools for the identification and establishment of aculture collection of Microporus, a wood decay fungus with potential economic importance	Thi Bee Kin	20,000	
18	Movement patterns and nesting behaviour of selected small mammals at different forest habitats in FRIM	Mohd Shahfiz Azman	14,000	
JUMLAH/TOTAL			225,000	
19	Synthesis, characterization and evaluation of 3-pyrrolin-2-ones derivatives as anti-methicillin resistant <i>Staphylococcus aureus</i> (MRSA) agent	Adiana Mohamed Adib	20,000	MTSF (Toray)
20	Research on development of forest carbon monitoring methodologies for REDD + in Malaysia	Dr Khali Aziz Hamzah	600,852	Forestry and Forest Products Research Institute (FFPRI)
21	Forest cover and carbon mapping in the greater Mekong subregion and Malaysia	Dr Khali Aziz Hamzah	280,935	Chinese Forest Academy
22	Chemical fingerprinting of <i>Eurycoma longifolia</i> and <i>E. apiculata</i> : an authentication tool in quality control of herbal materials	Tan Ai Lee	200,000	Tabung Luar Jangka
23	Assessment on the supply of ten selected herbal species in Peninsular Malaysia	Rohana Abd Rahman	20,000	Tabung Luar Jangka
24	Enrichment of <i>Eurycoma longifolia</i> 's botanical extract with ALKAElong and evaluation of ALKAElong's synergistic effects with selected chemo-drugs as anti-proliferating agent	Dr Nur Hanan Murni Yunos	300,000	NKEA Herbs Research Grant Scheme (NRGS)
25	Evaluation of polysaccharides from <i>Eurycoma longifolia</i> as potential ergogenic aids	Abd Rashid Li	280,000	NKEA Herbs Research Grant Scheme (NRGS)
26	Reducing forest degradation and emission through SFM in Peninsular Malaysia	Dr Samsudin Musa	1,850,000	ITTO
JUMLAH/TOTAL			3,551,787	
JUMLAH BESAR DANA R&D/ R&D FUNDS' GRAND TOTAL			4,624,047	

SEMINAR/PERSIDANGAN/BENGKEL/DIALOG/FORUM/KURSUS
SEMINARS/CONFERENCES/WORKSHOPS/DIALOGUES/FORUMS/COURSES

BIL NO.	TAJUK TITLE	TARIKH DATE
1	Seminar "Ecology and Genetics of Dipterocarps—Its Role in Sustainable Forest Management JIRCAS-FRIM-NRE" Seminar on Ecology and Genetics of Dipterocarps—Its Role in Sustainable Forest Management JIRCAS-FRIM-NRE	24–26 Januari/January
2	Ceramah bertajuk "Flammability Test Requirements for Furniture in the UK" Talk on Flammability Test Requirements for Furniture in the UK	25 Januari/January
3	Program Kesedaran mengenai Kepentingan Pemuliharaan Bakau di Delta Kelantan /Awareness Program on the Importance of Mangrove Conservation in Delta Kelantan	24 Februari/February
4	Kursus Latihan mengenai "Laminated Window Scantling for Quality Inspectors" Training on Laminated Window Scantling for Quality Inspectors	1 Mac/March
5	Pemindahan Teknologi mengenai Metodologi yang digunakan bagi Projek Perdagangan Domestik Knowledge Transfer on Methodology Used for Domestic Trade Project	3 Mac/March–1 April
6	Bengkel "State of the World Forest Genetic Resources Workshop, Kuala Lumpur (FA/AFAFRI/Bioversity International)" State of the World Forest Genetic Resources Workshop, Kuala Lumpur (FA/AFAFRI/Bioversity International)	7–9 Mac/March
7	Kursus Tapak Semaian FRIM/PACOS/CIMB FRIM/PACOS/CIMB Nursery Course	7–11 Mac/March
8	Kursus Pengecaman Spesies Pokok Hutan Forest Tree Species Identification Course	7–11 Mac/March, 19–23 September & 14–18 November
9	Bengkel Pengutipan Spesimen Tumbuhan bagi Orang Asli Semai di Kg Ulu Groh, Gopeng, Perak Workshop on Plant Specimen Collection among the Orang Asli Semai in Kg Ulu Groh, Gopeng, Perak	12–14 April, 24–26 April
10	Bengkel Kesedaran Pengetahuan Tradisi di Kalangan Orang Asli/Awareness Workshop on Traditional Knowledge among Orang Asli	22 April
11	Bengkel Konservasi: Teknologi Penyelidikan dalam Pemuliharaan Produk dan Artifak daripada Kayu, Buluh dan Rotan Workshop on Conservation: Research Technology in Products and Artifacts from Wood, Bamboo and Rattan	26 April
12	Kursus Teknologi Pulpa dan Kertas— (siri 1 dan 2) Course on Pulp and Paper Technology— (Series 1 and 2)	18–19 Mei/May & 23–26 Mei/May
13	Dialog dengan Sabah Timber Industry Association Dialogue with Sabah Timber Industry Association	23 Mei/May
14	Seminar Kebangsaan Projek-Projek Penyelidikan & Pembangunan (R&D) Bagi Hutan Persisiran Pantai di Malaysia National Seminar on Research & Development Projects on Coastal Forests in Malaysia	7–8 Jun/June
15	Kursus Teknik dan Pengurusan Herbarium Course on Herbarium Techniques and Management	13–17 Jun/June & 17–21 Oktober/ October
16	Bengkel Penilaian Rapid Bio-D Workshop on Rapid Bio-D Assessment	13–17 Jun/June

BIL NO.	TAJUK TITLE	TARIKH DATE
17	Bengkel Pembentukan Sifir Isi Padu Workshop on Volumetric Multiplication	24–25 Jun/June
18	Bengkel Pendidikan Alam Sekitar dalam Pembelajaran Luar Bilik Darjah Workshop on Environmental Education and Outdoor Learning	28–29 Jun/June
19	Bengkel Pengendalian Biji Benih Spesies Hutan Workshop on Handling of Forest Species Seeds	5–7 Julai/July
20	Bengkel Latihan Pendokumentasian & Pengutipan Sampel Tumbuhan Ubatan dan Beraroma di Kg. Pulau Kempas, Kuala Langat Selangor (Fasa 1 & 2) Workshop on Documentations Training & Medicinal and Aromatic Plant Speciment Collection at Kg. Pulau Kempas, Kuala Langat Selangor (Phases 1 & 2)	5–7 Julai/July & 16–18 Ogos/August
21	Kursus Teknologi Piawai Tumbuhan Ubatan dan Peningkatan Kualiti Produk Herba Course on Technology for Standardization of Medicinal Plants and Quality Enhancement of Herbal Products	12–14 Julai/July
22	Seminar Bio Nexus Bio Nexus Seminar	26 Julai/July
23	Bengkel Kebangsaan Pengurusan dan Analisis Data Ekologi National Workshop on Management and Analysis of Ecology Data	27–29 Julai/July
24	Bengkel Latihan Pendokumentasian & Pengutipan Sampel Tumbuhan Ubatan Dan Beraroma di Kg. Paya Mendoi, Kuala Krau, Pahang (Fasa 1 & 2) Workshop on Documentation Training & Medicinal and Aromatic Plants Speciment Collection at Kg. Paya Mendoi, Kuala Krau, Pahang (Phases 1 & 2)	5–9 September & 3–7 Oktober/October
25	Latihan Teknik-Teknik Kultur Tisu untuk Biotech Corporation Training on Tissue Culture Techniques for Biotech Corporation	13 Jun–15 September
26	Kursus Pengenalan Penyakit Pokok Hutan Course on Introduction to Forest Tree Diseases	19–21 September
27	Simposium Antarabangsa Tentang Kos dan Faedah REDD+: Apa, Siapa, Bagaimana dan Bila International Symposium on Costs and Benefits of REDD+: What, Who, How and When	19–20 September
28	Bengkel Analisis Pemegang Taruh Kemampanan Pengurusan Hutan dan Pensijilan Chain-of Custody Workshop on Stakeholder Analysis on Sustainability Forest Management and Chain-of-Custody Certification	22 September
29	Bengkel Latihan Pendokumentasian & Pengutipan Sampel Tumbuhan Ubatan Dan Beraroma di Kg. Bangkong, Pekan, Pahang (Fasa 1 & 2) Training Workshop on Documentation & Medicinal and Aromatic Plants Speciment Collection at Kg. Bangkong, Pekan, Pahang (Phase 1 & 2)	26–30 September & 1–5 Oktober/October
30	Pemindahan Teknologi mengenai “Heat Treatment of Wood Packing Material” Technology Transfer on Heat Treatment of Wood Packing Material	27 September
31	Kursus Analisis Pelepasan Formaldehid Course on Folmaldehyde Emission Analysis	3–7 Oktober/October
32	Program Latihan Teknikal (Dialog dengan Pemegang Taruh Utama termasuk MTIB)/Technical Training Programmes (Dialogue with Major Stakeholders Including MTIB)	11 Oktober/October
33	Analisis Pelepasan Formaldehid daripada Produk Komposit Kayu Formaldehyde Emission Analysis from Wood Composite Products	11–14 Oktober/October

BIL NO.	TAJUK TITLE	TARIKH DATE
34	Kursus Pemprosesan Kayu dan Kemasiapan Course on Wood Processing and Finishing	17–20 Oktober/October
35	Asas Pengenalan Buluh Basic Introduction to Bamboo	2 November
36	Bengkel Sistem Pengurusan Sumber Hutan Workshop on Forest Resource Management System (FRMS)	11 November
37	Kursus First Aider/ First Aider Course	14–15 November
38	Seminar Penghijauan Industri Perabot ke arah Pelestarian dan Keuntungan Seminar on Greening the Furniture Industry for Sustainability and Profitability	14 November
39	Bengkel Teknik Pemprofilan DNA Mikrosatelit dan Transformasi Genetik Tumbuhan Workshop on Microsatellite DNA Profiling Techniques and Plant Genetic Transformation	15 November
40	Seminar Teknikal Pembinaan Menggunakan Kayu Technical Seminar on Timber Construction	17 November
41	Seminar Pembangunan Usahawan Industri Perabot Sarawak Seminar on Furniture Industry Entrepreneur Development	23–24 November

SIMPOSIUM ANTARABANGSA TENTANG KOS DAN KELEBIHAN REDD PLUS: "REDD PLUS: WHAT, WHO, HOW AND WHEN?"

Simposium Antarabangsa Tentang Kos dan Kelebihan REDD Plus, bertemakan "What, Who, How and When?" telah dianjurkan dengan jayanya pada 19–20 Ogos di Kuala Lumpur. Simposium tersebut dirasmikan oleh Dato' Dr Abd Latif Mohmod, Ketua Pengarah FRIM mewakili Menteri NRE, Dato Sri Douglas Uggah Embas. Simposium ini merupakan anjuran bersama FRIM, Hiroshima University, NRE, United Nations University (UNU), Institute of Advanced Study dan Forestry and Forest Products Research Institute (FFPRI).

Seramai 114 peserta daripada pelbagai agensi antarabangsa dan tempatan telah menghadiri simposium tersebut. Antaranya termasuklah Japan, Indonesia, Finland, Vietnam, Singapura dan Australia. Sejumlah 20 kertas kerja (tiga kertas ucaptama dan 17 kertas pembentangan) telah disampaikan. Kertas ucaptama telah disampaikan oleh Dr Abd Rahim Nik, Timbalan Ketua Setiausaha NRE, Dr Midori Sasaki dari Kementerian Alam Sekitar Jepun dan Dr Mitsuo Matsumoto dari FFPRI.

Bersempena dengan seminar tersebut, FRIM dan Universiti Hiroshima juga telah menandatangani Memorandum Persefahaman (MoU) bagi tujuan menjalin kerjasama dalam penyelidikan jangka panjang. Antara objektif MoU ini adalah untuk memahami dan menguasai ilmu pengetahuan dan maklumat berkenaan kos dan manfaat REDD, dan mewujudkan peluang memperoleh sistem dana untuk menyokong aktiviti REDD *Plus* yang melindungi perkhidmatan ekosistem dan memelihara kesejahteraan komuniti tempatan.

INTERNATIONAL SYMPOSIUM ON COST AND BENEFITS OF REDD PLUS: WHAT, WHO, HOW AND WHEN?

The International Symposium on Cost and Benefits of REDD Plus, themed "What, Who, How and When?" was successfully held on 19–20 August in Kuala Lumpur. It was officiated by Dato' Dr Abd Latif Mohmod, the Director General of FRIM, representing the Minister of NRE. The symposium was jointly organized by FRIM, Hiroshima University, NRE, United Nations University (UNU), Institute of Advanced Study and Forestry and the Forest Products Research Institute (FFPRI).

The symposium was attended by 114 participants from various local and international agencies. Among the participants were from Japan, Indonesia, Finland, Vietnam, Singapore and Australia. A total of 20 papers (three keynote papers and 17 oral presentations) were delivered during the symposium. The keynote addresses were delivered by Dr Abd Rahim Nik, Deputy Secretary General of NRE, Dr Midori Sasaki from the Ministry of Environment Japan and Dr Mitsuo Matsumoto from the FFPRI.

In conjunction with the seminar, FRIM and Hiroshima University signed a memorandum of understanding (MoU) for the purpose of long-term research and collaboration. The objectives of this MoU were to take stock of current knowledge and information on costs and benefits of REDD, and to provide an opportunity to deliberate on funding systems to support REDD plus activities that protect the ecosystem services and secure the socio-economic well-being of local communities.

SESI JARINGAN RANGKAIAN KERJA RAKAN KONGSI BIONEXUS (BNP) DALAM BIDANG BIOTEKNOLOGI PERTANIAN DAN PERINDUSTRIAN

Sesi jaringan rangkaian kerja Rakan Kongsi BioNexus (BNP) dalam bidang bioteknologi pertanian and perindustrian yang bertemakan "*Sains kepada Pertanian: Sumbangan FRIM*" telah diadakan pada 26 Julai di FRIM. Sesi ini merupakan anjuran bersama FRIM dan Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) dan dirasmikan oleh YB Datuk Seri Dr Maximus Johnity Ongkili, Menteri Sains, Teknologi dan Inovasi. Pusat Kecemerlangan BNP untuk Pembangunan Produk Semula Jadi dan Monograf Herba Jilid II turut dilancarkan.

Objektif utama sesi jaringan rangkaian kerja ini adalah untuk mempromosi makmal-makmal BNP di FRIM. FRIM telah dilantik sebagai salah satu BNP sejak Disember 2008. Program BNP ini ialah inisiatif Malaysian Biotechnology Corporation Sdn. Bhd. (BiotechCorp) yang bertujuan menyokong keperluan industri bioteknologi Malaysia untuk kemudahan, infrastruktur dan keupayaan penyelidikan yang berteknologi tinggi dengan harapan syarikat-syarikat BioNexus akan dapat menggunakan kemudahan dan perkhidmatan yang ditawarkan ini. Sehingga kini, sebanyak enam makmal daripada Bahagian Bioteknologi Perhutanan dan Bahagian Hasil Semula Jadi telah dianugerahkan status BNP iaitu Makmal Kultur Tisu, Makmal Genetik, Makmal Fitokimia, Makmal Pembangunan Produk Herba, Makmal Farmakognosi dan Makmal Teknologi Herba. Objektif lain sesi jaringan rangkaian kerja ini adalah untuk mewujudkan platform dalam penyebaran maklumat perkhidmatan yang ditawarkan, kelengkapan dan kemudahan makmal sedia ada dalam makmal BNP di FRIM; meningkatkan penggunaan perkhidmatan, kelengkapan dan kemudahan serta menggalakkan kerjasama R&D antara pihak industri dan makmal BNP FRIM serta meningkatkan potensi komersialisasi produk bioteknologi.

SEMINAR KEBANGSAAN PROJEK-PROJEK PENYELIDIKAN DAN PEMBANGUNAN (R&D) BAGI HUTAN PESISIRAN PANTAI DI MALAYSIA

Program Penanaman Pokok Bakau dan Spesies-spesies yang Sesuai di Pesisiran Pantai Negara telah dilaksanakan bermula tahun 2005. Walaupun penanaman telah dilaksanakan, keperluan data dan maklumat daripada kajian-kajian penyelidikan dan pembangunan (R&D) yang berkaitan dengan penanaman seperti kesesuaian spesies, serangan penyakit dan serangga perosak, kesesuaian persekitaran dari segi tanah, ombak, hakisan perlu juga diambil kira. Justeru, adalah wajar bagi maklumat dan data daripada kajian R&D ini dikongsi bagi mendapat maklum balas terutamanya daripada agensi pelaksana.

BIONEXUS PARTNERS (BNP) NETWORKING SESSION ON AGRICULTURAL AND INDUSTRIAL BIOTECHNOLOGY

The BioNexus Partners (BNP) Networking Session on Agricultural and Industrial Biotechnology themed "*Science to Business : FRIM's Contributions*" was held on 26 July in FRIM. This networking session was jointly organised by FRIM and Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp). It was officiated by YB Datuk Seri Dr Maximus Johnity Ongkili, Minister of Science, Technology and Innovation. Launching of *BNP Centre of Excellence for Natural Product Development* and *Herbal Monograph Volume II* were held during the opening ceremony.

The key objective of this networking session was to promote FRIM's BNP laboratories. FRIM has been appointed as one of the BNP since December 2008. The BNP programme is an initiative by the Malaysian Biotechnology Corporation Sdn Bhd (BiotechCorp) aimed at supporting the needs of Malaysia's biotechnology industry for high-end research facilities, infrastructure and capabilities. In return, these laboratories and units will be required to guarantee BioNexus companies and other relevant commercial entities access to the facilities and services they offer. To date, there are six laboratories from the Forestry Biotechnology and Natural Product Divisions which have been accredited the BNP status. Laboratories with BNP status are the Tissue Culture Laboratory, Genetic Laboratory, Phytochemistry Laboratory, Herbal Product Development Laboratory, Pharmacognosy Laboratory and Herbal Technology Laboratory. Other objectives of this Networking Session were to create a platform to disseminate information on the services, equipment and facilities available in our BNP laboratories, to increase the utilization of these services, equipment and facilities, and to encourage R&D collaborations between the industry and our BNP laboratories, and potential commercialization of biotechnology products.

NATIONAL SEMINAR ON RESEARCH AND DEVELOPMENT (R&D) PROJECTS FOR COASTAL FORESTS IN MALAYSIA

The *Program Penanaman Pokok Bakau dan Spesies-spesies yang Sesuai di Pesisiran Pantai Negara* was implemented in 2005. Although planting was done in some areas, it still lacked data and information from research studies and development (R&D) related to planting, such as the suitability of species, diseases and insect pests, soil suitability, waves and erosion. Therefore, it is important for the information and data obtained from R&D to be shared to get some feedback, especially from the implementing agency.

Seminar yang diadakan di Auditorium FRIM pada 7 hingga 8 Jun berjaya menghasilkan percambahan fikiran terutamanya antara agensi yang menjalankan R&D bagi menentukan hala tuju R&D dan pelaksanaannya untuk masa hadapan. Seminar ini telah dirasmikan oleh Datuk Aziyah Mohamed yang mewakili Ketua Setiausaha NRE.

Seminar yang bertemakan “Hala Tuju R&D dan Pelaksanaannya” dengan 15 pembentangan kertas kerja dan 33 dalam bentuk poster telah dapat menarik 153 peserta daripada pelbagai agensi yang berkaitan. Antara penemuan serta impak baru yang diperoleh daripada seminar ini ialah dari segi penanaman, penilaian tanah, maklumat ombak/arus, perosak terhadap tanaman, pemantauan berterusan terhadap kawasan hutan bakau yang sedia ada di Sabah dan Sarawak, menggunakan teknologi penderiaan jauh dan GIS, mengenal pasti kawasan yang terancam oleh hakisan pantai, kajian untuk mempertingkatkan lagi penggunaan kayu bakau bagi pengeluaran produk nilai tambah; dan kajian perkhidmatan ekosistem hutan paya laut akan di pertingkatkan.

The seminar was held at FRIM’s Auditorium on 7 to 8 June as a platform to exchange ideas, especially between R&D agencies to determine the direction of R&D and its implementation for the future. This seminar was officiated by Datuk Aziyah Mohamed representing the Secretary General of NRE.

The seminar with the theme “Direction of R&D and its implementation” which consisted of 15 oral presentations and 33 poster presentations managed to attract 153 participants from various related agencies. The seminar emphasized on the results of research undertaken by this project and other government agencies as well as non-governmental organizations involved with collecting and disseminating new information on mangrove forest, presented findings that could be used in the field and identified problems in implementing and determining the direction of R&D in the future. Among the new discoveries and impacts gained from the seminar is in the field of planting, land suitability, information on tides and currents, pests and diseases, continuous monitoring of the existing mangrove forests in Sabah and Sarawak, remote sensing and GIS technology, identifying areas threatened by coastal erosion, improving the use of mangrove wood for the production of value-added products, and the increasing the studies of mangrove ecosystem services in the near future.

KURSUS TEKNOLOGI PIAWAIAN TUMBUHAN UBATAN DAN PENINGKATAN KUALITI PRODUK HERBA

Kursus ini telah dianjurkan pada 12 hingga 14 Julai yang bertindak sebagai satu platform dalam proses pemindahan teknologi bagi memperkenalkan kepakaran FRIM, kaedah baharu, penemuan saintifik dan teknologi terkini. Kursus ini bertujuan untuk memberi kesedaran kepada peserta dalam meningkatkan kualiti produk herba tempatan yang berpotensi menembusi pasaran global. Seramai 22 orang peserta daripada industri herba, agensi kerajaan, institut penyelidikan dan orang perseorangan telah menyertai kursus ini.

Pengendalian kursus telah dilaksanakan secara teori dan praktikal berkenaan aktiviti kajian penyelidikan dan pembangunan di FRIM yang berkaitan dengan tumbuhan ubatan dan produk herba serta kaedah dalam meningkatkan kualiti produk herba, bermula daripada pemilihan bahan mentah tumbuhan, penilaian biopotensi sehinggalah kepada pembangunan produk herba. Ceramah berkenaan topik piawaian bahan mentah tumbuhan, penilaian biopotensi, pemprosesan dan pembangunan produk, kawalan kualiti serta isu-isu pengawalan dan penguatkuasaan turut disentuh dalam kursus ini.

COURSE ON TECHNOLOGY FOR STANDARDIZATION OF MEDICINAL PLANTS AND QUALITY ENHANCEMENT OF HERBAL PRODUCTS

This course was organized by the Natural Products Division on 12 to 14 July at FRIM which acted as an avenue for technology transfer that introduced FRIM’s expertise, new methods, scientific discoveries and technologies. The aim of the course was to bring awareness to the participants on improving the quality of local herbal products which have the potential to penetrate the global market. There were 22 participants mainly from the herbal industry, government agencies and research institutes, including a few interested individuals.

The course provided the participants with theoretical and practical exposure to research and development (R&D) activities carried out by FRIM on medicinal plants and herbal products as well as methods of enhancing the quality of herbal products, from the selection of raw materials, assessment of their bio-potentials, right up to the product development. There were talks on topics such as standardization of raw materials, evaluation of biopotentials, processing and development of products, quality control of products and issues on regulation and enforcement.

PAMERAN

Pada tahun 2011, FRIM telah mengambil bahagian/ menyertai 25 pameran di dalam negara. Peranan pameran ini tidak kurang pentingnya kerana melaluinya aktiviti pemindahan teknologi dapat dilaksanakan. Pameran juga merupakan satu medium untuk para penyelidik FRIM menguji tahap kepakaran mereka menerusi pertandingan reka cipta dan inovasi seperti *Malaysia Technology Expo (MTE)*, *International Invention, Innovation and Technology Exhibition (ITEX)* dan *Bio Malaysia*. FRIM juga dapat menjalankan tanggungjawab korporat dan sosial kepada masyarakat melalui aktiviti pameran ini. Sepanjang tahun 2011, FRIM telah mencatat dua kejayaan dalam pertandingan kreativiti hiasan gerai pameran terbaik. Kejayaan tersebut ialah mendapat tempat kedua kategori Gerai Pameran Terbaik di Pameran “Malaysian International Commodity Conference And Showcase” (MICCOS) 2011 (peringkat Kebangsaan) dan Naib Johan Anugerah Rekaan dan Hiasan Pameran Terbaik sempena Hari Inovasi Kementerian Sumber Asli dan Alam Sekitar.

EXHIBITIONS

In 2011, FRIM participated in 25 exhibitions held locally. Exhibitions are crucial for FRIM to transfer its technologies. They also serve as a medium for FRIM researchers to gauge their level of expertise by competing in inventions and innovation-based exhibitions such as *Malaysia Technology Expo (MTE)*, *International Invention, Innovation and Technology Exhibition (ITEX)* and *Bio Malaysia*. In addition, some exhibitions also facilitate FRIM in fulfilling its corporate and social responsibilities. In 2011, FRIM won two awards in the creative decoration and best booth competition at both the national and ministry levels. FRIM won second prize in the Malaysian International Commodity Conference and Showcase (MICCOS) 2011 (national level) and was runner-up in the Booth Design and Decoration Award in conjunction with the Natural Resources and Environment Ministry (NRE).

Pameran yang dianjurkan/disertai
Exhibitions organized/participated

BIL. NO.	NAMA NAME	TEMPAT VENUE	TARIKH DATE
1	Perasmian Tahun Kelawar 2011 <i>Official Opening of the Bats Year</i>	Zoo Negara	15 Januari/January
2	Malaysia Technology Expo	Kuala Lumpur Convention Centre (KLCC)	17–19 Februari /February
3	Pameran Herba Sempena Seminar Persekutuan Perkumpulan Wanita Sarawak <i>Exhibition on Herbs in Conjunction with the Sarawak Women Association Seminar</i>	Yayasan Sarawak	26–27 Februari /February
4	Pameran Antarabangsa Perabot Malaysia <i>Malaysian International Furniture Fair</i>	Putra World Trade Centre	1–5 Mac/March
5	MoU Pusat Technopreneur UiTM-MTDC dan pelancaran dana RM100 juta untuk permulaan perniagaan <i>MoU of UiTM-MTDC Technopreneur Centre and launching of the RM100 million grant for business start-up</i>	Universiti Teknologi MARA (UiTM)	31 Mac/March
6	Pameran Pertandingan Fotografi 2011 <i>Exhibition of the Photography Competition</i>	FRIM	22–24 April
7	Anugerah Harta Intelek Negara <i>National Intellectual Properties Award</i>	Persada Johor International Convention Centre, Johor Bahru	26 April
8	Pameran Pelancongan Malaysia <i>Malaysian Tourism Fair</i>	Putra World Trade Centre (PWTC)	20–22 Mei/May
9	International Invention, Innovation and Technology Exhibition (ITEX)	Kuala Lumpur Convention Centre (KLCC)	20–22 Mei/May
10	Dialog Antarabangsa Langkawi (LID) <i>Langkawi International Dialogue (LID)</i>	Pusat Konvensyen Antarabangsa Putrajaya (PICC)	18–21 Jun/June

BIL. NO.	NAMA NAME	TEMPAT VENUE	TARIKH DATE
11	Lawatan Dialog Antarabangsa Langkawi (LID) 2011 <i>Visit of the Langkawi International Dialogue (LID) 2011</i>	FRIM	20 Jun/ <i>June</i>
12	Kem <i>My Bats</i> <i>My Bats Camp</i>	Institut Biodiversiti, Jabatan Perhilitan, Bukit Rengit, Lanchang, Pahang	23–24 Jun/ <i>June</i>
13	Program Sayangi Hutan Kita <i>Love Our Forests Programme</i>	Hutan Padang Kota Damansara, Sek. 4, Kota Damansara	2 Julai/ <i>July</i>
14	Seminar bagi Program Bionexus Partners (BNPs) <i>Seminar on Bionexus Partners (BNPs) Programme</i>	FRIM	26 Julai/ <i>July</i>
15	Hari Peladang, Penternak dan Nelayan Peringkat Negeri Perlis <i>Planters', Breeders' and Fishermen's Day, Perlis State Level</i>	Dataran Dato' Sheikh Ahmad, Kangar	27–30 Julai/ <i>July</i>
16	International Furniture Market (IFM)	Malaysian Agro Exposition Park Serdang (MAEPS)	6–10 September
17	Pameran dan Persidangan Antarabangsa Teknologi Hijau dan Produk Eko Malaysia <i>International Greentech and Eco-Products Exhibition and Conference Malaysia</i>	Kuala Lumpur Convention Centre (KLCC)	7–10 September
18	Pelancaran Dasar Landskap Negara dan Sambutan Hari Landskap Negara <i>Launching of the National Landscape Policy and the National Landscape Day Celebration</i>	Taman Tasik Cempaka, Bandar Baru Bangi	29 September–2 Oktober/ <i>October</i>
19	Pelancaran Minggu Alam Sekitar Malaysia (MASM) Peringkat Kebangsaan <i>Launching of the Malaysian Environmental Week, National Level</i>	Taman Tamadun Islam, Kuala Terengganu	18 Oktober/ <i>October</i>
20	Malaysian International Commodity Conference and Showcase (MICCOS)	Malaysian Agro Exposition Park Serdang (MAEPS)	28–30 Oktober/ <i>October</i>
21	Hari Inovasi NRE/ <i>NRE Innovation Day</i>	NRE	14 November
22	Persidangan dan Pameran Inovasi Kebangsaan <i>National Innovation Conference and Exhibition (NICE)</i>	Putra World Trade Centre (PWTC)	15–16 November
23	Pameran Kesedaran Alam Sekitar <i>Environmental Awareness Exhibition</i>	UiTM, Shah Alam	16–18 November
24	Bio Malaysia	Kuala Lumpur Convention Centre (KLCC)	21–23 November
25	Hari Inovasi FRIM <i>FRIM Innovation Day</i>	FRIM	7–8 Disember/ <i>December</i>
26	Hari Peladang, Penternak dan Nelayan Kebangsaan <i>National Planters', Breeders' and Fishermen's Day</i>	Infoternak, Sungai Siput, Perak	18–25 Disember/ <i>December</i>

KOMERSIALISASI DAN INOVASI

Pada tahun ini, FRIM mengendalikan sebanyak 47 khidmat perundingan yang bernilai RM1 978 170.50 kepada kedua-dua sektor awam dan swasta. Daripada jumlah ini, FRIM menerima sebanyak RM420 157.54 untuk kos pengurusan dan pentadbiran. Hasil penyelidikan FRIM juga berjaya memperoleh 35 pendedahan reka cipta, 10 pemfailan paten dan empat pengiktirafan rekabentuk perindustrian. FRIM juga telah berjaya menandatangani satu perjanjian pelesenan. Senarai khidmat perundingan, pendedahan reka cipta dan perjanjian adalah seperti yang berikut:

COMMERCIALIZATION AND INNOVATION

During the year, FRIM conducted 47 consultancies worth RM1 978 170.50. From these consultancy services, FRIM received RM420 157.54 as management fees. FRIM's new research findings led to 35 invention disclosures, 10 patent filings and four industrial designs granted. FRIM also successfully signed one Licensing Agreement. The lists of consultancy services, invention disclosures and agreements are given as follows:

KHIDMAT PERUNDINGAN
CONSULTANCY SERVICES

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
1	Kerja-kerja pengujian mikroskop, kandungan lembapan, pengecaman anatomi kayu dan serangga pengerek kayu ke atas sampel-sampel pallet <i>Microscopic, moisture content, wood anatomy identification and wood borer testing on pallet samples</i>	Dr Salmiah Ujang	Forensic Services (M) Sdn Bhd
2	Penyediaan Rancangan Pengurusan Hutan Taman-Taman Negeri Selangor 2008-2010 <i>Preparation of Forest Management Plan for Gardens in Selangor State</i>	Dr Noor Azlin Yahya	Jabatan Perhutanan Negeri Selangor
3	Penyelenggaraan tahunan (2010/2011) Sistem Pengurusan Gaji LKM (ESPG LKM) <i>LKM ESGP yearly maintenance (2010/2011)</i>	Wan Zahiri Hj Wan Yaacob	Lembaga Koko Malaysia
4	Kerja Pemetaan dan Inventori Pokok Di Majlis Bandaraya Alor Star dan Taiping <i>Tree mapping and inventory at the Alor Star City Council and Taiping</i>	Adnan Mohammad	Arbor Master Resources
5	Menjalankan kerja inventori pokok Majlis Daerah Kuala Lipis <i>Tree inventory at the Kuala Lipis District Council</i>	Adnan Mohammad	Tropics Plantscape Sdn Bhd
6	Menyediakan skrip buku mewah tentang "Mangrove of Johor RAMSAR sites" <i>Script writing on "Mangroves of Johor RAMSAR Sites" coffee-table book</i>	Mohd Nasir Husin	Perbadanan Taman Negara Johor
7	Memantau, menentu dan mengecam perosak dan penyakit di ladang-ladang <i>Acacia</i> <i>Monitoring, diagnosis and identification of pests and diseases in Acacia plantations</i>	Dr Lee Su See	Grand Perfect Sdn Bhd
8	Pemulihan dan pemuliharaan Taman Negeri Tasik Chini, Pekan, Pahang—Penanaman semula pokok-pokok <i>Rehabilitation and conservation of Tasik Chini State Park, Pekan, Pahang—Replanting of trees</i>	Dr Raja Barizan Raja Sulaiman	UKM Pakarunding Sdn Bhd

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
9	Penyelenggaraan (2010/2011) Sistem Pengurusan Gaji MARDI (eSPG MARDI) MARDI eSPG yearly maintenance (2010/2011)	Wan Zahiri Hj Wan Yaacob	Institut Penyelidikan Dan Kemajuan Pertanian Malaysia (MARDI)
10	Penyelenggaraan tahunan (2010/2011) Sistem Maklumat Penyelidikan dan Pembangunan Koko (CRIMS) Cocoa Research and Development Information System (CRIMS) eSPG yearly maintenance (2010/2011)	Wan Zahiri Hj Wan Yaacob	Lembaga Koko Malaysia
11	Tahap 2 Audit Skim RSPO ke atas Felda Kompleks Wilayah Segamat Stage 2 Audit RSPO Scheme on Felda Kompleks Wilayah Segamat	Dr Lim Hin Fui	SIRIM QAS International Berhad
12	Penilaian kerosakan dirian hutan Evaluation on forest stand	Dr Abd Rahman Kassim	IIUM Properties Sdn Bhd
13	Penilaian Risiko Pokok ke atas Pokok Terpilih di Datai dan Andaman Conduct of tree risk assessment on selected trees at The Datai and Andaman	Dr Elizabeth Philip	Ms Eleanor Hardy
14	Khidmat perundingan saintifik dan teknikal ke atas interaksi tanah-pokok Scientific and technical consultancy on soil-plant interactions	Dr Ang Lai Hoe	Kyeseon Enterprise Sdn Bhd
15	Inventori pokok Majlis Bandaraya Kuala Terengganu dan Majlis Daerah Kuala Kangsar Tree inventory for the Kuala Terengganu City Council and Kuala Kangsar District Council	Adnan Mohammad	Arbor Master Resources
16	Memeriksa dan memberi penilaian terhadap penggunaan kayu untuk projek pembinaan syarikat di tapak To check and evaluate the utilisation of wood for the company's construction projects	Dr Gan Kee Seng	Syarikat Pembinaan Yeoh Tiong Lay Sdn Bhd
17	Penilaian risiko pokok di Royal Selangor Golf Club VI Tree risk assessment at the Royal Selangor Golf Club VI	Sreetheran Maruthaveeran	The Royal Selangor Golf Club
18	Survei ekologi di Boga Valley Ecological survey of Boga Valley	Dr Pan Khang Aun	CENDANA Konsult Sdn Bhd
19	Penyediaan SOP bahan tanaman/Penubuhan nurseri ladang hutan SOP preparation for forest plantation plant materials/nursery establishment	Dr Aminah Hamzah	Lembaga Perindustrian Kayu Malaysia (MTIB)
20	Pengecaman pokok Tree identification	Sam Yen Yen	Setia Eco Glades Sdn Bhd

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
21	Semakan Separuh Penggal Rancangan Pengurusan Hutan Paya Gambut (2006–2015) dan rancangan Pengurusan Bersepadu Hutan Paya Gambut Pahang Tenggara (2006–2015) Mid-term Review of the Peat Swamp Forest Management Plan (2006–2015) and Pahang Tenggara Integrated Peat Swamp Forest Management Plan (2006–2015)	Dr Khali Aziz Hamzah	Jabatan Perhutanan Negeri Pahang
22	Pengurusan perosak dan penyakit di ladang Sabah Softwoods Berhad Pest and disease management in the plantations of Sabah Softwoods Berhad	Dr Lee Su See	Sabah Softwoods Berhad
23	Projek Penyediaan Rancangan Pengurusan Hutan (RPH) 2011–2020 Negeri Selangor Preparation of the Selangor State Forest Management Plan 2011–2020 Project	Samsudin Musa	Jabatan Perhutanan Negeri Selangor
24	Kerja penilaian pokok di Tapak Projek Pembangunan Pelancongan Warisan Pekan Tree assessment work at Pekan Heritage Tourism Development Project Site	Ahmad Azaruddin Mohd Noor	DZJ & Associates Architects Sdn Bhd
25	Ujian makmal ke atas keberkesanan kayu getah yang dirawat dengan Vascol Azure dan Azure Aqua terhadap kulat dan anai-anai Laboratory test on efficacy of vascol azure and azure aqua treated rubberwood against fungi and termite	Dr Salmiah Ujang	Arch Wood Protection (M) Sdn Bhd
26	Pemantauan, mengenal pasti dan pengecaman perosak dan penyakit di ladang <i>Acacia</i> Monitoring, diagnosing and identification of pests and diseases in <i>Acacia</i> plantations	Dr Lee Su See	Grand Perfect Sdn Bhd
27	Kualiti dan kemasan kayu Wood quality and finishing	Dr Hamdan Husain	TJ Civil & Structural Contractor Sdn Bhd
28	Pengecaman kayu di tanah seluas 75 ekar, Off Jalan Imbi, Kuala Lumpur. Tree identification on 75 acre land, Off Jalan Imbi, Kuala Lumpur.	Dr Richard Chung Cheng Kong	1MDB Real Estate Sdn Bhd
29	Kerja-kerja pemeriksaan tanah untuk penanaman semula dan penghijauan bekas lombong bijih timah dengan spesies hutan yang terpilih Land inspection for replanting and greening of ex-tin mine with selected tree species	Dr Hj Ahmad Zuhaidi Yahya	Rahman Hydraulic Tin Sdn Bhd
30	Kerjarunding bengkel kesedaran menjaga denai-denai hutan Majlis Perbandaran Pulau Pinang Consultancy on awareness workshop on maintenance of Pulau Pinang City Council forest trails	Dr Noor Azlin Yahya	Majlis Perbandaran Pulau Pinang
31	R&D antioksidan dalam pembangunan produk berasaskan tumbuhan herba/berubat Antioxidant R&D in herbal/medicinal plant based product development	Dr Vimala Subramaniam	Persona Kosmetik Sdn Bhd

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
32	Menyediakan 100L sap batang sawit dan 100kg hampas perahan sap teras batang sawit yang diambil daripada sisa industri papan lapis menggunakan kemudahan R&D FRIM <i>Preparation and demonstration of oil palm trunk sap (100L) and separated oil palm trunk parenchyma cells (100kg) from plywood mill residues using FRIM R&D facilities</i>	Dr Wan Asma Ibrahim	Sime Darby Research Sdn Bhd
33	Kualiti dan kemasan kayu <i>Wood quality and finishing</i>	Dr Hamdan Husain	Deluxe Home Interior Sdn Bhd
34	Pemantauan, diagnosis dan pengecaman perosak dan penyakit di ladang <i>Acacia</i> <i>Monitoring, diagnosis and identification of pests and diseases in Acacia plantations</i>	Dr Lee Su See	Grand Perfect Sdn Bhd
35	Penyelenggaraan tahunan (2011/2012) Sistem Pengurusan Gaji LKM (ESPG LKM) <i>LKM ESGP yearly maintenance (2010/2011)</i>	Zahari Othman	Lembaga Koko Malaysia
36	Penyelenggaraan tahunan (2011/2012) Sistem Maklumat Penyelidikan dan Pembangunan Koko (CRIMS) <i>Cocoa Research & Development Information Management System (CRIMS) yearly maintenance (2010/2011)</i>	Norul Maslissa Ahmad	Lembaga Koko Malaysia
37	RSPO Tahap 1 Felda Kompleks Kilang Tementi <i>Stage 1 RSPO Felda Tementi Mill Complex</i>	Dr Lim Hin Fui	SIRIM QAS International Berhad
38	Penyelenggaraan Sistem eOT MARDI 2011/2012 <i>Maintenance of the MARDI eOT system for 2011/2012</i>	Norul Maslissa Ahmad	Institut Penyelidikan Dan Kemajuan Pertanian Malaysia (MARDI)
39	Penyediaan, demonstrasi dan analisis sap serta pemisahan fiber dan parenkima batang kelapa sawit menggunakan kaedah R&D FRIM <i>Sap preparation, demonstration and analysis and separation of oil palm stem fibre and parenchyma using FRIM's R&D method</i>	Dr Wan Asma Ibrahim	Japan International Research Center For Agricultural Sciences (JIRCAS)
40	Penubuhan ladang herba, pembangunan herba dan kluster produk bioteknologi di Chegar Perah, Kuala Lipis, Pahang untuk ECERDC <i>Establishment of herbal plantation, development of herbal and biotechnology product clusters in Chegar Perah, Kuala Lipis, Pahang, for ECERDC</i>	Mohamad Lokmal Ngah	FAIRUZ Architect
41	Pemadanan spesies-tapak <i>Species-site matching</i>	Dr Ang Lai Hoe	Jabatan Pengairan dan Saliran Malaysia
42	Semakan Separuh Penggal Rancangan Pengurusan Hutan Negeri Perak 2006–2015 <i>Half Term Review of the Perak State Forest Management Plan 2006–2015</i>	Dr Khali Aziz Hamzah	Jabatan Perhutanan Negeri Perak

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
43	Audit untuk Audit Pematuhan—Skim RSPO (IOI Corporation Berhad, Bukit Leelau Palm Oil Mill, Muadzam Shah, Pahang) Audit for surveillance audit—RSPO scheme (IOI Corporation Berhad, Bukit Leelau Palm Oil Mill, Muadzam Shah, Pahang)	Dr Pan Khang Aun	SIRIM QAS International Sdn Bhd
44	Audit pematuhan ke atas Perak FMU Surveillance audit on Perak FMU	Dr Lim Hin Fui	SIRIM QAS International Berhad
45	Penilaian ke atas perubahan stok karbon di tapak demonstrasi Asean Peatland Forest Project (APFP) di Hutan Simpan Raja Musa dan pelan tindakan bagi Hutan Simpan Kuala Langat Selatan Assessment of carbon stock changes in demonstration site of Asean Peatland Forest Project (APFP) at Raja Musa Forest Reserve and blueprint for Kuala Langat South Forest Reserve	Azian Mohti	Jabatan Perhutanan Semenanjung Malaysia
46	Bekalan, penanaman dan penyenggaraan pokok nipah di kawasan PN 1, KN 1 dan KN 2 Supply, planting and maintenance of nipah trees at areas PN 1, KN 1 and KN 2	Dr Mohd Zaki Hj Abdullah	REDMAX Sdn bhd
47	Penyelenggaraan (2011/2012) Sistem Pengurusan Gaji MARDI (eSPG MARDI) MARDI eSPG yearly maintenance (2011/2012)	Zahari Othman	Institut Penyelidikan Dan Kemajuan Pertanian Malaysia (MARDI)

**PELESEN
LICENSEES**

BIL. NO.	TEKNOLOGI TECHNOLOGY	PELESEN LICENSEES
1	Tongkat ali bioactive compounds from hairy root tongkat ali	Focal Biotek Sdn Bhd

**PENDEDAHAN REKA CIPTA
INVENTION DISCLOSURES**

BIL. NO.	NO. IDENTITI ID NO.	REKA CIPTA INNOVATION	PEREKA CIPTA INNOVATOR
1	ID 01/2011	FRIMke001 genetically improved clone for the production of gaharu (agarwood)	Dr Mohd Noor Mahat
2	ID 02/2011	FRIMke002 genetically improved clone for the production of gaharu (agarwood)	Dr Mohd Noor Mahat
3	ID 03/2011	Clone FRIMsrp 001 as new cultivar (cultivated variety) for the production of timber for furniture industry	Dr Mohd Noor Mahat Dr Ab Rasip Ab Ghani Khairul Maseat Abdul Hamid Salleh
4	ID 04/2011	Inoculums recipe for production of gaharu (FRIM INOGA)	Dr Mohd Noor Mahat
5	ID 05/2011	Development of protocol for the production of <i>Acacia</i> hybrid synthetic seeds	Nor Asmah Hassan Dr Nor Hasnida Hassan Nashatul Zaimah Noor Azman Hamiliar Hamid
6	ID 06/2011	Versatile charcoal briquette machine	Puad Elham Ahmad Sharafi Othman Shamsuri Mohd Som
7	ID 07/2011	Multi-purpose laminar flow and trolley specifically designed for handling bioreactors	Dr Nor Hasnida Hassan Dr Fadhilah Zainudin Haliza Ismail Rozidah Khalid Rohani Abdullah Nor Rashidah Mustapha
8	ID 08/2011	FRIMke004 genetically improved clone for the production of gaharu (agarwood)	Dr Mohd Noor Mahat
9	ID 09/2011	Scrim-based engineered lumber and board from young <i>Acacia</i> wood (MYScrim-Acacia)	Dr Wan Tarmeze Wan Ariffin Dato' Dr Marzalina Mansor
10	ID 10/2011	<i>Ocimum sanctum</i> leaf natural standardized bioextract	Dr Vimala Subramaniam Shalini Markandan Juliza Mohamed Dr Nik Musaadah Mustapha Dr Fadzureena Jamaludin Normaizira Hamidi Dr Mastura Mohtar Rohana Sahdan Abdull Rashih Ahmad Mohamad Jemain Mohamad Ridhwan Ong Boo kean Norul Aiman Yusoff

BIL. NO.	NO. IDENTITI ID NO.	REKA CIPTA INNOVATION	PEREKA CIPTA INNOVATOR
11	ID 11/2011	<i>Ocimum basilicum</i> leaf natural standardized bioextract	Dr Vimala Subramaniam Shalini Markandan Juliza Mohamed Dr Nik Musaadah Mustapha Dr Fadzureena Jamaludin Normaizira Hamidi Dr Mastura Mohtar Rohana Sahdan Abdull Rashih Ahmad Mohamad Jemain Mohamad Ridhwan Ong Boo kean Norul Aiman Yusoff
12	ID 12/2011	Use of naregenin derivatives in preparation of products for inhibiting methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	Adiana Mohamed Adib Saiful Azmi Johari
13	ID 13/2011	Municipal solid waste (MSW) plastics and empty fruit bunches (EFB) fuel pellets for power generation	Dr Wan Asma Ibrahim Ass Prof Zulkafli Hassan
14	ID 14/2011	Domestication and cultivation of <i>Begonia rajah</i> for horticulture use	Joanne Tan Pei Chih Sam Yen Yen Dr Kodi Isparan Kandasamy Tasnim Ghazali
15	ID 15/2011	Chemically-modified galactomannan as alpha-glucosidase inhibitor	Abd Rashid Li Dr Nik Musaadah Mustapha Mohamad Jemain Mohamad Ridhwan Mohd Radzi Ahmad Normaizira Hamidi Rohana Sahdan Ahmad Shukri Abdullah Azman Mohamed Dr Rasadah Mat Ali
16	ID 16/2011	Producing rayon grade dissolving pulp from whole kenaf stalk	Dr Rushdan Ibrahim
17	ID 17/2011	<i>Piper sarmentosum</i> leaf natural antioxidant standardized extract (Nexus): Avonys & Cartilac	Dr Vimala Subramaniam Juliza Mohamed Rohana Sahdan Abdull Rashih Ahmad
18	ID 18/2011	<i>Psidium guajava</i> leaf natural antioxidant/ skin whitening standardised extract (Guavyn): Beaute	Dr Vimala Subramaniam Juliza Mohamed Rohana Sahdan Abdull Rashih Ahmad
19	ID 19/2011	<i>Garcinia mangostana</i> peel natural antioxidant/ skin whitening standardized extract (Osteen): Styn	Dr Vimala Subramaniam Juliza Mohamed Rohana Sahdan Abdull Rashih Ahmad
20	ID 20/2011	<i>Garcinia mangostana</i> whole fruit natural antioxidant standardised extract—Joystyn	Dr Vimala Subramaniam Juliza Mohamed Rohana Sahdan
21	ID 21/2011	A continuous processing system for the production of sap from oil palm trunk	Dr Wan Asma Ibrahim Puad Elham Rafidah Jalil Ahmad Sharafi Othman Shamsuri Mohd Som Nurul Fahiza Ahmad Zalidi

BIL. NO.	NO. IDENTITI ID NO.	REKA CIPTA INNOVATION	PEREKA CIPTA INNOVATOR
22	ID 22/2011	Table with hidden speaker system but with improved speaker sound quality	Dr Wan Tarmeze Wan Ariffin Nik Adlin Nik Mohamed Sukri
23	ID 23/2011	Producing pulp fibre from oil palm empty fruit bunch for liner and fine paper	Dr Rushdan Ibrahim
24	ID 24/2011	Method of teak (<i>Tectona grandis</i>) genetic transformation using gene gun bombardment	Dr Norwati Adnan Dr Norlia Basherudin Dr Mohd Rosli Haron Dr Norwati Muhammad
25	ID 25/2011	Mobile pulp moulding laboratory machine for research and development of biodegradable moulding products	Dr Rushdan Ibrahim Norhidayati Hassan
26	ID 26/2011	Environmental friendly green herbal door gift	Dr Aminah Hamzah Mohd Yusof Abdul Razak
27	ID 27/2011	Initiation of tissue culture plantlets of <i>Etlingera fulgens</i> from vegetative buds	Joanne Tan Pei Chih Sam Yen Yen Dr Kodi Isparan Kandasamy Tasnim Ghazali
28	ID 28/2011	<i>Persicaria minor</i> natural antioxidant standardised extract : Kezo And Digesto	Dr Vimala Subramaniam Juliza Mohamed Rohana Sahdan Abdull Rashih Ahmad
29	ID 29/2011	<i>Bougainvillea glabra</i> flower natural antioxidant standardised extract	Dr Vimala Subramaniam Shalini Markandan Juliza Mohamed Rohana Sahdan Abdull Rashih Ahmad
30	ID 30/2011	<i>Hibiscus Rosa-Sinensis</i> flower natural antioxidant standardised extract	Dr Vimala Subramaniam Shalini Markandan Juliza Mohamed Rohana Sahdan Abdull Rashih Ahmad
31	ID 31/2011	Method for production of glucose from oil palm trunk (OPT) biomass	Azmalisa Tahar Dr Wan Asma Ibrahim Assoc. Prof. Zulkafli Hassan Dr Norazwina Zainol
32	ID 32/2011	FRIMke003 genetically improved clone for the production of gaharu (agarwood)	Dr Mohd Noor Mahat
33	ID 33/2011	Bioethanol production from rice straw using local enzymes from white-root fungi via enzymatic hydrolysis process	Rafidah Jalil Dr Wan Asma Ibrahim Azmalisa Tahar Nurul Fahiza Ahmad Zalidi
34	ID 34/2011	Process for producing pulp from oil palm EFB suitable for printing paper	Dr Mohd Nor Mohd Yusoff Mahmudin Saleh
35	ID 35/2011	Producing fine paper from kenaf stalk	Dr Rushdan Ibrahim Mahmudin Saleh Latifah Jasmani

PEMFAILAN PATEN
PATENT FILINGS

BIL. NO.	PATEN PATENT	NO. HI IP NO.	PEREKA CIPTA INNOVATOR
1	Method for producing decorative panels and decorative panel products	PI 2011000541	Dr Hamdan Husain Dr Mohd Khairun Anwar Uyup
2	A method of producing fuel pellets	PI 2011000230	Puad Elham Ahmad Sharafi Othman Shamsuri Mohd Som Nordin Puteh
3	Engineered wood from palm trunk	PI 2011001900	Abdul Hamid Salleh Yanti Abd Kadir Dr Hamdan Hussain Dr Khairul Awang Dr Mohd Nor Mohd Yusoff Khairul Maseat Dato' Dr Marzalina Mansor
4	A methicillin-resistant <i>Staphylococcus aureus</i> inhibitor	PI 2011003129	Adiana Mohamed Adib Saiful Azmi Johari
5	A process of manufacturing oil palm flooring material	PI 2011003341	Hashim W Samsi Puad Elham Jalali Hj Salleh Dr Rahim Sudin Choo Koh Boon
6	A process of manufacturing oil palm wood product	PI 2011003340	Hashim W Samsi Puad Elham Jalali Hj Salleh Choo Koh Boon
7	Solid mixture separation apparatus	PI 2011003663	Dr Wan Asma Ibrahim
8	Fuel pellets from municipal solid wastes and palm wastes	PI 2011004288	Dr Wan Asma Ibrahim Ass Prof Zulkafli Hassan
9	A method for producing rayon grade dissolving pulp	PI 2011004379	Dr Rushdan Ibrahim
10	A method for manufacturing palm-based plywood	PI 2011005240	Hashim W Samsi Puad Elham Jalali Hj Salleh

PENGIKTIRAFAN REKA BENTUK PERINDUSTRIAN
INDUSTRIAL DESIGNS GRANTED

BIL. NO.	PATEN PATENT	NO. MY MY NO.	PEREKA CIPTA INNOVATOR
1	Chairs (Seats)	1. MY 10-00913-0104 2. MY 10-00914-0204 3. MY 10-00915-0304 4. MY 10-00916-0404	Nik Adlin Nik Mohamed Sukri Dr Wan Tarmeze Wan Ariffin

KERJASAMA PENYELIDIKAN

Sebanyak 18 kerjasama penyelidikan (12 memorandum persefahaman (MoU), lima perjanjian dan satu surat niat) telah ditandatangani antara MFRDB dengan pelbagai pelanggan yang terdiri daripada pihak industri bertujuan meningkatkan keupayaan R&D FRIM; serta memenuhi kehendak pasaran dan keperluan pelanggan di dalam mahupun di luar negara.

PERINGKAT ANTARABANGSA

Kerjasama dengan PT Mutuagung Lestari

Bersempena dengan majlis perasmian makmal ujian formaldehid pertama yang mematuhi peraturan-peraturan yang ditetapkan oleh *Californian Air Resources Board* (CARB), satu memorandum persefahaman (MoU) telah ditandatangani antara MFRDB dan PT Mutuagung Lestari pada 29 Mac untuk melanjutkan kerjasama yang telah dimulakan sejak tahun 2008. Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod mewakili MFRDB manakala PT Mutuagung Lestari diwakili oleh Pengarah Presiden, Ir H. Arifin Lambaga. MoU ini akan membolehkan kedua-dua pihak bekerjasama ke arah mendapatkan pensijilan antarabangsa, memastikan pengharmonian piawaian prosedur ujian dan menjalankan ujian silang antara makmal untuk meningkatkan kualiti perkhidmatan dan pembangunan keupayaan di antara kedua-dua belah pihak.

Kerjasama dalam bidang ekologi

Hutan Penyelidikan Pasoh yang terletak di Hutan Simpan Pasoh, Negeri Sembilan telah menjadi tumpuan penyelidikan ekologi hutan pamah tropika sejak awal tahun 1970-an kerana kekayaan kepelbagaian semula jadi floranya. Melalui usaha-usaha awal FRIM untuk mempromosi dan mengurus projek-projek penyelidikan di Pasoh, hutan ini mampu menarik minat institusi dan organisasi penyelidikan untuk mengadakan program-program usahasama. Bagi membantu aktiviti penyelidikan, FRIM mengurus dan menyelenggara sebuah stesen penyelidikan lengkap dengan kemudahan penginapan dan makmal, petak ekologi kekal bersaiz antara satu hingga 50 ha yang telah ditubuhkan dan dipantau menggunakan standard global, arboretum seluas 2 ha dan denai alam berpandu sejauh 3 km. FRIM juga membantu menyelenggara menara iklim setinggi 52 m dan titian silara.

Dua projek usahasama utama yang berlangsung di Pasoh ialah Projek Bersama FRIM/STRI/CTFS-AA (sejak 1985) dan Projek Penyelidikan Bersama FRIM/NIES/UPM/FDPM/UTM (sejak 1991). Projek pertama ialah projek usahasama dengan Smithsonian Tropical Research Institute (STRI) dan Centre for Tropical Forest Science (CTFS) yang telah ditubuhkan di bawah Arnold Arboretum in Harvard University, Amerika Syarikat. Projek ini yang membolehkan FRIM tersenarai dalam rangkaian petak penyelidikan global CTFS dengan tertubuhnya petak seluas 50-ha di Pasoh pada tahun

RESEARCH COLLABORATIONS

A total of 18 research collaborations were signed (12 memoranda of understanding (MoUs), five agreements and one letter of intent) by MFRDB and 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 locally and internationally.

INTERNATIONAL LEVEL

Collaboration with PT Mutuagung Lestari

In conjunction with the official opening ceremony of the first formaldehyde testing laboratory in compliance with Californian Air Resources Board (CARB) regulations, a memorandum of understanding (MoU) was signed between MFRDB and PT Mutuagung Lestari on 29 March to extend their collaboration, which has started since 2008. FRIM's Director General Dato' Dr Abd Latif Mohmod represented the MFRDB while PT Mutuagung Lestari was represented by its President Director Ir H. Arifin Lambaga. This MOU would enable both parties to work together towards obtaining international certification, ensuring harmonization of the standard testing procedures, cross-checking between laboratories to increase service quality and capacity building between both parties.

Collaboration in ecology

The Pasoh Research Forest located within the Pasoh Forest Reserve in Negeri Sembilan has been a focus for lowland tropical ecology research since the early 1970s due to its rich, natural floristic diversity. Through the early efforts of FRIM in promoting, coordinating and managing research projects in Pasoh, the forest site continues to lure in collaborations with various research local and international organizations in conducting meaningful ecological research programmes. To facilitate research activities, FRIM manages and maintains a research station with laboratories and dormitories, permanent ecological plots ranging in size from 1 ha to 50 ha established and monitored using global standards, a 2-ha arboretum and a 3-km guided nature trail. FRIM also assist in the maintenance of a 52-m climate tower and canopy walkway.

Two anchor long-term collaborative studies being carried out at Pasoh are the FRIM/STRI/CTFS-AA Joint Research Project (since 1985) and the FRIM/NIES/UPM/FDPM/UTM Joint Research Project (since 1991). The former project is a collaborative effort with the Smithsonian Tropical Research Institute (STRI) and the Centre for Tropical Forest Science (CTFS) which was established under the Arnold Arboretum in Harvard University, United States of America. It is this project which was responsible for enlisting FRIM into the CTFS global network of research plots when the 50-ha research plot in Pasoh was established in 1985, making it the second of such plots

1985. Ini merupakan petak yang kedua di dunia dan yang pertama di Asia dalam rangkaian ini. Kerjasama ini mengusahakan pengumpulan data pokok (pertumbuhan, mortaliti, kemasukan baharu) jangka panjang untuk lebih memahami dinamik ekologi hutan tropika. Pada tahun 2010, FRIM telah menyambut ulang tahun usahasama ini yang ke-25 dengan menganjurkan simposium antarabangsa untuk meraikan para penyelidik yang terlibat, serta hari terbuka untuk menarik minat penyelidik dan komuniti tempatan.

Projek yang kedua ialah usahasama dengan sepuluh institusi dan universiti Jepun yang diketuai oleh National Institute for Environmental Studies (NIES). Pihak kolaborasi tempatan yang lain ialah Universiti Putra Malaysia (UPM), Universiti Teknologi Malaysia (UTM) dan Jabatan Perhutanan Negeri Sembilan. Bidang utama usahasama ini adalah untuk mendalami impak perubahan iklim semula jadi dan antropogenik (buatan manusia) terhadap sumber hutan tropika. Pada masa ini, terdapat 11 kajian yang aktif selari dengan fokus ini termasuk penyelidikan pertukaran gas rumah hijau, perubahan stok karbon, hasil bersih hutan, kepelbagaian biologi, proses hidrologi dan pemetaan sumber hutan menggunakan aplikasi penderiaan jauh.

Setiap tahun FRIM menerima dan meneliti kertas-kertas cadangan daripada pelbagai institusi penyelidikan dan universiti untuk menjalankan aktiviti penyelidikan di Pasoh. Projek-projek yang dicadangkan ini akan diteliti dan implementasinya dipantau oleh Jawatankuasa Penyelidikan Pasoh FRIM. Pada tahun 2011, Jawatankuasa ini telah meluluskan 21 projek jangka pendek di Pasoh termasuk yang diterima daripada penyelidik-penyelidik dari Jepun, Australia, Singapura, Thailand dan Amerika Syarikat.

PERINGKAT KEBANGSAAN

Antara lain, FRIM telah menandatangani satu memorandum persefahaman (MOU) dengan Micro Bio Culture (M) Sdn Bhd pada 7 April untuk bekerjasama dalam penyelidikan serta perkongsian maklumat berkenaan pemencilan mikroorganisma tempatan untuk kegunaan dalam pengurusan sisa, aplikasi persekitaran dan pertanian, serta pengekstrakan enzim daripada buah-buahan tempatan terpilih untuk menghasilkan produk-produk kesihatan. Projek ini bercadang membangunkan teknologi *Malaysian New Blend Effective Microorganism (NBEM) 21 Powder Activator* dengan menggunakan mikroorganisma yang telah dikutip dan dipencil untuk penggunaan secara bersepadu. MoU tersebut ditandatangani oleh Dato' Dr Abd Latif Mohmod yang mewakili MFRDB dan Dato' Seri Prof Dr Gopala Krishnan, Pengarah Micro Bio Culture.

in the world, and the first in Asia. This network strives to collect long term data on forest trees (growth, mortality, recruitment) in order to better understand the ecological dynamics of tropical forests. In 2010, FRIM celebrated its 25th year of collaborative research by organizing an international symposium to celebrate all researchers involved and an open day, to create more awareness amongst the local research institutions and community.

The latter project is a collaboration with the Japanese counterparts consisting of ten research institutions and universities, led by the National Institute for Environmental Studies (NIES). The main local partners include local universities, Universiti Putra Malaysia (UPM) and Universiti Teknologi Malaysia (UTM) as well as the Forestry Department of Negeri Sembilan. The main interest of the collaboration is to understand the natural and anthropogenic impacts of climate changes on tropical forest resources. Currently, there are 11 active research projects in line with the focus of the collaboration including greenhouse gas exchanges, changes in carbon stocks, net production in forests, biodiversity, hydrological processes and mapping of forest resources using remote sensing applications.

Every year FRIM receives and reviews proposals from various research institutions and universities to conduct research activities in Pasoh. These proposals are reviewed and their implementation monitored by the FRIM Pasoh Research Committee. In 2011, the Committee approved 21 short-term projects in Pasoh which included researchers from Japan, Australia, Singapore, Thailand and the United States of America.

NATIONAL LEVEL

Among others, the signing ceremony of the memorandum of understanding (MoU) between MFRDB with Micro Bio Culture (M) Sdn Bhd was held on 7 April to collaborate in the fields related to microbes for agriculture, environmental applications and bioremediation, and enzyme extraction from selected Malaysian fruits for human health products. This project proposes to develop the Malaysian New Blend Effective Microorganism (NBEM) 21 Powder Activator Technology by utilizing natural microbes collected and isolated here for integrated applications. The MoU was signed by Dato' Dr Abd Latif Mohmod on behalf of the MFRDB and Director Dato' Seri Prof Dr Gopala Krishnan of Micro Bio Culture.

MEMORANDUM PERSEFAHAMAN/PERJANJIAN
MEMORANDUMS OF UNDERSTANDING/AGREEMENTS

BIL. NO.	RAKAN KERJASAMA COLLABORATORS	TAJUK/BIDANG KERJASAMA TITLE/FIELD OF COLLABORATION	KETUA PROJEK PROJECT LEADER	TARIKH T/TANGAN SIGNING DATE
1	Kitasato University (Perjanjian/Agreement)	R&D ke atas sampel ekstrak CfPR-113-1 (daripada sumber tumbuhan terpilih) dan ekstrak A045-M1 R&D on CfPR-113-1 (from selected plant resources) and A045-M1 extract samples	Dr Getha Krishnasamy	1 Januari/January
2	SPPTe Sdn Bhd (Perjanjian/Agreement)	Penyediaan pek bungkusan makanan daripada bahan boleh terurai Production of food packaging from biodegradable materials	Mahmudin Salleh	31 Januari/January
3	Forestry and Forest Products Research Institute (FFPRI) (Perjanjian/Agreement)	Membangunkan sistem MRV untuk perubahan karbon hutan yang boleh dilaksanakan bagi projek REDD+ di Malaysia To develop the MRV system for forest carbon change under REDD+ project in Malaysia	Dr Khali Aziz Hamzah	18 Februari/February
4	United Nations Environment Programme (UNEP) (Perjanjian/Agreement)	Penentuan dan pelaksanaan <i>environmental sound technology</i> (EST) bagi menukar sisa biojisim pertanian (terutama sisa pokok kelapa sawit) kepada sumber tenaga/bahan Determination and implementation of the environmental sound technology (EST) to change the agro biomass waste (especially the oil palm tree waste) to energy /material resources	Dr Wan Asma Ibrahim	10 Februari/February
5	Dewan Bandaraya Kuching Utara (DBKU) (MoU)	R&D berkaitan pengurusan ekopelancongan dan pengurusan hutan bandar di sekitar Bandaraya Kuching R&D on ecotourism and urban forest management in Kuching City Hall	Dr Noor Azlin Yahya	26 Februari/February
6	Sarawak Forestry Corporation (SFC) (MoU)	R&D dalam bidang pengurusan hutan (hutan asli dan hutan ladang; pemuliharaan hutan keluaran hutan (bukan pemprosesan ; lebih kepada <i>timber tracking</i>), produk asli (ubatan / herba) R&D in forest management (natural and plantation forests; conservation of forest produce forest (non-processing; more on timber tracking), natural products (medicinal/herbal)	Dr Shamsudin Ibrahim	26 Februari/February
7	Sarawak Bioversity Council (SBC) (MoU)	Pembangunan biodiversiti dan <i>bioprospecting</i> Development of biodiversity and bioprospecting	Dr Saw Leng Guan	26 Februari/February

BIL. NO.	RAKAN KERJASAMA COLLABORATORS	TAJUK/BIDANG KERJASAMA TITLE/FIELD OF COLLABORATION	KETUA PROJEK PROJECT LEADER	TARIKH T/TANGAN SIGNING DATE
8	Borneo Biogahru Sdn Bhd (MoU)	R&D pengekstrakan minyak gaharu, pembangunan produk daripada minyak gaharu dan pengurusan penanaman pokok karas <i>R&D on the extraction of gaharu oil, development of products from gaharu oil and management of karas tree planting</i>	Dr Nor Azah Mohamad Ali	26 Februari/ <i>February</i>
9	Forest Research Institute of Nigeria (FRIN) (MoU)	R&D kontemporari dalam bidang hutan tropika dan pengurusan hasil hutan <i>Contemporary R&D on tropical forest and management of forest produce</i>	Dr Shamsudin Ibrahim	7 Mac/ <i>March</i>
10	PT Mutuagung Lestari, Indonesia (MoU)	Persijilan/ <i>Certification</i>	Dr Rahim Sudin	29 Mac/ <i>March</i>
11	Moody International Certification (Malaysia) Sdn Bhd (MoU)	Rantian perlindungan, pengurusan hutan dan pensijilan produk <i>Chain of custody, forest management and product certification</i>	Salamah Selamat	28 Mac/ <i>March</i>
12	The Persyst Department of the Centre De Cooperation Internationale En Recherche Agronomique Pour Le Developpement (CIRAD) (Perjanjian/ <i>Agreement</i>)	R&D hutan tropika serta pembangunan modal insan. <i>R&D in tropical forest and development of human capital</i>	Rohana/Dr Rahim Sudin	1 April
13	Micro Bio Culture (M) Sdn Bhd (MoU)	R&D bioremediasi/ <i>R&D on bio-remediation</i>	Dr Getha Krishnasamy	7 April
14	The Johan Henrich Vounthunen Institute (vTI) (MoU)	Penyelidikan khususnya dalam bidang pengesanan balak menggunakan teknologi penanda DNA <i>Research especially on log detection using DNA markers technology</i>	Dr Lee Soon Leong	6 Julai/ <i>July</i>
15	KAR Masterpiece Sdn Bhd (Surat Niat/ <i>Letter of Intent</i>)	R&D untuk pengkomersialan dan pemasaran produk-produk buluh keluaran tempatan <i>R&D in commercialization and marketing of local bamboo products</i>	Dr Hamdan Husain	7 Julai/ <i>July</i>
16	Hiroshima University (MoU)	R&D Ecology, Biodiversity & REDD+	Dr Christine Fletcher	19 September
17	Universiti Malaysia Kelantan (MoU)	Kerjasama dalam bidang penyelidikan, pembangunan sumber manusia, pembelajaran dan teknikal <i>Research, human resource development, learning and technical collaborations</i>	Dr Norini Haron	6 Oktober/ <i>October</i>

APAFRI

Laman web APAFRI kini memiliki wajah baharu yang lebih segar bermula awal 2011. Syuqiyah Abdul Hamid, Pegawai Maklumat APAFRI telah mereka bentuk semula laman sesawang tersebut dan menambah pelbagai ciri baharu. Selari dengan perkembangan terkini, APAFRI turut menyertai "Facebook". Muka "Activities" pada laman sesawang APAFRI yang baharu terdapat pautan kepada laman "Facebook" APAFRI yang memaparkan koleksi gambar aktivitinya.

APAFRI telah mengurus dan melaksanakan sejumlah projek multinasional dan multi-institusi sejak beberapa tahun. Dengan adanya pengalaman, dan meningkatnya permintaan untuk kerjasama antara-institusi, APAFRI menyarankan untuk mewujudkan satu program berkembar kepada ahli-ahli institusi terutamanya dalam bidang penyelidikan dan pembangunan perhutanan, pendidikan dan perkara berkaitan perhutanan yang lain. APAFRI telah menandatangani memorandum persefahaman (MoU) dengan Institut Penyelidikan Perhutanan Korea (KFRI), Seoul, pada bulan Ogos. Antara komitmen yang diperincikan dalam MoU ini termasuklah untuk melaksanakan projek khusus kepada kepentingan bersama dan menerbitkan hasil/keputusan daripada projek gabungan. KFRI akan memberi bantuan kewangan bersesuaian untuk memenuhi komitmen-komitmen tersebut. APAFRI telah memperuntukkan sumbangan permulaan untuk menganjurkan satu simposium antarabangsa mengenai pemulihan hutan di Kuala Lumpur pada tahun depan.

Pada bulan September, APAFRI berjaya memperoleh dana daripada Rangkaian Asia Pasifik untuk Pengekalan Pengurusan dan Pemulihan Hutan (APFNet). Projek yang akan berjalan dalam tempoh dua tahun ini akan dilaksanakan oleh APAFRI dan Universiti Renmin China, Beijing selaku rakan kongsi bantuan teknikal untuk projek (Technical Assistance Partner).

APAFRI terlibat secara aktif dalam kebanyakan aktiviti FAO di rantau Asia Pasifik sejak penubuhannya lebih daripada 15 tahun yang lalu. Pada bulan November, bersempena dengan Sesi ke-24 Suruhanjaya Perhutanan Asia Pacific, FAO telah menganjurkan Minggu Perhutanan Asia Pasifik di Beijing, China. Aktiviti sepanjang minggu yang merupakan aktiviti utama bagi persaudaraan perhutanan pada tahun ini, padat dengan pelbagai bengkel dan acara sampingan. Selain mempunyai pameran bahan penerbitan, APAFRI turut terlibat dalam menganjurkan beberapa acara sampingan dan bengkel sepanjang minggu tersebut.

APAFRI telah membiayai beberapa peserta dari rantau ini untuk menghadiri bengkel latihan anjuran IUFRO SPDC. APAFRI turut menjadi penganjur bersama bagi Mesyuarat Permulaan untuk Projek Biayaan APFNet Mengenai Peralihan Hutan pada hari Ahad, 6 November serta Bengkel "Asia Pacific Forest Invasive Species Network Workshop on Forest Health Technology and Pythosanity Standards".

APAFRI

APAFRI website has a fresh new look starting early 2011. Pn Syuqiyah Abdul Hamid, APAFRI's Information Officer, redesigned the webpages and added many new features onto the website. In line with the current trend, and looking for the best way to share the many photographs captured during the activities, APAFRI has recently joined *Facebook*. From the 'Activities' page in APAFRI's new website, there is a link to the APAFRI page in *Facebook* where a collection of photographs has been posted.

APAFRI has managed and implemented a number of multi-national and multi-institutional projects over the years. With these experiences, and the increasing requests for inter-institutional collaborations, APAFRI has proposed to establish Twinning Programmes for its member institutions primarily for forestry research and development, education and other forestry related matters.

APAFRI has signed a memorandum of understanding (MoU) with the Korea Forest Research Institute (KFRI), Seoul, in August. The commitments detailed under this MOU include carrying out specified projects of mutual interest and publishing results of joint projects. KFRI will provide appropriate financial support to fulfill such commitments. APAFRI has committed the initial contribution to organize an international symposium on forest rehabilitation in Kuala Lumpur next year. In September, a proposal was finally approved for funding by the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet). The project, to be carried out in two years, would be executed by APAFRI together with the Renmin University of China, Beijing, as the project's Technical Assistance Partner.

APAFRI has always been very actively involved in most FAO activities in the Asia Pacific region ever since its establishment more than 15 years ago. In November, in conjunction with the Twenty-fourth Session of the Asia-Pacific Forestry Commission, FAO organized the Second Asia-Pacific Forestry Week in Beijing, China. The week-long event was a major event for the forestry fraternity during the year, packed with several workshops and side-events each day. Besides putting up an exhibition booth to display and distribute publications, APAFRI was also involved in the organizing of several side-events and workshops during the week.

APAFRI supported a few participants from the region to a training workshop organized by IUFRO SPDC the week before the APFW. Then APAFRI co-organized the Inception Meeting for the APFNet funded project on Forest Transition on 6 November. With financial support from USDA, APAFRI also co-organized the Asia Pacific Forest Invasive Species Network Workshop on Forest Health Technology and Pythosanity Standards.

Mesyyuarat Jawatankuasa Eksekutif APAFRI yang ke-17 pula diadakan pada hari kedua minggu tersebut. Lima daripada sembilan Jawatankuasa Eksekutif menghadiri mesyyuarat ini. Beberapa rakan dari FAO, FFPRI Jepun dan ICFRE India turut hadir sebagai pemerhati dalam mesyyuarat ini.

APAFRI turut menganjurkan acara sampingan untuk Sumber-sumber Genetik Hutan (FGR) dengan bantuan rakan-rakan dari Pengurusan Perhutanan Negeri China (SFA) dan Akademi Perhutanan China (CAF). Di bawah perjanjian dengan FAO, APAFRI menjadi penganjur dan pemudahcara bagi satu mesyyuarat untuk merasmikan "Asia Pacific Forest Policy Think Tank". APAFRI juga turut membantu dalam bengkel "Workshop on Transition to SFM and Rehabilitation in the Asia-Pacific Region".

Pada bulan Disember, APAFRI telah menganjurkan satu bengkel Asia Pasifik di Guangzhou, China. Institut Penyelidikan Hutan Tropika (RITF) merupakan tuan rumah bagi bengkel selama tiga hari mengenai "Multinational and Transboundary Conservation of Valuable and Endangered Forest Tree Species" ini yang dibiayai terutamanya dari sumbangan KFRI melalui IUFRO. Lebih daripada 60 penyelidik perhutanan dan ahli akademik dari 12 negara Asian telah menyertai bengkel ini untuk berkongsi, dan bertukar pengalaman dan maklumat tentang pemuliharaan pelbagai spesies pokok hutan berharga dan terancam yang biasa di kalangan negara-negara di rantau ini. Bengkel yang merupakan inisiatif oleh IUFRO ini, dianjurkan oleh APAFRI dengan kerjasama teknikal oleh RITF-CAF, China, FRIM dan Institut Penyelidikan Perhutanan Korea (KFRI). Antara topik yang dibincangkan ialah: inisiatif pemuliharaan multinasional dan "transboundary"; strategi nasional; polisi dan program dalam pemuliharaan spesies berharga; penubuhan ladang; kepelbagaian genetik dan status pemuliharaan; dan perosak dan penyakit. Sejak tahun 2007, KFRI telah memperuntukkan satu bahagian daripada sumbangannya kepada IUFRO untuk APAFRI bagi melaksanakan pelbagai aktiviti di Asia Pasifik untuk para pengamal perhutanan di rantau ini. Peruntukan tahun 2007 telah digunakan untuk membiayai "International Conference on Traditional Forest-related Knowledge" di Kunming, China; peruntukan tahun 2008 digunakan untuk penganjuran Bengkel Kesihatan Hutan Asia Pasifik di Kuala Lumpur; dan peruntukan 2009 pula adalah untuk Bengkel Produk Hutan Asia Pasifik di Sri Lanka. Peruntukan tahun lepas digunakan untuk simposium serantau di Manila, 7-9 Disember di mana Ecosystems Research and Development Bureau of the Philippines merupakan tuan rumah kepada aktiviti tersebut. Prosiding untuk kesemua aktiviti tersebut telah diterbitkan oleh IUFRO sebagai IUFRO World Series jilid 21, 24, 27 dan 29.

APAFRI had its 17th Executive Committee Meeting on the second day of that week. Five out the nine members of the Executive Committee attended the meeting. A number of colleagues from FAO, FFPRI Japan and ICFRE India were also present as observers in this meeting.

APAFRI also organized the side-event on Forest Genetic Resources with the assistance of colleagues from the State Forest Administration of China and the Chinese Academy of Forestry. Under an agreement with FAO, APAFRI organized and facilitated a meeting to inaugurate the proposed Asia Pacific Forest Policy Think Tank. APAFRI also assisted in the Workshop on Transition to SFM and Rehabilitation in the Asia-Pacific Region.

In December, APAFRI organized an Asia Pacific workshop in Guangzhou, China. The Research Institute of Tropical Forestry hosted the three-day workshop on Multinational and Transboundary Conservation of Valuable and Endangered Forest Tree Species funded mainly with contributions from KFRI through the International Union of Forest Research Organizations (IUFRO). Over 60 forestry researchers and academicians from 12 Asian countries participated in a workshop to share and exchange experiences and information on conservation of several valuable and threatened forest tree species common among countries in the region. The workshop, an initiative of the International Union of Forest Research Organizations (IUFRO), was organized by Asia Pacific Association of Forestry Research Institutions (APAFRI) in technical collaboration with the Research Institute of Tropical Forestry, Chinese Academy of Forestry (RITF-CAF) of China, FRIM and the Korea Forest Research Institute (KFRI). Among the topics discussed were: multinational and transboundary conservation initiatives; national strategies, policies and programmes in conservation of valuable tree species; plantation establishments; genetic diversity and conservation status; and pests and diseases. Since 2007, KFRI has allocated a portion of its contributions to IUFRO for APAFRI to carry out activities in the Asia Pacific for forestry practitioners of this region. The 2007 allocation was used to partially finance the International Conference on Traditional Forest-related Knowledge in Kunming, China, the 2008 allocation for organizing an Asia Pacific Forest Health Workshop in Kuala Lumpur, and the 2009 allocation for an Asia Pacific Forest Products Workshop in Sri Lanka. Last year's allocation was utilized for a regional symposium hosted by the Ecosystems Research and Development Bureau of the Philippines in Manila, 7-9 December. Proceedings for these events have already been published by IUFRO as IUFRO World Series Volumes 21, 24, 27 and 29.

Penerbitan/Publications:

1. Extended abstracts from the Asia and the Pacific Symposium on Vulnerability Assessments to Natural and Anthropogenic Hazards, 7–10 December 2010, Manila, Philippines. IUFRO World Series Volume 29.
2. Technical Synthesis Report: Strengthening monitoring, assessment and reporting on Sustainable Forest Management. FAO Bangkok.

Aktiviti anjuran/ disertai APAFRI/ Activities Organized/Participated by APAFRI in 2011

Date	Activity	Venue
7–9 Mac/March	State-of-the-World's Forest Genetic Resources Regional Training Workshop for Asia	Kuala Lumpur, Malaysia
8–11 Ogos/August	International Conference on Response of Forest and Adaptation Management to Climate Change	Yichun, China
4–8 Oktober/October	Contributions of Forests to a Green Economy – Country-led Initiative of the UN Forum on Forests	Bonn, Germany
6 November	Inception Meeting—APFNet Funded Project on Forest Transition	Beijing, China
6, 8, 10–11 November	APFISN Workshop on Forest Health Technology and Phytosanitary Standards	Beijing, China
9 November	Inauguration Workshop of the Asia Pacific Forest Policy Think Tank	Beijing, China
10 November	Forest Genetic Resources—Towards a Better Understanding and Use of Their Potential	Beijing, China
7–11 November	APFC Twenty-fourth Session & Asia Pacific Forestry week	Beijing, China
5–7 Disember/December	Asia and the Pacific Workshop—Multinational and Transboundary Conservation of Valuable and Endangered Forest Tree Species	Guangzhou, China

APAFRI amat menghargai sokongan yang diterima dari agensi-agensi yang berikut dalam menjayakan pelbagai aktiviti selama ini (mengikut susunan abjad).

- ASEAN-Korean Environmental Collaboration Project (AKECOP)
- Australian Centre for International Agricultural Research (ACIAR)
- Australian Department of Agriculture, Fisheries and Forestry (DAFF)
- Bioversity International (previously International Plant Genetic Resources Institute (IPGRI))
- Chinese Academy of Forestry (CAF)
- Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
- Food and Agriculture Organization of United Nations (FAO)
- Forest Research Institute Malaysia (FRIM)
- International Tropical Timber Organization (ITTO)
- Korea Forest Research Institute (KFRI) contributions through the International Union of Forestry Research Organizations (IUFRO)
- United States Department of Agriculture (USDA) - Forest Service
- Universiti Putra Malaysia (UPM)

APAFRI gratefully recognizes the generous support from the following agencies which have supported our activities over the years (in alphabetical order):

- ASEAN-Korean Environmental Collaboration Project (AKECOP)
- Australian Centre for International Agricultural Research (ACIAR)
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- Korea Forest Research Institute (KFRI) contributions through the International Union of Forestry Research Organizations (IUFRO)
- United States Department of Agriculture (USDA) - Forest Service
- Universiti Putra Malaysia (UPM)

IUFRO

FRIM ialah ahli IUFRO (International Union of Forest Research Organizations), iaitu jaringan global (dunia) bagi kerjasama sains yang dianggotai lebih daripada 15 000 orang ahli dari 700 buah organisasi, di lebih daripada 110 buah negara. Dr Lee Su See merupakan Timbalan Presiden IUFRO bagi penggal 2010–2014 yang bertanggungjawab terhadap Pasukan Petugas, Program Khas, Projek-projek dan Inisiatif IUFRO. Dalam tahun 2011, beliau telah terlibat dalam Mesyuarat Jawatankuasa Pengurusan (MC) IUFRO dan Mesyuarat Lembaga ke-50 dan Seminar Saintifik pada 22–25 Februari di Vienna dan Helenenthal, Austria, seterusnya mesyuarat MC pada 24–28 September yang diadakan di Seoul, Korea Selatan dan Beijing, China. Semasa mesyuarat-mesyuarat MC, Dr. Lee mengambil bahagian dalam membincangkan isu-isu IUFRO termasuklah isu-isu kewangan, pengumpulan dana, pelan kongres serantau dan antarabangsa, perkongsian strategik, kerjasama antarabangsa, komunikasi dan keahlian. Beliau memaklumkan ahli-ahli tentang aktiviti terkini yang melibatkan sembilan Pasukan Petugas. Manakala pada Mesyuarat Lembaga ke-50, Dr Lee mempengerusikan sesi Pasukan Petugas IUFRO dan seterusnya semasa Seminar Saintifik, beliau mempengerusikan sesi “Forest and Water Interaction”. Pada mesyuarat tersebut, beliau juga mengemukakan Terma Rujukan dan pelan aktiviti Pasukan Petugas “Resources for the Future” bagi menggantikan Koordinator Pasukan Petugas. Jawatankuasa Pengurusan IUFRO telah dijemput untuk melawat Seoul, Korea Selatan oleh mantan Presiden IUFRO, Prof. Don K. Lee yang juga merupakan Menteri Perhutanan Korea Selatan sebelum mesyuarat MC diadakan di Beijing. Di Seoul, IUFRO MC telah bertemu dengan pegawai-pegawai dari Korea Forest Research Institute (KFRI) dan Menteri Perhutanan bagi membincangkan isu-isu kerjasama.

Berdasarkan kepakaran dan pengalamannya dalam penyelidikan perhutanan, Dr Lee Su See telah dilantik sebagai salah seorang daripada empat orang ahli Panel Kajian Semula untuk mengkaji Department of Forest Sciences, Faculty of Forestry, University of British Columbia (UBC) di Vancouver, Canada pada 9–11 May 2012. Ahli Panel Kajian Semula yang lain ialah Pengerusi Panel, Prof Victor Lieffers, dari Department of Renewable Resources, University of Alberta, Canada, Prof Lisa Graumlich, Dekan, College of the Environment, University of Washington, Amerika Syarikat, dan Prof Brenda McComb, Ketua, College of Forestry, Forest Ecosystems and Society, Oregon State University, Amerika Syarikat. Department of Forest Resources Management fakulti tersebut juga telahpun dikaji semula pada masa yang sama oleh empat orang panel penilai lain yang dilantik dari luar. Kajian Semula ini dianggap sebagai langkah penting dalam mengenal pasti strategi masa depan untuk jabatan sejajar dengan universiti tetapi yang khusus kepada fakulti.

IUFRO

FRIM is a member of IUFRO (International Union of Forest Research Organizations), the global network for science cooperation which brings together more than 15 000 members in almost 700 member organizations in over 110 countries. Dr Lee Su See is IUFRO Vice President for the term 2010–2014, in charge of Task Forces, Special Programmes, Projects and IUFRO-led Initiatives. In 2011, she participated in the IUFRO Management Committee (MC) Meeting and 50th Board Meeting & Scientific Seminar, 22–25 February 2011, in Vienna and Helenenthal, Austria, and in the IUFRO MC Meeting, 24 – 28 September, held in Seoul, South Korea and Beijing, China. At the MC meetings, Dr Lee participated in discussions on IUFRO management issues including financial issues, fundraising, plans for regional and international congresses, strategic partnerships, international cooperation, communication and membership. She updated members on the activities of the nine current IUFRO Task Forces. During the 50th Board meeting, Dr Lee chaired the session on the IUFRO Task Forces and in the subsequent Scientific Seminar, she chaired the session “Forests and Water Interactions”. At that meeting, she also presented the Terms of Reference and planned activities for the Task Force, “Resources for the Future” in the absence of the Task Force coordinator. The IUFRO MC was invited to visit Seoul, South Korea, by the immediate past-IUFRO President, Prof Don K Lee, who is also the Minister of Forests for South Korea, prior to the MC meeting in Beijing. In Seoul the IUFRO MC members met with officials from the Korea Forest Research Institute (KFRI) and Ministry of Forests to discuss issues of collaboration and cooperation.

Review Panel Member, Department of Forest Sciences, Faculty of Forestry, University of British Columbia, Canada

Based on her expertise and experience in forest research, Dr Lee Su See was appointed a member of a four-person panel to conduct a review of the Department of Forest Sciences, Faculty of Forestry, University of British Columbia (UBC), Vancouver, Canada, from 9 to 11 May 2012. Other members of the review panel were Panel Chair, Prof Victor Lieffers, Department of Renewable Resources, University of Alberta, Canada, Prof Lisa Graumlich, Dean, College of the Environment, University of Washington, USA, and Prof Brenda McComb, Head, College of Forestry, Forest Ecosystems and Society, Oregon State University, USA. The Department of Forest Resources Management of the faculty was also reviewed at the same time by another panel of four external reviewers. These reviews were viewed as an important step in determining the future strategy of the departments in alignment with that of the university, but which was also specific to the Faculty.

Ini juga merupakan satu peluang untuk belajar dengan lebih terperinci tentang sistem pendidikan perhutanan di Kanada dan Amerika Syarikat dan manfaat yang boleh diperoleh pelajar Malaysia. Interaksi dengan kakitangan universiti, pelajar, pelanggan dan ahli-ahli Panel Penilai menyediakan satu saluran yang baik untuk pertukaran idea dan maklumat mengenai perkembangan terkini dalam bidang perhutanan dan hasil hutan di samping mengukuhkan jalinan hubungan kerjasama antara institusi perhutanan yang khusus dan para penyelidik di Kanada, Malaysia dan Amerika Syarikat.

CONFERENCE OF PARTIES, PERUBAHAN IKLIM BANGSA-BANGSA BERSATU, DURBAN

Persidangan Perubahan Iklim Bangsa-bangsa Bersatu telah diadakan di Durban, Afrika Selatan pada 28 November hingga 11 Disember. Persidangan tersebut terdiri daripada Persidangan Parti-Parti ke-17 (COP 17) *United Nations Framework Convention on Climate Change* (UNFCCC), Mesyuarat ke-35 *Subsidiary Body for Scientific and Technological Advice* (SBSTA35), *Subsidiary Body for Implementation* (SBI36), Sesi Ke-18 *Ad Hoc Working Group on Further Commitments* bagi Parti-Parti Annex 1 di bawah Protokol Kyoto (AWG-KP 18) dan Sesi ke-18 *Ad Hoc Working Group on Long-term Cooperative Action* di bawah UNFCCC (AWG-LCA 18) yang diadakan serentak.

Isu-isu perhutanan yang telah dirunding di bawah UNFCCC adalah seperti berikut:

- Peraturan sistem bagi memberi maklumat berkaitan dengan aspek perlindungan dan pembentukan *reference emissions level/references level* bagi REDD+ (SBSTA35)
- Pembiayaan REDD+ bagi tindakan berdasarkan hasil (AWG-LCA 18)
- Memasukkan perbincangan berkaitan *Forest in exhaustion* di bawah A/R CDM (SBSTA35)
- Land use, land use change and forestry* (LULUCF) (AWG-KP 18)

Selain perkara d, semua perkara di atas adalah berkaitan dengan negara-negara membangun.

Bagi perkara peraturan dan *reference level*, SBSTA telah membuat rumusan bagi perkara yang berikut:

- Panduan bagi sistem untuk menyediakan maklumat berkaitan kaedah aspek perlindungan dalam REDD+ ditangani dan dihormati;
- Peraturan (modalities) bagi *forest reference emission levels* dan *forest reference level*; dan
- Panduan untuk penghantaran maklumat berkaitan *reference levels*.

This was also an opportunity to learn in greater detail about the forest education system in Canada and the United States and how Malaysian students could benefit. The interaction with the university staff, students, clients, and Review Panel members provided an excellent avenue for exchange of ideas and information about the latest developments in forestry and forest products research whilst strengthening networking relationships with forest related institutions and researchers in Canada, Malaysia and the United States.

THE UNITED NATIONS CLIMATE CHANGE CONFERENCE OF PARTIES, DURBAN

The United Nations Climate Change Conference in Durban, Mexico, began on 28 November 2011 and concluded on 11 December 2011. The conference included the Seventeenth Conference of the Parties (COP17) to the United Nations Framework Convention on Climate Change (UNFCCC) and the Seven Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP7). In addition, the thirty-fifty session of the Subsidiary Body for Scientific and Technological Advice (SBSTA35), the Subsidiary Body for Implementation (SBI36), the Eighteen session of the *Ad Hoc Working Group on Further Commitments* for Annex I Parties under the Kyoto Protocol (AWG-KP 18) and the Eighteen session of the *Ad Hoc Working Group on Long-term Cooperative Action* under the UNFCCC (AWG-LCA 18) were also held concurrently

The forestry issues discussed under the UNFCCC platform are as follows:

- Modalities for system to provide information on safeguards and development of *reference emissions level/ references level* for REDD+ (SBSTA35)
- REDD+ financing for result based action (AWG-LCA 18)
- Inclusion of *Forest in exhaustion* under the A/R CDM (SBSTA35)
- Land use, land use change and forestry* (LULUCF) (AWG-KP 18)

Except for item d, all the other implementation is for developing country parties.

The SBSTA concluded on the guidance and modalities for REDD-plus activities as follows:

- guidance on system for providing information on how safeguard are addressed and respected;
- modalities for forest reference emission levels and forest reference level; and
- Guideline for submission of information on reference levels.

Bagi pelaksanaan REDD+ di peringkat nasional, persetujuan telah dicapai supaya maklumat berkaitan kaedah menangani dan menghormati aspek perlindungan (termasuk perlindungan kepada kepelbagaian hayat serta kepentingan komuniti hutan) perlu dilaksanakan secara telus. Sistem yang dibentuk perlu fleksibel bagi membolehkan penambahbaikan di masa akan datang dan dibentuk mengikut keperluan negara serta sistem tempatan yang sedia ada.

Mengenai aspek *reference emission levels* dan *forest reference level*, persetujuan telah dicapai supaya selari dengan inventori gas rumah hijau sesebuah negara. Apabila *reference emission level/reference level* dibentuk, data sejarah atau keadaan yang lepas perlu digunakan. Proses pembentukan *reference emission level/reference level* harus telus, lengkap, tekal dan tepat serta kaedah pembentukan perlu dijelaskan. Aspek takungan karbon serta gas lain yang diambil kira perlu ditunjukkan.

Berkaitan pembiayaan bagi REDD+ berdasarkan hasil tindakan, peruntukan kewangan kepada negara-negara membangun mestilah daripada sumber baharu, tambahan kepada yang sedia ada, serta berterusan daripada pelbagai punca termasuk awam, persendirian, kerjasama dua hala serta kerjasama pelbagai hala termasuk sumber alternatif. COP boleh membentuk mekanisme sesuai bagi pendekatan yang menggunakan pasaran untuk membiayai projek REDD+ yang berdasarkan hasil daripada aktiviti REDD+ yang dijalankan oleh negara membangun.

Konsep *forest in exhaustion* untuk disertakan sebagai salah satu aktiviti di bawah mekanisme *afforestation and reforestation clean development mechanism* (A/R CDM) telah dicadangkan oleh Brazil. Konsep ini adalah berkaitan dengan pemberian insentif di bawah mekanisme CDM bagi tindakan yang diambil untuk meningkatkan produktiviti hutan terosot yang tidak dapat dipulihkan tanpa bantuan manusia. Banyak negara masih kurang jelas dengan konsep serta implikasi perkara ini dan memohon supaya perbincangan lanjut dijalankan. Oleh yang demikian, aspek ini akan dibincang lagi dalam mesyuarat SBSTA yang akan datang.

Perbincangan LULUCF di bawah AWG-KP adalah berkaitan dengan negara-negara maju di bawah Protokol Kyoto. Perbincangan LULUCF menumpukan pada aktiviti perhutanan dan perubahan guna tanah yang berkaitan dengan definisi, peraturan dan panduan dalam membolehkan negara maju menggunakan LULUCF untuk memenuhi komitmen mereka termasuk dalam tempoh komitmen kedua Protokol Kyoto.

For national REDD+ implementation, it is agreed that a summary of the information on how all the safeguards are addressed and respected in a transparent manner. The system should be flexible to allow for future improvements, country driven and potentially build upon an existing system.

On forest reference emission levels and forest reference level, it was agreed that consistency should be maintained with a country's greenhouse gas inventory. In this regard, when developing the reference emission level/reference level, historic data could be used. The process should be transparent, complete, consistent and accurate with details of methodological information used. Carbon pools and gases accounted for must also be shown.

On REDD+ financing for result based actions, that results-based finance provided to developing parties that is new, additional and predictable may come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources. Parties should consider based on the demonstration activities, appropriate market-based approaches could be developed by the COP to support results-based actions by developing countries.

The concept of *forest in exhaustion in the A/RCDM* is proposed by Brazil but many countries expressed the lack of clarity on what it means and the implications. It is therefore suggested that this be discussed in the next SBSTA.

The LULUCF discussion under the AWG-KP is for developed countries signatory to the Kyoto Protocol. It provides guidance on the definitions, modalities, rules and guidelines relating to land use, land-use change and forestry activities under the Kyoto Protocol for application in the second commitment period.

PROJEK R&D ANTARABANGSA DALAM PENDERIAAN JAUH UNTUK BIOJISIM DAN KARBON HUTAN, REDD+ DAN PERUBAHAN IKLIM

Pada tahun 2010 FRIM berjaya melaksanakan projek antarabangsa mengenai penggunaan teknologi hiperspektra untuk pemetaan *Gonystylus bancanus* (ramin) yang dibiayai oleh ITTO/CITES. Kejayaan tersebut mendorong penyelidik FRIM untuk sekali lagi menggembleng tenaga mencadangkan dan akhirnya berjaya mendapat tiga lagi projek penyelidikan yang mendapat biayaan dan melibatkan agensi dari luar negara pada tahun 2011. Agensi antarabangsa yang terlibat ialah Forestry and Forest Product Research Institute (FFPRI), Japan, the Asia Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) dan Institute of Forest Resource Information Techniques, Chinese Academy of Forestry (IFRIT) berpejabat di negara China, serta Jepun Aerospace Exploration Agency (JAXA), Japan. Ketiga-tiga projek tersebut yang bernilai lebih daripada RM1 juta dan untuk tempoh sehingga 2014 memberi tumpuan terhadap kajian REDD+ (Reducing Emissions from Deforestation and Forest Degradation), penilaian biojism dan stok karbon hutan serta berkaitan dengan isu-isu perubahan iklim. Tajuk ketiga-tiga projek tersebut adalah seperti di bawah.

- 1 Development of Forest Carbon Monitoring Methodologies For REDD+ In Malaysia (FRIM-FFPRI)
- 2 Forest Cover and Carbon Mapping in the Greater Mekong Sub-region and Malaysia (FRIM – APFNet/IFRIT)
- 3 Aboveground Biomass and Carbon Stock Mapping and Changes Monitoring in the Forest of Peninsular Malaysia Using L-Band ALOS Palsar and JERS-1 (FRIM-JAXA)

FRIM telah berbincang dengan Jabatan Perhutanan Semenanjung Malaysia (JPSM) mengenainya dan kedua-dua agensi telah bersetuju bekerjasama untuk melaksanakan ketiga-tiga projek berkenaan. Projek-projek ini juga telah dikemukakan sebelum ini kepada NRE dan mendapat sokongan penuh daripada kementerian yang seterusnya menasihatkan supaya pelaksanaan projek dipantau dengan teliti oleh Jawatankuasa Kebangsaan REDD di NRE. Dengan penglibatan JPSM dan sokongan padu oleh NRE, adalah dijangkakan bahawa ketiga-tiga projek antarabangsa berkaitan penderiaan jauh dan perubahan iklim yang baru diterima ini akan berjaya dilaksanakan untuk faedah negara.

INTERNATIONAL R&D FUNDED PROJECTS ON REMOTE SENSING FOR ASSESSMENT OF FOREST BIOMASS, CARBON STOCK, REDD+ AND CLIMATE CHANGE

Upon successful completion of the international ITTO-CITES funded project on hypersepctral remote sensing for *Gonystylus bancanus* (ramin) mapping in 2010, FRIM researchers had put up another team effort to propose and successfully secured three other international collaborated projects in 2011. The international collaborators and donor agencies are the Forestry and Forest Product Research Institute (FFPRI), Japan, the Asia Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) and Institute of Forest Resource Information Techniques, Chinese Academy of Forestry (IFRIT) based in China, and the Japan Aerospace Exploration Agency (JAXA), Japan. The three projects that worth more than RM 1 million are to be completed in 2014 which focus on REDD+ (Reducing Emissions from Deforestation and Forest Degradation), biomass estimation, carbon stock assessment and the climate change issues. The three project titles are listed below.

- 1 Development of Forest Carbon Monitoring Methodologies For REDD+ In Malaysia (FRIM-FFPRI)
- 2 Forest Cover and Carbon Mapping in the Greater Mekong Sub-region and Malaysia (FRIM – APFNet/IFRIT)
- 3 Aboveground Biomass and Carbon Stock Mapping and Changes Monitoring in the Forest of Peninsular Malaysia Using L-Band ALOS Palsar and JERS-1 (FRIM-JAXA)

FRIM had presented and discussed the projects with Forestry Department Peninsular Malaysia (FDPM) and both FRIM and FDPM pledged their commitment to put their efforts together to jointly implement the projects. The projects had also previously been presented to the NRE and gained full support from the ministry which consequently advised that the projects' implementation be monitored closely by the National REDD Committee at NRE. With the involvement of FDPM and strong support by NRE, it is envisaged that these three newly secured international remote sensing and climate change related projects will be successfully implemented for the benefit of the country.

Dr Mohd Nor Yusoff telah dilantik sebagai wakil pengurusan menggantikan Dr Abd Rahim Hj Nik yang memulakan tugas di NRE sebagai Timbalan Ketua Setiausaha II berkuat kuasa 18 Mei.

Dr Mohd Nor Yusoff was appointed the new management representative replacing Dr Abd Rahim Hj Nik who commenced his duty as Deputy-Secretary General II at the NRE effective 18 May.

Struktur Jawatankuasa Pengurusan Kualiti 2011

Struktur Jawatankuasa Sistem Pengurusan Kualiti (SPK) yang baharu telah dibentuk dengan mengambil kira keperluan semasa SPK yang semakin berkembang. Struktur ini dikemudikan oleh Jawatankuasa Pemandu Kualiti. Setiap Jawatankuasa yang dibentuk dibawahnya diwakili oleh seorang wakil bagi setiap bahagian. Unit Pengurusan Kualiti pula bertindak sebagai sekretariat bagi setiap Jawatankuasa yang ditubuhkan.

Quality Management Committee Structure 2011

The new structure of Quality Management System (QMS) Committee has been established to strengthen up the current needs of quality system. It is headed by the Quality Steering Committee. Each committee is represented by a representative from each division and the Quality Management Unit acts as the secretariat.

Pelaksanaan Audit Dalam

Audit dalam MS ISO 9001:2008, MS ISO/IEC 17025 dan QE/5S telah dilaksanakan sebanyak dua kali pada tahun ini. iaitu 21 Februari–18 Mac dan 8–19 Ogos. Secara keseluruhannya, penemuan audit semakin berkurangan dari tahun ke tahun. Ini menunjukkan warga FRIM semakin prihatin dengan sistem kualiti dan sedikit demi sedikit menerapkannya sebagai satu budaya kerja. Indeks penemuan audit (IPA) ISO 9001:2008 menurun daripada 4.15 pada siri 1/2011 kepada 1.22 pada siri 2/2011. Manakala IPA bagi MS ISO/IEC 17025 menurun daripada 5.47 pada siri 1/2011 kepada 3.13 pada siri 2/2011.

Internal Audit

Internal audit MS ISO 9001:2008, MS ISO/IEC 17025 and QE/5S has been conducted twice this year; i.e. on 21 February–18 March and 8–19 August. Overall, audit findings were decreasing from the previous years. It shows that FRIM's staff were becoming more aware of the quality management system and adopted it as their work culture. Audit finding index (AFI) for ISO 9001:2008 decreased from 4.15 on audit series 1/2011 to 1.22 on series 2/2011, whereas AFI for MS ISO/IEC 17025 decreased from 5.47 on audit series 1/2011 to 3.13 on series 2/2011.

Pada siri 1/2011, audit dalam QE/5S melibatkan 12 Bahagian di FRIM. Namun pada siri 2/2011, audit telah dilaksanakan di 32 zon yang telah ditetapkan. Kriteria penilaian adalah berdasarkan keperluan utama pelaksanaan; ruang tugas guna sama; keperluan utama individu; tempat simpanan; tempat umum dan kawasan persekitaran.

During series 1/2011, the QE/5S internal audit assessment involved 12 divisions in FRIM while during series 2/2011, 32 selected zones were assessed. The assessment criteria included main needs of implementation, shared working spaces, individual main needs, storage areas, public areas and environment.

Audit Luar (Pemantauan) MS ISO 9001:2008/External MS ISO 9001:2008 Audit (Surveillance)

Tarikh/Date : 11 & 12 Oktober/October
Juruaudit/Auditors : Moody International Sdn Bhd:
 Simon Lim Wing Wang, Mohd Nazib Marwan and Dr Oii Cheng Lee

Sejumlah 35 CUMBS terlibat/A total of 35 CUMBS involved.

Penemuan/Findings:

Tiada ketidakakuran ditemui. Hanya lima pemerhatian dan sembilan peluang penambahbaikan. FRIM berjaya mengekalkan pensijilan.

There was no non-conformity found. Only five observations and nine opportunities for improvement. FRIM maintained the certification successfully.

Pelaksanaan audit luar 5S/QE (Pensijilan Semula)/External QE/5S Audit (Re-Certification)

Tarikh/Date	: 13 Oktober/October
Juruaudit/Auditors	: Perbadanan Produktiviti Malaysia/Malaysian Productivity Corporation: Md. Muzany Md. Suradi dan/and Zaki Jaafar
Zon Diaudit/Zones Audited	: RSGI & HH, KEW, PENT, PJK, BSM, MTBB, PULIH, ICT, PPS, HTC, MAAK, EAS & PBB, RePP & KL
Keputusan/Findings:	Markah keseluruhan sebanyak 93% dan berjaya mendapatkan pensijilan semula. Total marks of 93% and FRIM successfully obtained the certifications.

Pelaksanaan Latihan Kualiti

Sebanyak lapan latihan yang menggabungkan keperluan kualiti dan teknikal telah diadakan sepanjang tahun 2011 merujuk ringkasan maklumat seperti jadual di bawah:

Quality Training Implementation

A total of eight training courses which combined quality and technical requirements were organized for the year 2011. The list of training courses is shown as follows:

Bil/No	Nama latihan/Description	Tarikh/Date
1	Latihan Juruaudit QE/5S QE/5S Training for Auditors	25–28 Januari/January & 11 Februari/February
2	Latihan /Training on Measurement Uncertainty and Statistical Process Control (SPC)	12–13 April
3	Seminar Kebangsaan Kumpulan Inovatif dan Kreatif (KIK) National Seminar on Innovative and Creative Group (KIK)	10 –11 Mei/May
4	Latihan Kesedaran KIK Training on KIK Awareness	27 Jun/June
5	Taklimat Pelaksanaan QE/5S Kepada Ketua Zon QE/5S Implementation Briefing to Zone Heads	6 Julai/July
6	Latihan Kesedaran QE/5S QE/5S Awareness Training	27 Julai/July
7	Bengkel KIK KIK Workshop	27–28 Julai/July
8	Latihan Kawalan Mutu Kaedah Statistik (SPC) Training on Statistical Process Control	3–4 November

Dokumen Kualiti FRIM

Pada tahun ini empat prosedur kualiti baharu diwujudkan bagi memantapkan lagi sistem pengurusan kualiti FRIM iaitu Pembekalan Perkhidmatan, Pengendalian MoU/Perjanjian, Pembekalan Bahan Rujukan dan Sistem Arahan Pengurusan dan Pentadbiran FRIM.

FRIM Quality Document

Four new quality procedures were established in order to strengthen quality management system in FRIM. They were procedures for Supply Services, Handling of MoU/Agreement, Supply of Reference Materials and FRIM Management and Administrative Order System.

Aktiviti Bulan Inovasi

November merupakan Bulan Inovasi FRIM 2011 dan pelbagai aktiviti kualiti telah dilaksanakan. Pada 7 Disember diadakan pertandingan Kumpulan Inovatif dan Kreatif (KIK) dan Pertandingan Inovasi dan Reka Cipta di FRIM. Pada 8 Disember 2011 pula telah diadakan Hari Inovasi 2011 bagi memberi anugerah dan pengiktirafan kepada pemenang-pemenang. Majlis tersebut telah dirasmikan oleh Dato' Dr Abd Latif Mohmod, Ketua Pengarah FRIM.

Innovation Month Activities

The month of November was declared as FRIM's Innovation Month 2011 where many quality competitions were organized. On 7 December, an Innovative and Creative Group as well as Innovation Competitions was held in FRIM. On 8 December, Innovation Day was held as a giving and recognition ceremony to the winners.

No.	Pertandingan/Competition	Keputusan/Result		
		Tempat Pertama First Place	Tempat Kedua Second Place	Tempat Ketiga Third Place
1.	Persekitaran Kerja Terbaik (Pejabat)/Best Working Environment (Offices)	Unit Pengurusan Kualiti Quality Management Unit	Bahagian Sumber Manusia/Human Resource Division	Cawangan Kewangan & Akaun/Finance & Account Branch
2.	Persekitaran Kerja Terbaik (Makmal)/ Best Working Environment (Laboratories)	Makmal Genetik, Bitoteknologi Perhutanan Genetic Laboratory, Forest Biotechnology Division	Makmal Teknologi Biji Benih, Bioteknologi Perhutanan Seed Technology Laboratory, Forest Biotechnology Division	Makmal Kultur Tisu, Bioteknologi Perhutanan Tissue Culture Laboratory, Forest Biotechnology Division
3.	Persekitaran Kerja Terbaik (Bengkel & Nurseri)/Best Working Environment (Workshops & Nurseries)	Bengkel Awetan Kayu, Keluaran Hutan Wood Preservation Workshop, Forest Products Division	Bengkel Ujian Perabot, Keluaran Hutan Furniture Testing Workshop, Forest Products Division	Taman Etnobotani, Hasil Semula Jadi Ethnobotanic Garden, Natural Products Division
4.	Persekitaran Kerja Terbaik (SPF)/ Best Working Environment (SPF)	SPF Mata Ayer Mata Ayer SPF	SPF Jengka Jengka SPF	SPF Pasoh Pasoh SPF
5.	Sudut Kualiti Terbaik/Best Quality Corners	Bahagian Keluaran Hutan Forest Products Division	Bahagian Hasil Semula Jadi/Natural Products Division	Bahagian Bioteknologi Perhutanan/Forest Biotechnology Division
6.	Zon 5S Terbaik/Best 5S Zones	Zon/Zone 12	Zon/Zone 9	Zon/Zone 8
7.	Pertandingan Menulis Esei/ Essays Competition	Nor Haliyan Tan Shilan	Wahayu Abdul Wahab	Dr Ho Wai Mun
8.	Pertandingan KIK (Pengurusan)/ KIK Competition (Management)	BIJAK WANG—Kewangan/Finance Division	Lebah—Sumber Manusia Human Resource Division	Ceria—Pentadbiran Administrative Division
9.	Pertandingan KIK (Teknikal)/ KIK Competition (Technical)	GBS—Hasil Semula Jadi/Natural Products Division	AWAN NANO—Bioteknologi Perhutanan/Forest Biotechnology Division	BIODIVERSITI 101—Biodiversiti Hutan/Forest Biodiversity Division

No.	Pertandingan/Competition	Keputusan/Result		
		Tempat Pertama First Place	Tempat Kedua Second Place	Tempat Ketiga Third Place
10.	Pertandingan Idea Terbaik/ Best Ideas Competition	1. Mohd Azahari Faidi 2. Suharti Samod 3. Khairul Masseat 4. Nurhanan Murni Yunos 5. Zaliha Che Muda		
11.	Anugerah Juruaudit Terbaik/ Best Auditors Award	1. MS ISO 9001 – Nor Asmah Hasan 2. MS ISO/IEC 17025 – Habibah Mohamad 3. QE/5S – Dr Pin Kar Yong		
12.	Anugerah Inovasi Ketua Pengarah/ Director General Innovation Award	Dr Wan Tarmeze Wan Ariffin		
13.	Anugerah Pertandingan Inovasi & Rekapipta/ Invention and Innovation Competition Award	Best of the Best 1 LKS Flooring (Papan lantai terolah daripada venir spesies kayu kurang popular) – Hashim Wan Samsi Anugerah Emas/Gold Award 1 Proses efisien pemerahan sap daripada batang sawit untuk tujuan penghasilan bioetanol dan bahan kimia bio – Dr Wan Asma Ibrahim 2 Pellet komposit daripada plastik terbuang dan tandan kosong sawit (TKS) untuk Tenaga Boleh diperbaharui – Dr Wan Asma Ibrahim 3 Producing fine paper from the kenaf stalk – Dr Rushdan Ibrahim 4 A method of producing pulp for fine paper and linerboard from oil palm empty fruit bunches – Dr Rushdan Ibrahim 5 MYScrim-Acacia (SCRIM-based engineered lumber and board from young acacia wood) – Dr Wan Tarmeze Wan Ariffin 6 DnR briket : Briket arang daun – Puad Elham 7 Biodiesel mesra alam dari sumber bukan makanan – Mohammad Edziani Rosali 8 LKS Flooring (Papan lantai terjurutera daripada venir spesies kayu kurang popular) – Hashim Wan Samsi		

Hari Inovasi NRE 2011

Bertempat di Dewan Baiduri NRE, Putrajaya majlis Hari Inovasi NRE telah diadakan pada 14 November. Majlis ini telah dirasmikan oleh YB Dato' Sri Douglas Uggah Embas, Menteri NRE. Sempena Hari Inovasi ini pelbagai pertandingan telah dilaksanakan bagi agensi dan jabatan di bawahnya bagi mengiktiraf usaha yang telah dilaksanakan oleh warga NRE dalam meningkatkan inovasi dan kreativiti. FRIM juga tidak ketinggalan terlibat dalam pertandingan-pertandingan yang telah diadakan. FRIM telah berjaya membolot beberapa tempat bagi kategori yang dipertandingkan. Keputusan adalah seperti yang berikut:

- 1 Anugerah Penarafan Bintang/[Star Rating Award](#)—Johan/[First Place](#)
- 2 Pertandingan “NRE GOES GREEN”/[NRE GOES GREEN Competition](#)—Kedua/[Second Place](#)
- 3 Anugerah Pengurusan Sumber Manusia Terbaik/[Best Human Resource Management Award](#)—Kedua/[Second Place](#)
- 4 Mini Konvensyen 5S NRE: Pelaksanaan Amalan 5S/[NRE 5S Mini Convention: 5S Implementation](#)—Ketiga/[Third Place](#)
- 5 Pertandingan Koir Inovasi/[Innovation Choir Competition](#)—Ketiga/[Third Place](#)
- 6 Pertandingan Lagu-lagu Dakwah/[Dakwah Song Competition](#)—Ketiga/[Third Place](#)
- 7 Anugerah Cemerlang Penilaian Portal dan Laman Web Kerajaan Malaysia/[Malaysian Government Portal and Website Assessment Excellent Award](#)—5 Bintang/[5 Star](#)
- 8 Anugerah Rekaan Hiasan Pameran Terbaik/[Best Exhibition Award](#)—Kedua/[Second Place](#)

NRE Innovation Day 2011

The NRE Innovation Day was held at Dewan Baiduri, Putrajaya on 14 November. The ceremony was officiated by YB Dato' Sri Douglas Uggah Embas, Minister of NRE. Various competitions were organized for agencies and departments under NRE. The purpose of the competitions was to recognize staff efforts in enhancing their innovation and creativity. FRIM has taken part in the competitions and bagged some of the prizes. The results were:

Pencapaian/Performance	2010	2011
Bil. projek penyelidikan dijalankan No. of research projects	181	188
Dana penyelidikan diperoleh (RM) Research funds obtained	31.1 juta	18.6 juta
Penghasilan kertas teknikal and saintifik Technical and scientific papers produced	420	515
Kertas yang diterbitkan di dalam jurnal (refereed journal) Papers published in journals (refereed journal)	77	71
Penerbitan (Teknikal/Bukan Teknikal) Publications (Technical/Non-Technical)	151	109
Pendedahan rekapipta Invention disclosure	15	35
PROMOSI/PROMOTIONS		
Penyertaan Pameran Exhibition participations	22	24
Penghasilan artikel/rencana media Articles/features published in the media	118	97
Penganjuran seminar/persidangan/bengkel/dialog Seminar/conferences/workshops/dialogues organized	27	36
AKTIVITI KOMERSIALISASI/COMMERCIALIZATION ACTIVITIES		
Hasil/Output Penyelidikan berpotensi untuk dikomersialkan Potential R&D findings/outputs to be commercialized	18	18
Menandatangani teknologi perlesenan Signing of licensing technology	3	2
Pengiktirafan paten Patents	1	4
Pemfailan paten Patents filed	17	10

Pencapaian/ Performance	2010	2011
PERKHIDMATAN/SERVICES		
Ujian dan Perkhidmatan/ Testing and Services (RM)	490,237	898,330
Perkhidmatan Perundingan Ikhtisas (Bilangan) Professional consultancy services (No.)	39	49
Nilai Perundingan/ Value of consultancies (RM)	874,000	2,100,000
Pelawat berdaftar ke FRIM Registered FRIM visitors	237,770	285,052
Pendapatan—Sewaan peralatan, ruang, penjualan bahan & perkhidmatan (latihan, bengkel dll.) (RM) Income—Rentals of equipment, space, sales of materials & services (training, workshop etc.)	1,508,164	2,413,211
LATIHAN/TRAINING		
Menganjurkan latihan dalaman/luaran mengikut kepakaran (termasuk latihan awam & induksi) Organizing internal/external trainings according to expertise (including public trainings & induction courses)	207	340

Usaha dan sumbangan aktif FRIM terus diiktiraf oleh pelbagai pihak baik di peringkat kebangsaan mahupun antarabangsa. Tahun 2011 telah mencatatkan kejayaan gemilang FRIM dengan penganugerahan berprestij yang diterima, antaranya termasuklah:

Lantikan Sebagai CARB-Approved Third-Party Certifier

Perasmian makmal ujian formaldehid pertama yang mematuhi peraturan-peraturan yang ditetapkan oleh *Californian Air Resources Board* (CARB) telah disempurnakan oleh YB Nancy Shukri, Pengerusi MFRDB di FRIM. Upacara perasmian telah diadakan pada 29 Mac di FRIM. FRIM telah dilantik oleh PT Mutuagung Lestari, Indonesia, sebagai *CARB-approved third-party certifier* untuk menyediakan kemudahan dan perkhidmatan yang berkualiti bagi industri kayu di Malaysia. Pensijilan ini berperanan sebagai usaha mengatasi halangan-halangan teknikal dan pasaran yang dikenakan oleh negara pengimport. Menjelang tahun 2012, FRIM akan dapat menawarkan perkhidmatan ujian pembebasan formaldehid kepada industri di Malaysia untuk memastikan produk tersebut mematuhi kehendak pasaran luar negara, terutamanya Amerika Syarikat. *Californian Air Resource Board* ialah sebuah agensi yang menguatkuasakan langkah-langkah pengawalan udara toksik termasuklah mengurangkan pembebasan formaldehid bagi produk komposit kayu dan perabot siap. Formaldehid ialah sejenis bahan kimia yang digunakan dalam penghasilan perekat pengikat kayu (urea) dan dihasilkan pada skala besar di seluruh dunia.

Appointment As CARB-Approved Third-Party Certifier

The official opening of the first formaldehyde testing laboratory in compliance with the Californian Air Resources Board (CARB) regulations was conducted by YB Nancy Shukri, MFRDB chairperson, at FRIM. The opening ceremony was held on 29 March at FRIM. FRIM has been appointed by PT Mutuagung Lestari, Indonesia, as CARB-approved third-party certifier to provide facilities and quality services for the wood industry in Malaysia. The certification will serve to overcome the technical and market barriers imposed by importing countries. By 2012, FRIM will be able to offer formaldehyde release testing services to the industry in Malaysia to ensure products are in compliance to the overseas market, especially the United States. The Californian Air Resource Board is an agency which enforces airborne toxic control measures to reduce formaldehyde emission for composite wood products and furniture goods. Formaldehyde is a chemical derivative being used in the production of wood-binding adhesives (with urea) and is produced on a large scale worldwide.

International Socrates Award for the Best Enterprise Award (Applied Research and Scientific) 2011 dan/and European Best Manager of the Year (Science) Award

FRIM telah menerima International Socrates Award for the Best Enterprise Award (Applied Research and Scientific Achievements) 2011 dari Europe Business Assembly (EBA) pada 12 Disember bertempat di Oxford Town Hall, Oxford, United Kingdom. Di majlis yang sama Ketua Pengarahnya, Dato' Dr Abd Latif Mohmod dianugerahi International Socrates Award for Manager of the Year (Applied Research and Scientific Achievements) 2011. Abd Latif menerima pingat dan sijil yang disampaikan oleh Christina Howell dari Chamber of Commerce/Europe Business Assembly dan Paul Briggs dari International Socrates Committee Award.

FRIM received the International Socrates Award for Best Enterprise (Applied Research and Scientific Achievements) Award 2011 category from the Europe Business Assembly (EBA) at The Oxford Summit of Leaders on 12 December held at The Oxford Town Hall, Oxford, United Kingdom. Also at the same ceremony, FRIM's Director General (DG) Dato' Dr Abd Latif Mohmod was awarded the International Socrates Award for the Manager of the Year (Applied Research and Scientific Achievements) 2011 category.

FRIM menerima anugerah ini berdasarkan kriteria kebolehpercayaan, ketekalan dan kecemerlangan pencapaian dan profesionalisme R&D dalam bidang perhutanan dan hasil hutan tropika sementara Dato' Dr Abd Latif menerima anugerah di atas usaha beliau mengubah sistem dan tradisi kerja yang mengarah kepada transformasi sistem penyampaian penyelidikan dan profesionalisme sains dalam kesedaran alam sekitar dan penjana ekonomi daripada R&D negara sehingga melonjakkan prestasi dan ranking FRIM di mata dunia. FRIM dan Abd Latif merupakan penerima pertama dari Malaysia sejak 47 Oxford Summit of Leaders ini diadakan.

Dato' Dr Abd Latif received the medal and certificate presented by Christina Howell of the Chamber of Commerce/Europe Business Assembly and Paul Briggs, of the International Socrates Committee Award. FRIM received the award for the institute's reliability, consistency and excellence of achievement and professionalism in research and development (R&D) in tropical forestry and forest products. Dato' Dr Abd Latif was awarded for his efforts in initiating change in the system and traditional work practices that have led to the transformation of the research delivery system and implementing scientific professionalism in environmental awareness and economic generation from R&D that has

International Socrates Award diberikan untuk pembangunan intelektual masyarakat masa ini oleh Europe Business Assembly (EBA) sebuah badan korporat bebas yang ditubuhkan untuk kerjasama sosial, ekonomi dan kemanusiaan. Sebagai sebuah organisasi bukan kerajaan EBA menyelia transformasi ekonomi melalui pengalaman dan amalan terkini yang menggalakkan jalinan ekonomi, pelajaran, kebudayaan, saintifik serta menyokong usaha perniagaan peringkat kebangsaan.

propelled the performance and ranking of FRIM globally. FRIM and Abd Latif are the first recipients from Malaysia since the inception of the 47-year-old Oxford Summit of Leaders.

The International Socrates Award is given to the intellectual development of today's society by the Europe Business Assembly (EBA), an independent corporation formed for social, economic and humanitarian cooperation. As a non-governmental organization, the EBA facilitates economic transformation through the exchange of up-to-date experience and practice. It encourages the establishment of economic, educational, cultural and scientific ties and supports the national business elite.



Dato' Dr Abd Latif menerima anugerah daripada Christina Howell (kiri) dan Paul Briggs (kanan)
Dato' Dr Abd Latif receiving the award from Christina Howell (left) and Paul Briggs (right)

Portal atau Laman Web 5 Bintang

FRIM telah dinobatkan sebagai salah sebuah agensi kerajaan yang berjaya mencapai penarafan 5 Bintang untuk portal atau laman web berdasarkan Penilaian Portal dan Laman Web Kerajaan 2011 (MGPWA) yang dilaksanakan oleh Multimedia Development Corporation Sdn Bhd (MDeC) sejak bulan April 2011. Majlis penganugerahan Portal Laman Web Kerajaan 5 Bintang telah diadakan di PICC, Putrajaya pada 1 Disember 2011. Anugerah ini disampaikan oleh Dato' Dr Nor Aliah Mohd Zain, Timbalan Ketua Pengarah (ICT) MAMPU.

5-Star Ranking for Portals or Websites

FRIM was credited as one of the government agencies which had managed to achieve the 5-Star ranking for their portals or websites in the Malaysian Government Portals and Websites Assessment (MGPWA) by the Multimedia Development Corporation Sdn Bhd (MDeC) since April 2011. The award was presented by the MAMPU (ICT) Deputy Director General, Dato' Dr Nor Aliah Mohd Zain.



Dr Mohamed Nor (kiri) menerima anugerah daripada Dato' Dr Nor Aliah
 Dr Mohamed Nor (left) receiving the certificate from Dato' Dr Nor Aliah

Anugerah Penjenamaan Selebriti

FRIM telah menerima Anugerah Penjenamaan Selebriti bagi Kategori Pendidikan di Majlis Anugerah Penjenamaan Selebriti pada 25 November di Kuala Lumpur. Anugerah ini disampaikan oleh HRH Samdech Reach Botrei Preah Anoch Norodom Arunrasmy, Duta Diraja Cambodia kepada Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod. FRIM dipilih untuk menerima anugerah penjenamaan selebriti ini di atas usaha-usahanya yang berterusan dalam perkongsian pengetahuan dan pengalaman, serta menggalakkan kesedaran awam tentang kepentingan pemuliharaan hutan semula jadi dan alam sekitar.

Celebrity Brand Award

FRIM received the Celebrity Brand Award for Celebrity Education at the Celebrity Brand Award Ceremony held on 25 November in Kuala Lumpur. The award was presented by HRH Princess Samdech Reach Botrei Preah Anoch Norodom Arunrasmy, the Ambassador Extraordinary and Plenipotentiary of the Royal Embassy of Cambodia to FRIM Director General (DG) Dato' Dr Abd Latif Mohmod. The Celebrity Education Award was presented to the Institute in recognition of its continuous efforts in sharing knowledge and experience, and in promoting public awareness of the importance of natural forest and environment conservation.



Dato' Dr Abd Latif menerima ucapan tahniah daripada salah seorang pegawai kanan FRIM
 Dato' Dr Abd Latif receiving the congratulatory wish from one of FRIM's senior officers



Trofi dan sijil Anugerah Penjenamaan Selebriti yang diterima oleh FRIM
 Celebrity Brand Award 2011 trophy and certificate received by FRIM

Pengiktirafan Produk Eco-Label SIRIM bagi produk Ciera Eco-Friendly Multi-Purpose Disinfectant

Nature Profusion Sdn Bhd (FMBIOSIS) memperoleh pengiktirafan Produk Eco-Label SIRIM bagi produk Ciera Eco-Friendly Multi-Purpose Disinfectant. Majlis penyampaian sijil tersebut telah dilakukan oleh YAB Tan Sri Dato' Haji Muhyiddin Mohd Yasin, Timbalan Perdana Menteri Malaysia di majlis makan malam SIRIM - INDUSTRI 2011 di Pusat Konvensyen Kuala Lumpur (KLCC) pada 21 November. Timbalan Perdana Menteri telah merasmikan majlis ini dan melancarkan Skim Ekopelabelan Kebangsaan dan Skim Pensijilan Sistem Pengurusan Tenaga. Nature Profusion ialah salah sebuah syarikat yang ditubuhkan di bawah program usahawan siswazah FRIM-MTDC.

Recognition of SIRIM Eco-Label Product for its Ciera Eco-Friendly Multi-Purpose Disinfectant product

Nature Profusion Sdn Bhd (FMBIOSIS) received the recognition of SIRIM Eco-Label Product for its Ciera Eco-Friendly Multi-Purpose Disinfectant product. The certificate was received from YAB Tan Sri Dato' Haji Muhyiddin Mohd Yasin, the Deputy Prime Minister of Malaysia at Kuala Lumpur Convention Centre (KLCC) on 21 November. The Deputy Prime Minister officiated and launched the National Eco-Label Scheme and Energy Management System Certification Scheme. Nature Profusion is one of the companies that was established under FMBIOSIS, the FRIM-MTDC graduate entrepreneurial program.



Wakil Nature Profusion (kanan) menerima sijil pengiktirafan produk Eco-Label SIRIM daripada Tan Sri Muhyiddin
 A representative from Nature Profusion (right) receiving the certificate of SIRIM Eco-Label Product from
 Tan Sri Muhyiddin

Anugerah Penarafan Bintang

FRIM telah berjaya menjadi johan bagi Anugerah Penarafan Bintang peringkat NRE yang julung-julung kali diadakan berdasarkan kriteria penilaian prestasi agensi-agensi kerajaan Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU). Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod menerima piala, sijil serta hadiah RM5000 yang disampaikan oleh Dato' Zol Azha Yusoff, Ketua Setiausaha NRE di Majlis Hari Inovasi 2011 di NRE pada 14 November. Hari Inovasi NRE kali ini telah menghimpunkan kesemua 12 agensi dan jabatan-jabatan di bawah kementerian melalui Pertandingan Anugerah Reka Bentuk dan Hiasan Pameran. Majlis tersebut dilancarkan oleh Menteri NRE, YB Dato Sri Douglas Uggah Embas.

Bersempena sambutan Hari Inovasi 2011 ini, NRE menganjurkan pelbagai pertandingan dari bulan September hingga November, dan FRIM telah memenangi beberapa anugerah seperti berikut:

- Kedua, Pertandingan Kempen NRE Goes Green;
- Kedua, Anugerah Pengurusan Sumber Manusia Terbaik;
- Ketiga, Mini Konvensyen 5S NRE: Perlaksanaan Amalan 5S;
- Ketiga, Pertandingan Koir Inovasi;
- Ketiga, Pertandingan Lagu-lagu Dakwah; dan
- 5 Bintang, Anugerah Cemerlang Penilaian Portal dan Laman Web Kerajaan Malaysia.

Star Rating Award

FRIM has emerged as the winner of the Ministry of Natural Resources and Environment's (NRE) Star Rating Award in a competition held for the first time by the ministry based on the Malaysian Administrative Modernization and Management Planning Unit (MAMPU) criteria for measuring the performance of public sector agencies. FRIM's Director General, Dato' Dr Abd Latif Mohmod received the prizes comprising a trophy, a certificate and RM5000 from NRE Secretary-General Dato' Zol Azha Yusoff at the ministry's Innovation Day 2011 celebration on 14 November. The event also attracted the participation of all 12 agencies and departments under the Ministry in the Best Exhibition Design and Decoration Competition. The celebration was launched by Minister YB Dato Sri Douglas Uggah Embas.

In conjunction with the celebration of Innovation Day 2011, the ministry conducted various competitions between September and November 2011 for which FRIM won the following:

- Second for the NRE Goes Green Competition;
- Second for the Best Human Resource Management Award;
- Third for the NRE 5S Mini Convention: Implementation of 5S Practices;
- Third for the Innovation Choir Competition;
- Third for the NRE Dakwah Songs Competition 2011; and
- 5-Star for the Malaysian Government Portals and Websites Assessment Excellence Award.



Beberapa piala yang dimenangi oleh FRIM dipamerkan di gerai pameran
Some of the trophies received by FRIM displayed at the exhibition booth



Dato' Dr Abd Latif (kiri) menerima cek bernilai RM5000 daripada Dato' Zool Azha (tengah)
Dato' Dr Abd Latif (left) receiving the RM5000 cheque from Dato' Zool Azha (middle)

Pengiktirafan daripada Jabatan Standard Malaysia

FRIM merupakan antara organisasi di dalam negara yang menerima penghargaan daripada Jabatan Standard Malaysia (DSM) atas sokongan serta penglibatannya dalam pembangunan 'Malaysian Standards' (MS) di Majlis Anugerah Standard dan Akreditasi Kebangsaan 2011 yang berlangsung pada 14 Oktober.

Lima buah makmal FRIM, iaitu Makmal Laminasi Kayu, Makmal Ujian Perabot, Makmal Kejuteraan Kayu, Makmal Pengeringan Kayu dan Makmal Kemasiapan Kayu, telah menerima sijil penghargaan bagi Skim Akreditasi Makmal Malaysia (SAMM) kerana telah memenuhi keperluan MS ISO/IEC 17025. Pegawai Penyelidik kanan FRIM, Mohd Arshad Saru juga menerima anugerah atas sumbangan beliau dalam aktiviti pembangunan MS dan standard piawaian antarabangsa semenjak 1995.

Recognition from the Department of Standards Malaysia

FRIM is one of the organizations in the country recognized by the Department of Standards Malaysia (DSM) for its support and involvement in the development of Malaysian Standards (MS) at the National Standards and Accreditation Awards 2011 Ceremony on 14 October 2011.

Five FRIM laboratories, namely the Wood Lamination Laboratory, Furniture Testing Laboratory, Timber Engineering Laboratory, Wood Drying Laboratory and Wood Finishing Laboratory, received certificates of appreciation for participation in the Laboratory Accreditation Scheme of Malaysia (SAMM) and meeting the requirements of MS ISO/IEC 17025. Her Senior Research Officer, Mr Mohd Arshad Saru, also received an award for his contribution to the development of Malaysian Standards (MS) and international standardization activities since 1995.



En Mohd Arshad Saru menerima anugerah di atas sumbangan beliau dalam pembangunan Standard Malaysia
 Mr Mohd Arshad Saru receiving an award for his contribution to the development of Malaysian Standard

Anugerah Pembentangan Lisan Terbaik

Pegawai Penyelidik FRIM, Dr Nik Musa'adah Mustapha memenangi tempat kedua Anugerah Pembentangan Lisan Terbaik di Persidangan Diabetes Asia 2011 kali ke-10 yang berlangsung di Petaling Jaya pada 5–9 Oktober. Pembentangannya yang bertajuk “Protective effects of *Gynura procumbens* against glucose-induced toxicity in early diabetic retinopathy” ialah salah satu daripada sejumlah 12 pembentangan yang dipertandingkan di bawah kategori anugerah ini. Dr Nik menerima Sijil Anugerah serta RM1000 yang disampaikan oleh Prof Adel El-Sayed yang merupakan Naib Pengerusi *International Diabetes Foundation* (IDF) Timur Tengah dan Rantau Afrika Utara di majlis penyampaian anugerah pada 9 Oktober.

Pusat Kecemerlangan BioNexus Partners (BNP)

Perbadanan Bioteknologi Malaysia (BiotechCorp) bersama-sama dengan Institut Penyelidikan Perhutanan Malaysia (FRIM) telah melancarkan Pusat Kecemerlangan BioNexus Partners (BNP) di FRIM, Kepong, pada 26 Julai untuk pembangunan produk hasilan semula jadi. Pusat ini mempunyai enam buah makmal berstatus BNP serta unit-unit khusus untuk penyelidikan dan pembangunan (R&D) produk berasaskan herba.

YB Datuk Seri Dr Maximus Johnity Ongkili, Menteri Sains, Teknologi dan Inovasi merasmikan Majlis Pelancaran Pusat Kecemerlangan BNP yang akan berfungsi sebagai pusat rujukan dan perkhidmatan setempat bagi industri untuk pembangunan produk-produk berdasarkan herba.

The Best Oral Presentation Award

FRIM Research Officer, Dr Nik Musa'adah Mustapha, bagged the second place for the Best Oral Presentation Award at the 10th Asian Diabetes Conference 2011 held in Petaling Jaya from 5–9 Oktober. Her presentation entitled “Protective effects of *Gynura procumbens* against glucose-induced toxicity in early diabetic retinopathy” was among the 12 presentations that participated in the competition. Dr Nik received a certificate and RM1000 from Prof Adel El-Sayed, the Assistant Chairman of Middle East and North African Region of International Diabetes Foundation (IDF) during an award presentation ceremony on 9 Oktober.

BioNexus Partners (BNP) Excellence Centre

The Malaysian Biotechnology Corporation (BiotechCorp) together with FRIM launched the BioNexus Partners (BNP) Centre of Excellence located at FRIM on 26 July for the development of natural products. The Centre comprises six BNP laboratories and units specializing in the research and development (R&D) of herbal-based products.

The Minister of Science, Technology and Innovation, YB Datuk Seri Dr Maximus Johnity Ongkili, launched the BNP Centre of Excellence, which will serve as the reference and one-stop centre for the industry. The BNP programme is an initiative by BiotechCorp aimed at supporting Malaysia's biotechnology and sciences industry with high-end research facilities, infrastructure and services.

Program BNP merupakan satu inisiatif oleh BiotechCorp yang bertujuan menyokong bioteknologi dan industri sains Malaysia dengan kemudahan penyelidikan, infrastruktur dan perkhidmatan yang canggih. BNP merupakan makmal-makmal dan unit-unit terpilih untuk memastikan industri mempunyai akses kepada perkhidmatan, peralatan serta kemudahan-kemudahan yang sedia ada di institusi-institusi pengajian tinggi, institusi penyelidikan, taman teknologi serta inkubator yang dibiayai kerajaan, dan syarikat-syarikat berkaitan kerajaan (GLCs).

Pameran Antarabangsa Reka Cipta, Inovasi dan Teknologi

FRIM memenangi empat pingat emas dan satu pingat perak untuk kesemua hasil penyelidikannya yang dipertandingkan di Pameran Rekaan, Inovasi dan Teknologi (ITEX 2011) yang berlangsung dari 20 hingga 22 Mei 2011 di Kuala Lumpur. Hasil-hasil penyelidikan FRIM yang mendapat pingat emas ialah (1) Pembangunan ekstrak piawai daripada daun *Ocimum basilicum* (Ketua projek: Vimala Subramaniam) (2) Pembangunan ekstrak piawai daripada daun *Ocimum sanctum* (Ketua projek: Vimala Subramaniam) (3) Pellet jerami padi (Ketua projek: Puad Elham) dan (4) Kerusi arbori berkonsep hiburan (Ketua projek: Nik Adlin Nik Mohamed Sukri).

Kumpulan diketuai oleh Siti Syarifah Mohd Mutalip telah menerima pingat perak untuk hasil penyelidikan "Sebatian Kardiak Glikosida daripada *Rauvolfioideae* yang mempunyai Kesan Anti-kanser Ovari".

ITEX yang dianjurkan oleh Persatuan Rekabentuk dan Rekacipta Malaysia (MINDS) setiap tahun semenjak 1989 adalah acara utama serantau yang bertujuan mempamerkan rekacipta baru, teknologi-teknologi dan produk, serta bertujuan untuk menggalakkan dan meningkatkan pelaburan, prospek pembuatan dan pengkomersialan serta rakan kongsi.

BNP are laboratories and units selected to ensure the industry's access to services, equipment and facilities available within publicly-funded institutes of higher learning, research institute, technology parks, incubators and government linked-companies (GLCs).

International Invention, Innovation and Technology Exhibition (ITEX)

FRIM clinched four gold medals and one silver medal for all its five research products showcased at the 22nd International Invention, Innovation and Technology Exhibition (ITEX) 2011 held from 20 to 22 May in Kuala Lumpur.

The FRIM research products that won the gold medals were: (1) Development of *Ocimum basilicum* Leaf Standardized Extract (Project leader: Vimala Subramaniam); (2) Development of *Ocimum sanctum* Leaf Standardized Extract (Project leader: Vimala Subramaniam); (3) High Combustion Rice Straw Pellet (Project leader: Puad Elham) and (4) "Entertainment-ready" Arbor Seat (Project leader: Nik Adlin Nik Mohamed Sukri).

The team led by Siti Syarifah Mohd Mutalip received silver for "Cardiac glycoside constituents from *Rauvolfioideae* with novel anti-ovarian cancer property". Held annually since 1989 by the Malaysian Invention and Design Society (MINDS), ITEX is the region's leading exhibition showcasing new inventions, technologies and products, aimed at promoting and securing investment, manufacturing and commercialization prospects and partners.



Dr Wan Tarmeze (kanan) menerima pingat emas daripada ketua panel hakim, Dr Leo Ann Mean
Dr Wan Tarmeze (right) receiving the medals from Dr Leo Ann Mean, head of the panel of judges

Anugerah Harta Intelek Negara 2011

FRIM merupakan salah satu daripada lima agensi yang dipilih untuk menerima hadiah sagu hati Anugerah Harta Intelek Negara 2011 di majlis penyampaian anugerah tersebut yang diadakan di Johor sempena Majlis Sambutan Hari Harta Intelek Negara (HHIN) 2011. Majlis telah disempurnakan oleh Menteri Perdagangan Dalam Negeri, Koperasi dan Kepenggunaan, YB Dato' Sri Ismail Sabri Yaakob. Anugerah Harta Intelek Negara diperkenalkan sejak tahun 2006 untuk mengiktiraf pereka cipta/pencipta atas sumbangan harta intelek mereka dalam pembangunan ekonomi dan sosial negara. Anugerah ini terbahagi kepada dua kategori iaitu Kategori Organisasi dan Kategori Perekacipta Muda. Agensi lain yang terpilih ialah UPM, FRIM, Les' Copaque Production Sdn Bhd, Universiti Malaya dan Universiti Teknologi Malaysia. Hadiah utama telah dimenangi oleh Les' Copaque Production Sdn Bhd.

National Intellectual Property Award

FRIM was among the five agencies that received the Consolation Prize of the National Intellectual Property Award (AHIN) 2011 at an award presentation ceremony held in conjunction with the celebration of the National Intellectual Property Day in Johor. The prizes were presented by Domestic Trade, Co-operatives and Consumerism Minister YB Dato' Sri Ismail Sabri Yaakob. The award was introduced in 2006 in conjunction with the celebration of the National Intellectual Property Day to accord recognition to inventors or creators for their contribution to the country's socio-economic development. There were two award categories, namely Organization and Young Inventor categories. For Organizations, FRIM was shortlisted as one of the top five finalists (Universiti Putra Malaysia, Universiti Malaya, Universiti Teknologi Malaysia and Les' Copaque Production Sdn Bhd) out of 41 contenders. The award was won by Les' Copaque Production Sdn Bhd, a local production company which has produced the animation series "Upin and Ipin" that has successfully penetrated the overseas market.



YB Nancy (tengah) bersama-sama wakil FRIM selepas majlis penganugerahan
YB Nancy (middle) and FRIM representatives after the award presentation ceremony

PEMUDAH Challenge

Dr Khairul Awang, Pegawai Penyelidik dari FRIM memenangi anugerah PEMUDAH Challenge yang diadakan buat kali pertama di PICC (Pusat Konvensyen Antarabangsa Putrajaya), Putrajaya pada 29 Mac. Dr Khairul menerima cek RM1000 daripada Tan Sri Mohd Sidek Haji Hassan, Ketua Setiausaha Negara merangkap Pengerusi Bersama PEMUDAH. Idea Dr Khairul, "Mewajibkan kaunter khas untuk warga emas, ibu mengandung, orang kurang upaya di organisasi LHDN, bank, imigresen, JPJ dan lain-lain" merupakan antara 67 idea yang diterima daripada 1105 penyertaan.

Dr Khairul Awang, FRIM Research Officer bagged the PEMUDAH Challenge award held for the first time at the Putrajaya International Convention Centre (PICC), Putrajaya on 29 March. Dr Khairul received RM1000 cheque from Tan Sri Mohd Sidek Haji Hassan, Ketua Setiausaha Negara cum Co-chairman of PEMUDAH. Dr Khairul's idea, "To make compulsory for all government agencies (i.e. Internal Revenue Board, banks, Immigration, Road Transportation Department, etc.) to provide special counters for old, pregnant and disabled persons" were among the 67 ideas accepted from 1105 participants.



Ketua Setiausaha Negara mengucapkan tahniah kepada Dr Khairul selepas menyampaikan anugerah PEMUDAH Challenge
KSN congratulating Dr Khairul after giving away the PEMUDAH Challenge award

Anugerah The Brandlaureate 2010–2011

FRIM memenangi Anugerah *The BrandLaureate Awards 2010–2011* bagi kecemerlangan dalam Penjenamaan Korporat untuk Jenama Terbaik dalam Perhutanan dan Pemuliharaan Alam Sekitar pada 23 Mac 2011 di Kuala Lumpur. Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod telah menerima sijil dan trofi anugerah tersebut daripada Dr KK Johan, Presiden The BrandLaureate. Anugerah yang dianjurkan oleh Asia Pacific Brands Foundation (APBF) ini bertujuan meningkatkan standard penjenamaan di Malaysia dan Asia Pasifik. Anugerah ini diberikan atas dasar pencapaian FRIM yang konsisten termasuk memenangi Anugerah Nikkei Asia 2009 sebagai pengiktirafan sumbangannya terhadap pemuliharaan alam sekitar di rantau ini; Anugerah Sains Mahathir 2009 bagi sumbangannya kepada penyelidikan dan pembangunan industri kayu getah negara; Anugerah Kecemerlangan Anugerah *APECP Excellent Child Contributor 2009/2010* bagi kategori Destinasi Ekopendidikan Mesra Kanak-kanak; dan Anugerah Buku Negara bagi Kategori Buku Teknikal.

Nama FRIM juga terserlah sebagai tapak warisan semula jadi dan juga lambang penghutan semula boleh dilakukan dan menjadi contoh terbaik bagi pengurusan, pemeliharaan dan pemuliharaan semula hutan tropika di kawasan tanah terbiar. Sebagai agensi kerajaan, FRIM juga proaktif dan kreatif melaksanakan aktiviti CSR dengan badan korporat seperti PETRONAS, SHELL, TETRAPAK, MINUTES dan JACOB dalam pelaksanaan program “tree planting untuk pelancongan perniagaan” bersama MYCEB Tourism. FRIM turut bekerjasama dengan badan-badan korporat lain utk meningkatkan kesedaran dan mencintai alam sekitar dengan melaksanakan Hari Alam Sekitar dan Hari Perhutanan yang mendatangkan faedah kepada lebih 300 ribu

The Brandlaureate Awards 2010–2011

FRIM received yet another award in recognition of its achievements—The BrandLaureate Awards 2010–2011 for the Best Brand in Forestry—Environment Conservation—on 23 March 2011 in Kuala Lumpur. FRIM Director General Dato' Dr Abd Latif Mohmod received the trophy and certificate from The BrandLaureate President Dr K.K. Johan. The award was granted based on the Institute's consistent performance and achievements, including winning the Nikkei Asia Award 2009 for its contribution to environmental protection in the region; the Mahathir Science Award 2009 for its contribution to the research and development of the country's rubberwood industry; the Association of Professional Early Childhood Providers Malaysia (APECP) Excellent Child Contributor Award 2009/2010 for child-friendly eco-education destination; and National Book Award 2010 for the best technical book.

The Institute has also gained further prominence having been declared as one of the natural heritage sites in the country, and has become a model for successful tropical forest rehabilitation, management and conservation. As a government agency, FRIM has been proactive and creative in carrying out corporate social responsibility (CSR) activities with corporate partners such as PETRONAS, SHELL, TETRAPAK, MINUTES and JACOB, including “tree planting for business tourism” with MYCEB Tourism Malaysia. FRIM has also collaborated with other government agencies, corporate bodies as well as non-governmental organizations in organizing awareness-raising programmes including the annual celebrations of the World Environment Day and World Forestry Day, and other activities of mutual benefit for the public. Among others, FRIM is also the first research institute in Malaysia to obtain ISO 9001:2008; it is one of the three Bionexus

pengunjung setiap tahun. Ini menyebabkan nama FRIM terkenal di kalangan pencinta alam di dalam dan luar negara. Di samping itu, FRIM juga merupakan institusi penyelidikan pertama di Malaysia yang mendapat ISO 9001:2008; antara tiga pusat rujukan Bionexus di negara ini; dan memiliki enam makmal bertaraf Bionexus dan 12 yang berstatus ISO 17025, selain diiktiraf sebagai pusat ujian perabot tunggal Malaysia oleh FIRA, United Kingdom.

Referral Centres in Malaysia and it has six laboratories with Bionexus status and 12 with ISO 17025, apart from having the only FIRA-certified furniture testing centre in Malaysia.



KP FRIM menerima piala The Brandlaureate Awards daripada En KK Johan
FRIM's DG receiving The Brandlaureate Awards trophy from Mr KK Johan



Dato' Dr Abd Latif bersama-sama warga FRIM selepas menerima anugerah The Brandlaureate Awards
Dato' Dr Abd Latif with FRIM's staff after receiving The Brandlaureate Awards' trophy and a certificate

Ekspo Teknologi Malaysia

Para penyelidik FRIM menggondol satu pingat emas, satu perak dan tiga gangsa untuk inovasi yang mereka ilhamkan menerusi Ekspo Teknologi Malaysia ke-10 (Malaysia Technology Expo) 2011, satu acara inovasi terbesar di Asia yang diadakan pada 17–19 Februari di Kuala Lumpur. Pasukan yang diketuai oleh Nor Datiakma Mat Amin telah memenangi pingat emas bagi penyertaan bertajuk “Potential Biocides from Local Weeds.” Inovasi ini melibatkan penyediaan ekstrak alkohol daripada rumpai tempatan yang didapati mengandungi agen anti MRSA (Methicillin-resistant *Staphylococcus aureus*). Di samping itu, ekstrak ini juga didapati aktif menentang patogen *Escherichia coli*, *Bacillus subtilis* dan strain kulat *Trichophyton rubrum*. Ekstrak ini boleh diaplikasikan oleh industri sanitari untuk kegunaan di pusat-pusat perubatan, hotel, rumah atau di mana-mana terdapat risiko pencemaran yang tinggi.

Pasukan yang sama turut menerima pingat perak bagi penyertaan bertajuk “Combating Superbug from Fagaceae sp.” yang bertujuan memenuhi keperluan industri terhadap ekstrak piawai berdasarkan tumbuhan yang berkesan sebagai agen anti-MRSA. Ciptaan ini ialah kaedah bagi mendapatkan satu rujukan piawai daripada Fagaceae sp. yang boleh digunakan oleh industri bagi memastikan ekstrak yang digunakan terbukti mempunyai kesan anti-MRSA. Pingat gangsa pula dimenangi oleh kumpulan penyelidik yang diketuai oleh Dr Wan Tarmeze Wan Ariffin bagi “Acoustical Arbor Seat; dan kumpulan yang diketuai oleh Puad Elham bagi “Pelletizing of Rice Straws – Potential Solid Fuel from Agricultural Residues as Well as for Versatile Charcoal Briquetting Machine.” Dua reka cipta yang melibatkan penyelidik FRIM iaitu “Improvement of Old Corrugated Carton via Mechanical Treatment” (Dr Rushdan Ibrahim) dan “Intelligent Classification System for Agarwood Using k-NN” (Dr Nor Azah Mohamad Ali dan Abd Majid Jalil) masing-masing memenangi pingat perak dan gangsa.

Malaysia Technology Expo (MTE)

FRIM researchers clinched one gold, one silver and three bronze medals for their innovations presented at the 10th Malaysia Technology Expo (MTE) 2011, held from 17 to 19 February 2011 in Kuala Lumpur. The team, led by Nor Datiakma Mat Amin, received the gold medal for “Potential biocides from local weeds.” The innovation involves the preparation of alcoholic extracts of Malaysian local weeds found to have anti-MRSA (Methicillin-resistant *Staphylococcus aureus*) agents. The extracts, also found active against bacteria *Escherichia coli*, *Bacillus subtilis* and fungus strain *Trichophyton rubrum*, can be applied in the sanitary industry for use in medical vicinities, hotels or homes where there may be high risks of contamination by MRSA.

The same team also won the silver medal for “Combating superbug from Fagaceae sp.”, aimed at catering to the industrial need for the production of effective standardized plant-based extracts for anti-MRSA agent. The invention is a method that derives a standard reference of Fagaceae sp. for bioactive extract determination. The bronze medal recipients were the team led by Dr Wan Tarmeze Wan Ariffin for “Acoustical arbor seat”; and teams led by Mr Puad Elham for “Pelletizing of rice straws—potential solid fuel from agricultural residues” as well as for “Versatile charcoal briquetting machine”. Two joint inventions involving FRIM researchers, namely “Improvement of old corrugated carton via mechanical treatment” (Dr Rushdan Ibrahim) and “Intelligent classification system for agarwood using k-NN” (Dr Nor Azah Mohamad Ali and Mr Abd Majid Jalil) won a silver and a bronze medal respectively.



Sesi penilaian oleh panel juri
Evaluation session by the panel

TANGGUNGJAWAB SOSIAL KORPORAT **DAN KOMUNIKASI**

CORPORATE SOCIAL RESPONSIBILITY AND COMMUNICATION

Kempen “Tidak Kepada Plastik dan Polistirena”

Tahun 2011 dimulakan dengan pengisytiharan FRIM sebagai sebuah kawasan yang bebas daripada plastik dan polistirena oleh Ketua Pengarah FRIM pada 29 Januari. Untuk tujuan tersebut, FRIM bekerjasama dengan Tupperware Brands Malaysia yang menawarkan satu set bekas air dan bekas makanan di dalam satu beg mesra alam dengan menawarkan harga istimewa kepada kakitangan FRIM.

Warga kerja FRIM digalakkan membawa bekas makanan apabila membeli makanan bagi mengelakkan kedua-dua bahan tersebut dibawa ke dalam kampus FRIM. Lambakan bahan-bahan tersebut telah dikenal pasti punca sampah sarap di FRIM. Di samping itu, kafeteria dan semua gerai jualan di FRIM dibekalkan dengan bekas mesra alam yang diperbuat daripada tandan kosong kelapa sawit (EFB) hasil kerjasama R&D dengan SPPT Engineering Sdn Bhd.

“No to Plastics and Polystyrene” Campaign

The year 2011 started with FRIM being declared as an area free from plastics and polystyrene by the Director General of FRIM on 20 January. For this purpose, FRIM collaborated with Tupperware Brands Malaysia, which offered eco-sets each consisting of a tumbler and food container in an eco-friendly bag at a special price to FRIM employees.

FRIM staff were encouraged to bring their own food containers when buying food to discourage them from bringing plastics and polystyrene into the FRIM campus. Indiscriminate dumping of these materials has been identified as the main cause of the problems with rubbish in FRIM.

Apart from that, the cafeteria and all food outlets in FRIM were presented with eco-friendly food packs made from oil palm empty fruits bunch, produced through R&D collaboration with SPPT Engineering Sdn Bhd.



Puan Norhayati menyampaikan bekas makanan eco set kepada Dato' Dr Abd Latif
Mrs Norhayati presenting the eco set to Dato' Dr Abd Latif

Pertandingan Fotografi

Diadakan sempena Tahun Hutan Antarabangsa, pertandingan fotografi yang bertemakan “FRIM Tapak Warisan Semula Jadi” ini telah menarik perhatian umum tentang kepentingan hutan dan alam sekitar untuk kesihatan dan kesejahteraan kita. Pertandingan yang berlangsung dari 1 Januari hingga 28 Februari adalah untuk meningkatkan kesedaran awam akan pentingnya FRIM, bukan sahaja sebagai sebuah institusi yang menyumbang kepada pemuliharaan hutan di rantau ini, tetapi juga sebagai sebuah tapak warisan semula jadi negara. Pertandingan fotografi ini juga berhasrat untuk mewujudkan sokongan orang awam terhadap usaha-usaha pemuliharaan hutan dan pada tahun ini berjaya menarik sebanyak 317 peserta yang menyumbangkan sebanyak 1304 keping gambar.

Photography Competition

Held in conjunction with International Year of Forests, a photography competition entitled “FRIM Natural Heritage Site” brought public attention to the importance of forests and the environment to our health and well-being. The competition held from 1 January to 28 February was to enhance public awareness of FRIM, not only as an institution that contributes to forest conservation in the region but also as the nation's natural heritage site. The aim of the photography competition was to create public support for its forest conservation efforts and for 2011, it attracted 317 participants who submitted a total of 1304 photographs.

Bengkel Asas Fotografi Alam

Bersempena dengan Pertandingan Fotografi FRIM 2011, satu Bengkel Asas Fotografi Alam telah diadakan khusus kepada pelajar sekolah menengah berumur antara 15–17 tahun pada 29 Januari di FRIM. Kumpulan ini diselia oleh En Asmar Hassan iaitu tenaga pengajar profesional dalam bidang fotografi dan dibantu oleh En Yusni Idris. Pada tahun ini sambutan adalah di luar jangkaan iaitu dengan penyertaan 62 orang pelajar dan 24 orang guru daripada 32 buah sekolah di sekitar negeri Selangor dan Wilayah Persekutuan.



Basic Nature Photography Workshop

In conjunction with the Photography Competition 2011, a basic Nature Photography Workshop was conducted in FRIM especially for secondary school students aged 15–17 years in January 2011. The workshop was facilitated by Mr Asmar Hassan, a professional photographer, with the assistance of Mr Yusni Idris. This year, the response was overwhelming with the participation of 62 students and 24 teachers from 32 schools in Selangor and Wilayah Persekutuan.



Peserta Bengkel Asas Fotografi Alam
Participants of the Basic Nature Photography Workshop

Tahun Hutan Antarabangsa

Tahun 2011 diisytiharkan sebagai Tahun Hutan Antarabangsa dan sebagai sebuah institusi perhutanan, FRIM telah merangka beberapa aktiviti yang menjurus kepada peningkatan visibiliti R&D di mata masyarakat di samping menimbulkan kesedaran terhadap tanggungjawab bersama dalam memelihara kesejahteraan hutan dan alam sekitar. Majlis sambutan tersebut akan diadakan di Johor Baharu pada 21 Mac 2012. FRIM telah dipertanggungjawab untuk persembahan *choral speaking* dan deklarasi kanak-kanak.

Hari Bumi telah disambut di FRIM pada 22 April. Satu pameran fotografi telah diadakan sempena sambutan tersebut. Sebanyak seratus gambar yang terbaik daripada Pertandingan Fotografi Alam 2011; termasuk 24 gambar yang diambil oleh pemenang telah dipamerkan 22–24 April untuk tontonan umum.

International Year of Forests

To commemorate the International Year of Forests and to highlight FRIM's role as a forestry institution, FRIM planned various activities aimed at increasing the visibility of its R&D in the public eye as well as encouraging public participation in conserving the well-being of our forests and environment. The celebration was held in Johor Baharu on 21 March. FRIM was responsible for presentations of the choral speaking as well as the Children's Declaration.

The Earth Day was celebrated by FRIM on 22 April. A photography exhibition was held in conjunction with this celebration on 22–24 April. The top one hundred photographs from the Nature Photography Competition 2011 were displayed for public viewing, including the top 24 winning entries.

TANGGUNGJAWAB SOSIAL KORPORAT DAN KOMUNIKASI

CORPORATE SOCIAL RESPONSIBILITY AND COMMUNICATION

Aktiviti Penanaman Pokok

Antara aktiviti yang paling diminati oleh pihak korporat ialah menanam pokok. Di sepanjang 2011 sebanyak 2427 batang pokok telah ditanam hasil usaha FRIM dan 15 badan korporat dengan jumlah pembiayaan yang diterima sebanyak RM152 000.

Tree Planting Activities with Corporate Bodies

Amongst the most popular activities preferred by corporate bodies was tree planting. Throughout 2011, a total of 2427 trees were planted in collaboration with 15 corporate bodies with the total sponsorship amounting to RM152 000.



Aktiviti menanam pokok bersama-sama MyCEB
The tree planting activity with MyCEB

Aktiviti Menanam Pokok Bersama-sama Badan Korporat Tree Planting Activities with Corporate Bodies

Bil. No.	Organisasi Organization	Tarikh Date	Jumlah/Jenis pokok Total/Tree types	Sumbangan Donation (RM)	Lokasi Venue
1.	Epson Toyocom Sdn Bhd	13 Januari/January	30/Karas	3000	Field 31, Villa Aromatica
2.	PETRONAS Carigali Sdn Bhd	27 Mac/March	30/pelbagai spesies	3000	Kepong Botanical Gardens (KBG)
3.	Toshiba	30 Mac/March	55/pelbagai spesies	5000	KBG
4.	Nets Printwork Sdn Bhd	23 April	50/karas	5000	Field 31, Villa Aromatica
5.	Malaysian Institute of Accountants	7 Mei/May	100/bakau kurap	60 000	Sg. Hj Dorani, Sungai Besar
6.	Malaysian Institute of Accountants	14 Jun/June	100/mahang		Field 40, Taman Tema
7.	Amcor Tobacco Packaging Subang	14 Jun/June	30/mahang	3000	Taman Bidara
8.	Malaysian Institute of Accountants	2 Julai/July	100/bakau kurap		Sg. Hj Dorani, Sungai Besar

Bil. No.	Organisasi Organization	Tarikh Date	Jumlah/Jenis pokok Total/Tree types	Sumbangan Donation (RM)	Lokasi Venue
9.	Institute of Internal Auditors Malaysia and IIA Global	7 Julai/July	2/chengal		Field 44, Bukit Hari
10.	Petronas Gas Berhad	24 September	10/pelbagai spesies	1000	KBG
11.	Sapura Acergy Sdn Bhd	13 Oktober/October	30/mahang	3000	Field 50, Bukit Hari
12.	Pelajar dari lapan institusi pengajian tinggi awam menyertai program Cintai Alam Sekitar yang dianjurkan bersama-sama dengan Majlis Sekretariat Sukarelawan Universiti-universiti Malaysia (MASKUM) Students from the eight government's higher learning institutions participated in Love the Environment programme jointly organized by the Secretariat Council of Malaysian Universities' Volunteers (MASKUM)	16 Oktober/October	900/bakau	–	Sg. Hj Dorani, Sungai Besar 6
13.	Nets Printwork Sdn Bhd	22 Oktober/October	50/chengal	5000	Field 48, Bukit Hari
14.	Permit Pro Services Sdn Bhd	12 November	30/karas	3000	Field 31, Villa Aromatica
15.	BOLTON Berhad	12 November	10/karas	1000	Field 31, Villa Aromatica
16.	Lions Club of KL Sentul	12 November	10/karas	1000	Field 31, Villa Aromatica
17.	Bumi Armada Berhad	6 Disember/December	100/chengal	10 000	Field 48, Bukit Hari
18.	MyCEB	16 Disember/December	50/chengal	5000	Field 48, Bukit Hari
KOMITED/COMMITTED					
1.	Malaysian Institute of Accountants		300	–	Field 43 – HHW and forest fruit trees
2.	Institute of Internal Auditors Malaysia dan IIA Global		250	25 000	Field 43
3.	BOLTON Berhad		90/HHW	9000	Field 43
4.	MyCEB		100/Chengal	10 000	Field 43
Jumlah/Total			2427 pokok/trees	152 000	

Khidmat Kemasyarakatan dan Gotong-Royong

Selain menanam pokok, terdapat juga permohonan untuk melaksanakan aktiviti yang tidak membabitkan sumbangan kewangan kepada FRIM tetapi menyumbang tenaga dengan melaksana kerja pembersihan dan gotong royong. Aktiviti ini popular terutama di kalangan institusi pengajian tinggi serta badan bukan kerajaan (NGO). Pada tahun 2011 sebanyak enam aktiviti berkenaan telah dilaksanakan.

Community Service and Gotong Royong

Apart from tree planting, there were other requests for activities, which did not bring financial but in-kind contribution to FRIM through cleaning activities and *gotong royong*. This activity was popular especially among institutions of higher learning as well as non-governmental organisations (NGOs). In 2011, a total of six such activities were conducted.



Sukarelawan dari Institut Pendidikan Guru, Kampus Ilmu Khas bergotong-royong membersihkan tapak perkelahan
Volunteers from Institut Pendidikan Guru, Kampus Ilmu Khas, taking part in gotong-royong to clean the picnic area

Aktiviti Kemasyarakatan dan Gotong-Royong
Community Services and "Gotong Royong"

Bil No	Organisasi Organization	Bil peserta/ No. of Participants	Tarikh Dates	Lokasi/Aktiviti Venue/Activity
1	Sin Chew Cadet Journalists' Community Service Activity in FRIM	25	17 Mac/March	Denai Rover
2	Kolej Multimedia & Institusi Orang Pekak (PESIBA)	60	3 April	Rumah Terengganu, Denai Alam & Treasure Hunt
3	Starbucks PJ	35	7 April	Kem Perah
4	Maybank (Group Credit Management & Regional Retail Credit, Region FT)	70	1 Oktober/ October	Villa Aromatica 501
5	Institut Pendidikan Guru	40	13 Oktober/ October	Sg. Keroh
6	Kumpulan Kursus Bahasa Melayu Kejuruteraan UIAM	50	25 November	Denai Engkabang

Liputan Media/Publisiti

Unit Pengurusan Korporat (CCU) FRIM telah melaksanakan beberapa aktiviti, membantu dan menyertai aktiviti NRE yang berkenaan untuk mempererat hubungan FRIM dengan pengamal media pada tahun 2011. Berita terpilih dan artikel rencana/laporan yang mengandungi maklumat yang padat dan tepat mengenai FRIM yang disiarkan dalam media cetak atau siaran berjumlah 189 dengan anggaran nilai PR: RM 5.6 juta.

Jika dikira jumlah petikan akhbar yang menyebut nama FRIM termasuk oleh agensi lain dalam usaha sama atau melaksanakan aktiviti di FRIM misalnya, jumlahnya meningkat kepada 364, dengan nilai PR berjumlah RM13.4 juta. Jumlah ini ialah berita yang dimuat naik ke laman web FRIM. Agensi lain atau orang perseorangan yang menyebut FRIM turut dikira kerana membawa nilai positif walaupun keseluruhan artikel itu tentang mereka. Daripada jumlah artikel dan laporan; media cetak berjumlah 88% (iaitu akhbar 75% dan majalah 13%), manakala televisyen (8%) dan radio (4%). Akhbar yang paling banyak membuat liputan tentang FRIM masih The Star (13%); diikuti oleh Utusan Malaysia (10.2%); New Straits Times (9.8%); Sinar Harian (6.2%); Sin Chew Daily (5.8%); dan Berita Harian (5.5%). Perubahan paling ketara pada tahun 2011 ialah peningkatan petikan berita daripada akhbar Sabah dan Sarawak. Ini mungkin disebabkan oleh peningkatan pemantauan akhbar di kedua-dua negeri berdasarkan permintaan FRIM. Selain itu, jumlah rencana khusus berkenaan FRIM telah meningkat kepada 52 artikel (Nilai PR: RM3.4 million) pada tahun 2011 berbanding 44 artikel (RM2.7 million) pada tahun 2010. Peningkatan ini menunjukkan keberkesanan kerjasama baik yang diberi oleh Unit Pengurusan Korporat kepada pihak media dan kesediaannya membantu mendapatkan bahan-bahan yang boleh disiarkan.

Aktiviti-aktiviti yang dianjurkan oleh FRIM dan juga secara kerjasama dengan pihak lain masih merupakan sumber publisiti yang baik yang diterima oleh FRIM, dengan menyumbangkan sejumlah RM2.19 juta nilai publisiti. Terdapat 13 program/aktiviti utama yang menarik minat pihak media dan acara FRIM yang mendapat paling banyak liputan media iaitu Seminar Persekutuan Perkumpulan Wanita Sarawak (PPWS), Sambutan Hari Bumi Sedunia, Sambutan Hari Alam Sekitar Sedunia, Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan bagi Hutan Pesisiran Pantai di Malaysia dan Pelancaran Penggunaan Biodiesel di Peringkat FRIM.

Media Coverage/Publicity

The Corporate Management Unit had undertaken various activities as well as assisted and participated in related activities organized by the Ministry of Natural Resources and Environment (NRE) to enhance FRIM's relationship with media practitioners. The number of news and feature articles/reports containing substantial information about FRIM from the print and broadcast media totalled 186 with an estimated PR value of RM5.6 million.

Taking into consideration newspaper articles/reports of joint activities/programmes with partners, the total number has increased to 364 items with PR value at RM13.4 million. These were items uploaded to the FRIM website. They included articles/reports related to activities conducted by other agencies, about other organizations or individuals which mention FRIM's involvements positively. Of the total items, the print media produced 88% of them (newspapers, 75% and magazine, 13%), followed by television (8%) and radio (4%). The newspapers which published the most articles on FRIM continued to be The Star (13%), followed by Utusan Malaysia (10.2%), New Straits Times (9.8%), Sinar Harian (6.2%), Sin Chew Daily (5.8%), and Berita Harian (5.5%). The obvious change in 2011 was the increased number of news and feature reports from newspapers in Sabah and Sarawak. This may be due to the extension of media monitoring coverage in the two states, based on the FRIM's request. In addition, the number of feature reports related to FRIM has increased to 52 (PR value: RM3.4 million) in 2011 compared to 44 articles (PR value: RM2.7 million) in 2010. This may be a reflection of the effectiveness of FRIM in handling media requests, ensuring prompt response and assistance in obtaining required information.

Major activities or events organized by FRIM as well as those jointly organized with partners continued to be a good source of publicity for the Institute, generating a total of RM2.19 million in PR value. There were 13 major activities/events in 2011 which attracted media coverage and the following garnered the most publicity, i.e. Seminar Persekutuan Perkumpulan Wanita Sarawak (PPWS), World Earth Day Celebration, World Environment Day, Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan bagi Hutan Pesisiran Pantai di Malaysia and Launching of the Biodiesel Usage at FRIM.

CORPORATE SOCIAL RESPONSIBILITY AND COMMUNICATION

Daripada laporan/artikel yang terpilih, terdapat lebih daripada 130 artikel berkenaan penyelidikan yang dijalankan oleh FRIM; dan lebih daripada 25 orang kakitangan FRIM telah diberi ruang untuk berkongsi tentang kejayaan, hasil penyelidikan dan kerjaya mereka. Terdapat juga program-program TV berbentuk berita dan bukan berita seperti Nota Al-Zahra (TV Al Hijrah), Offbeat Living (NTV7) dan CCTV News yang telah memaparkan temu ramah dengan pegawai penyelidik FRIM tetapi nilai PR tidak diperolehi.

From the total number of selected reports on FRIM, there were more than 130 research-related items; and there were also over 25 FRIM research officers and support staff who were given the opportunity to share their success, research findings as well as aspects of their jobs. There were also a number of news and non-news TV programmes such as Nota AI Zahra of TV Al Hijrah, Offbeat Living (NTV7) and CCTV News which featured interviews with FRIM researchers but for which the PR values were unknown.



Susunan imej beberapa keratan akhbar utama
Image of the some of the main newspaper cuttings in juxtaposition

FRIM telah menyampaikan pelbagai hadiah termasuk cenderahati dan sijil penghargaan kepada lebih daripada 200 kakitangannya sebagai pengiktirafan sumbangan, khidmat cemerlang serta pencapaian mereka sepanjang tahun 2010 di Majlis Hari Anugerah FRIM 2011 yang diadakan pada 27 Mei.

Majlis tersebut dirasmikan oleh Menteri Sumber Asli dan Alam Sekitar, Dato Sri Douglas Uggah Embas. Turut hadir ialah Pengerusi Lembaga Penyelidikan dan Pembangunan Perhutanan (MFRDB), YB Puan Hajah Nancy Shukri, ahli-ahli Lembaga, Dato' Dr Abd Latif Mohmod serta mantan Ketua Pengarah, Tan Sri Dr Salleh Mohd Nor.

FRIM presented various prizes and certificates of appreciation to over 200 of its staff in recognition of their excellent services and achievements for the year 2010 at its annual awards ceremony on 27 May 2011.

The ceremony was officiated by the Minister of Natural Resources and Environment Dato Sri Douglas Uggah Embas, and also attended by the Malaysian Forestry Research and Development Board (MFRDB) Chairperson, YB Puan Hajah Nancy Shukri, Board members, FRIM's Director General Dato' Dr Abd Latif Mohmod and former DG Tan Sri Dr Salleh Mohd Nor.

A. Anugerah Lembaga MFRDB/MFRDB Award

Tiada penerima/**No recipient**

B. Anugerah Ketua Pengarah/Director General's Award

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEME	BHG/PROGRAM DIV/PROGRAMME
1	Sufian Hamsan	Tukang K2 R22 Carpenter	Keluaran Hutan Forest Products
2	Yusof Haji Mohd Saman	Pereka Set/Grafik B5 (Jawatan akhir) Designer/Graphic (Last Post)	Pesara FRIM FRIMs retiree

C. Anugerah Saintis Terbaik FRIM/FRIM Best Scientist Award

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEME	BHG/PROGRAM DIV/PROGRAMME
1	Dr Lee Su See	Pegawai Penyelidik Gred Khas C VK7 Research Officer Special Grade	Biodiversiti Hutan Forest Biodiversity
2	Dr Lim Hin Fui	Pegawai Penyelidik Q53 Research Officer	Komersialisasi dan Inovasi Commercialization and Innovation

D. Anugerah Penyelidikan Terbaik FRIM/FRIM Best Research Award

BIL. NO.	PROJEK PENYELIDIKAN RESEARCH PROJECTS	AHLI KUMPULAN GROUP MEMBERS
1	Improving Utilization and Value-adding of Plantation Timbers from Sustainable Sources in Malaysia	Dr Tan Yu Eng (Ketua), Ong Chee Beng, Dr Gan Kee Seng, Thilagawathy a/p Maniam, Dr Hamdan Husain, Khairul Masseat, Dr Mohd Omar Mohd Khaidzir, Dr Salmiah Ujang, Dr Koh Mok Poh, Dr Khairul Awang & Lim Seng Choon
2	Safeguarding the Forest Plant Diversity of Peninsular Malaysia Component A: Flora of Peninsular Malaysia Component B: Conservation Monitoring of Rare and Threatened Plants of Peninsular Malaysia	Dr Saw Leng Guan (Ketua), Dr Richard Chung Cheng Kong, Dr Lillian Chua Swee Lian, Dr Ruth Kiew, Dr Gary William Theseira, Dr E. Soepadmo, Aslina Baharom, Avelinah Julius, Chan Yoke Mui, Chew Ming Yee, Hamidah Mamat, Joanne Tan Pei Chih, Lau Kah Hoo, Kamarudin Saleh, Suhaida Mustafa, Lim Chung Lu, Wendy Yong Sze Yee, Nor Ezzawanis Abdullah Thani, Ong Poh Teck, Rafidah Abdul Rahman, Sam Yen Yen, Siti Munirah Mat Yunoh, Syahida Emiza Suhaimi, Ummul Nazrah Abdul Rahman & Yao Tze Leong

E. Anugerah Pekerja Terbaik Tahunan/Best Employee Award

NAMA NAMES	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
Kumpulan Pengurusan & Profesional/Management & Professional Group		
Puad Elham	Pegawai Penyelidik Q48 Research Officer	Keluaran Hutan Forest Products
Kumpulan Sokongan 1/Support Group 1		
Mohd Hasan Buang	Pembantu Penyelidik Q22 Research Assistant	Keluaran Hutan Forest Products
Kumpulan Sokongan 2/Support Group 2		
Ahmad Awang	Pengawas Hutan G14 Forester	Perhutanan dan Alam Sekitar Forestry and Environment

F. Anugerah Perkhidmatan Cemerlang—Individu/Excellent Service Award—Individual

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
1	Dr Lee Su See	Pegawai Penyelidik Khas C VK 7 Research Officer Special C VK 7	Biodiversiti Hutan Forest Biodiversity
2	Dr Norwati Adnan	Pegawai Penyelidik Q48 Research Officer	Bioteknologi Perhutanan Forest Biotechnology
3	Rosdi Koter	Pegawai Penyelidik Q48 Research Officer	Bioteknologi Perhutanan Forest Biotechnology
4	Mohd Zaki Abdullah	Pegawai Penyelidik Q48 Research Officer	Bioteknologi Perhutanan Forest Biotechnology
5	Dr Mohd Farid Ahmad	Pegawai Penyelidik Q44 Research Officer	Biodiversiti Hutan Forest Biodiversity
6	Nor Asmah Hassan	Pegawai Penyelidik Q41 Research Officer	Bioteknologi Perhutanan Forest Biotechnology
7	Maizura Ishak	Pegawai Penyelidik Q41 Research Officer	Perkhidmatan Teknikal Technical Services
8	Khairuddin Kamaruddin	Pen. Pegawai Penyelidik Q32 Assistant Research Officer	Perhutanan & Alam Sekitar Forestry & Environment
9	Yang Nazli Yahya	Setiausaha Pejabat N27 Office Secretary	Perkhidmatan Teknikal Technical Services
10	Mahat Mijan	Pembantu Penyelidik Q26 Research Assistant	Keluaran Hutan Forest Products
11	Maimunah Tompong	Pembantu Setiausaha Pejabat N22 Office Secretary Assistant	Sumber Manusia Human Resource
12	Mohd Yusof Mohamed	Pembantu Penyelidik Q17 Research Assistant	Perkhidmatan Teknikal Technical Services
13	Faezah Mohd	Pembantu Penyelidik Q17 (K) Research Assistant	Keluaran Hutan Forest Products
14	Ab Lah Mohd Nor	Pembantu Tadbir (P/O) N17 Administrative Assistant	Perkhidmatan Teknikal Technical Services

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
15	Wan Rohana Wan Husin	Pembantu Tadbir (P/O) N17 <i>Administrative Assistant</i>	Inovasi & Komersialisasi <i>Innovation & Commercialization</i>
16	Ahmad Awang	Pengawas Hutan G14 <i>Forester</i>	SPF Pasoh <i>Pasoh SPF</i>
17	Jefery Zainudin	Pemandu Kenderaan R6 <i>Driver</i>	Pentadbiran <i>Administration</i>
18	Parthiban a/l Marimuthu	Pemandu Kenderaan R6 <i>Driver</i>	Pentadbiran <i>Administration</i>
19	Zulkifli Md Said	Pekerja Awam R1 <i>General Worker</i>	Pentadbiran <i>Administration</i>
20	Azizah Ariffin	Pekerja Awam R1 <i>General Worker</i>	Bioteknologi Perhutanan <i>Forest Biotechnology</i>
21	Nor Salwah Ab Wahid	Pekerja Awam R1 (K) <i>General Worker</i>	Bioteknologi Perhutanan <i>Forest Biotechnology</i>

G. Anugerah Perkhidmatan Cemerlang—Kumpulan/Excellent Service Award—Group

BIL. NO.	NAMA KUMPULAN NAME	BAHAGIAN/PROGRAM DIVISION/PROGRAMME	AHLI KUMPULAN TEAM MEMBERS
1	Bengkel Kerja Kayu <i>Wood Working Workshop</i>	Program Pemprosesan Termaju dan Reka Bentuk, Bahagian Keluaran Hutan <i>Advance Processing & Design, Forest Products Division</i>	Dr Khairul Awang (Ketua) Yaacob Zahari, Abdul Rahim Razali, Mohd Zaini Ujang, Saari Ibrahim, Abd Karim Nasir, Ascem Mohd Kumari, Shuhaimi Sulaiman, Sufian Hamsan, Mohd Asri Adam, Rusli Mahidin, A. Roslee Radzali, Muhamad Sahrul Selamat, Mohd Yamin Yusof, Nasri Nasir, Abdul Ghani Mohamad, Norrahmad Buyong, Mohammad Adzam Ahmad & Kunasegaran a/l Muthu
2	Cawangan Pengembangan <i>Extension Services Branch</i>	Perkhidmatan Teknikal <i>Technical Services</i>	Azmarizawati Zainal Azhar (Ketua), Rosdi Mohamad, Mohd. Ehlas Haji Hassan & Zuriati Ahmadin
3	Unit Pengurusan Korporat <i>Corporate Management Unit</i>	Dasar Pengurusan <i>Management Policy</i>	Norhayati Nordin (Ketua), Wahyu Abdul Wahab, Toh An Nee, Salmah Abd. Karim, Saifulhazlin Abd Rahim, Mohammad Faizal Jaafar & Edi Hermi Mohammad Ramli

H. Anjakan Gaji/Salary Increment Award

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
1	Dr Ani Sulaiman	Pegawai Penyelidik Q54 Research Officer	Keluaran Hutan Forest Products
2	Wan Mohd Shukri Wan Ahmad	Pegawai Penyelidik Q48 Research Officer	Perhutanan dan Alam Sekitar Forestry & Environment
3	Zahari Othman	Pegawai Penyelidik Q44 Research Officer	Perkhidmatan Teknikal Technical Services
4	Saripah Barom	Pembantu Penyelidik Q22 Research Assistant	Biodiversiti Hutan Forest Biodiversity
5	Zuriati Ahmadin	Pembantu Penyelidik Q17 Research Assistant	Perkhidmatan Teknikal Technical Services
6	Nor Marzuina FK Nasyir	Pembantu Penyelidik Q17 Research Assistant	Perhutanan dan Alam Sekitar Forestry & Environment
7	Madzlan Zainuddin	Pembantu Penyelidik Q17 Research Assistant	Bioteknologi Perhutanan Forest Biotechnology
8	Zaitihaiza Khamaruddin	Pembantu Penyelidik Q17 Research Assistant	Keluaran Hutan Forest Products
9	Muzalina Muhamad	Pembantu Penyelidik Q17 Research Assistant	Keluaran Hutan Forest Products
10	Yahya Marhani	Pembantu Penyelidik Q17 Research Assistant	Bioteknologi Perhutanan Forest Biotechnology
11	Mohd Norin Nizan Mohd Janah	Pembantu Tadbir (P/O) N17 Administrative Assistant	Sumber Manusia Human Resource
12	Mahat Mohd Judin	Pengawas Hutan G14 Forester	Bioteknologi Perhutanan Forest Biotechnology
13	Mohamad Bohari Ehwan	Pengawas Hutan G11 Forester	Perhutanan dan Alam Sekitar Forestry & Environment
14	Amran Haron	Pengawas Hutan G11 Forester	Bioteknologi Perhutanan Forest Biotechnology
15	Mohd Hanafiah Ahmad	Pengawas Hutan G11 Forester	Bioteknologi Perhutanan Forest Biotechnology
16	Wan Adanan Wan Ishak	Pengawas Hutan G11 Forester	Perhutanan dan Alam Sekitar Forestry & Environment
17	Irwan Mohd Taib	Pekerja Awam R4 General Worker	Bioteknologi Perhutanan Forest Biotechnology
18	Zairul Hisham Suid	Pekerja Awam R4 General Worker	Bioteknologi Perhutanan Forest Biotechnology
19	Latifamir Ibrahim	Pemandu Kenderaan R3 Driver	Pentadbiran Administration
20	Mat Salan Mat Rosli	Pemandu Kenderaan R3 Driver	Pentadbiran Administration
21	Shukor Mohd Arif	Pekerja Awam Khas R3 Special General Worker	Bioteknologi Perhutanan Forest Biotechnology

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
22	Khamis Mat Ain	Pekerja Awam Khas R3 Special General Worker	Bioteknologi Perhutanan Forest Biotechnology
23	Vasuthevan a/l Narayana	Pekerja Awam Khas R3 Special General Worker	Pentadbiran Administration
24	Mohd Amirul Ezzuan Mohd Yatim	Pembantu Am Pejabat N1 Office General Assistant	Sumber Manusia Human Resource
25	Samsudin Abdul Hamid	Pekerja Awam R1 General Worker	Pentadbiran Administration
26	Mohamad Adnan Mohd Idris	Pekerja Awam R1 General Worker	Bioteknologi Perhutanan Forest Biotechnology
27	Abdul Muhaimin Mohd Razali	Pekerja Awam R1 General Worker	Keluaran Hutan Forest Products

I. Anugerah Khidmat Masyarakat/Community Service Award

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
1	Puad Elham	Pegawai Penyelidik Q48 Research Officer	Keluaran Hutan Forest Products

J. Anugerah Khidmat Setia/Loyal Service Award

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
1	Dr Ang Lai Hoe	Pegawai Penyelidik Q54 Research Officer	Bioteknologi Perhutanan Forest Biotechnology
2	Dr Khali Aziz Hamzah	Pegawai Penyelidik Q54 Research Officer	Perhutanan & Alam Sekitar Forestry & Environment
3	Dr Abdul Rahman Kassim	Pegawai Penyelidik Q54 Research Officer	Perhutanan & Alam Sekitar Forestry & Environment
4	Dr Wan Asma Ibrahim	Pegawai Penyelidik Q54 Research Officer	Keluaran Hutan Forest Products
5	Muhammad Farid Abdul Rashid	Pegawai Penyelidik Q52 Research Officer	Perhutanan & Alam Sekitar Forestry & Environment
6	Jamal Abdul Razak	Pen. Juruukur Bahan J38 Assistant Quantity Surveyor	Pentadbiran Administration
7	Amrah Toha	Setiausaha Pejabat N32 Office Secretary	Dasar Pengurusan Management Policy
8	Emlee Mohamad Taib	Pen. Pegawai Penyelidik Q27 Assistant Research Officer	Keluaran Hutan Forest Products
9	Mohd. Akhir Abdul Rahman	Pen. Pegawai Tadbir N27 Assistant Research Officer	Pentadbiran Administration
10	Nazly Jamaludin	Pen. Pegawai Tadbir N27 Assistant Administrative Officer	Pentadbiran Administration
11	Norridah Aziz	Pemb. Tadbir (Kewangan) W26 Administrative Assistant (Financial)	Kewangan Financial

BIL. NO.	NAMA NAME	SKIM PERKHIDMATAN SERVICE SCHEMES	BAHAGIAN/PROGRAM DIVISION/PROGRAMME
12	Zakiah Mohamed	Pemb. Tadbir (Kewangan) W22 Administrative Assistant (Financial)	Kewangan Financial
13	Norashikin Mohd. Zabri	Pemb. Tadbir (Kewangan) W22 Administrative Assistant (Financial)	Kewangan Financial
14	Maimunah Tompong	Pemb. Setiausaha Pejabat N22 Office Secretary Assistant	Sumber Manusia Human Resource
15	Zuraidda Abdul Majid	Pemb. Setiausaha Pejabat N22 Office Secretary Assistant	Keluaran Hutan Forest Products
16	Siti Salmi Abd Rafae	Pemb. Tadbir (P&O) N22 Administrative Assistant (C&O)	Pentadbiran Administration
17	Nor Rizan Mohammad	Pemb. Tadbir (P&O) N22 Administrative Assistant (C&O)	Sumber Manusia Human Resource
18	Raja Aminah Raja Aman Shah	Pemb. Perpustakaan S22 Library Assistant	Perkhidmatan Teknikal Technical Services
19	Normah Basir	Pemb. Penyelidik Q22 Research Assistant	Bioteknologi Perhutanan Forest Biotechnology
20	Rozidah Khalid	Pemb. Penyelidik Q22 Research Assistant	Bioteknologi Perhutanan Forest Biotechnology
21	Yusni Idris	Pemb. Penyelidik Q22 Research Assistant	Perkhidmatan Teknikal Technical Services
22	Mazli Abdul Wahab	Pemb. Penyelidik Q22 Research Assistant	Perhutanan & Alam Sekitar Forestry & Environment
23	Kamal Ariffin Ismail	Pemb. Penyelidik Q22 Research Assistant	Perkhidmatan Teknikal Technical Services
24	Zuriati Ahmadin	Pemb. Penyelidik Q22 Research Assistant	Perkhidmatan Teknikal Technical Services
25	Shahudin Sulong	Penjaga Jentera Letrik R22 Chargeman	Pentadbiran Administration
26	Salmah Abdul Karim	Pemb. Setiausaha Pejabat N17 Office Secretary Assistant	Dasar Pengurusan Management Policy
27	Rosnaidah Ibrahim	Pemb. Setiausaha Pejabat N17 Office Secretary Assistant	Keluaran hutan Forest Products
28	Azmei Marzuki	Pemb. Tadbir (P&O) N17 Administrative Assistant (C&O)	Pentadbiran Administration
29	Sukinah Jamaluddin	Pemb. Tadbir (P&O) N17 Administrative Assistant (C&O)	Sumber Manusia Human Resource
30	Nor Azni Jaafar	Pemb. Tadbir (P&O) N17 Administrative Assistant (C&O)	Perhutanan & Alam Sekitar Forestry & Environment
31	Ramli Saad	Pemandu Kenderaan R6 Driver	Pentadbiran Administration
32	Rosmadi Salim	Pembantu Am Pejabat N4 Office General Assistant	Dasar Pengurusan Management Policy

K. Anugerah Tesis Terbaik/Best Thesis Award**KATEGORI/CATEGORY: PhD****Tesis Terbaik/Best Thesis**

Dr Sik Huei Shing

Keluaran Hutan /Universiti Kebangsaan Malaysia

Forest Products/Universiti Kebangsaan Malaysia

Tajuk/Title:

Kajian sifat fizikal dan mekanik kayu getah yang diproses menggunakan rawatan pengeringan suhu tinggi

KATEGORI/CATEGORY: MSc**Anugerah Merit/Merit Award**

Chan Hong Twu

Biodiversiti Hutan/Universiti Malaya

Forest Biodiversity/ Universiti Malaya

Tajuk/Title:

Biodiversity of Boletaceae in Peninsular Malaysia

L. Augerah Penerbitan FRIM/FRIM Publication Award**KATEGORI/CATEGORY A: PENERBITAN TEKNIKAL/TECHNICAL PUBLICATIONS****Pertama/First**

L H Tnah, SL Lee, Kevin Kit Siong Ng, QZ Faridah & I Faridah Hanum

Tajuk/Title:

Forensic DNA profiling of tropical timber species in Peninsular Malaysia

Kedua/Second

HS Sik, KT Choo, Z Sarani, S Ahmad, SS How, CH Chia & Y Maisarah

Tajuk/Title:

Dimensional stability of high temperature-dried rubberwood solid lumber at two equilibrium moisture content conditions

Ketiga/Third

Sreetheran Maruthaveeran & Amat Ramsa Yaman

Tajuk/Title:

The identification of criteria and indicators to evaluate hazardous street trees of Kuala Lumpur, Malaysia: A Delphi study

KATEGORI/CATEGORY B: PENERBITAN SEPARA/BUKAN TEKNIKAL/SEMI/NON-TECHNICAL PUBLICATIONS**Pertama/First**

HF Lim, AM Abdul Rashid, SS Lee, P Ahmad Fauzi, YS Chang, Y Ahmad Zuhaidi, M Mohd Parid
EH Lok, A Mohd Farid & MA Nor Azah

Tajuk/Title:

Penanaman *Aquilaria* dan penghasilan gaharu di Malaysia

Kedua/Second

SP Ong, Shawn Cheng, VC Chong & YS Tan

Tajuk/Title:

Pests of planted mangroves in Peninsular Malaysia

Ketiga/Third

Sharmiza Adnan, Manh Hoang, Huanting Wang, Brian Bolto & Zongli Xie

Tajuk/Title:

Recent trends in research, development and application of membrane technology in the pulp and paper industry

KATEGORI/CATEGORY C: BUKU/BOOKS

LSL Chua, M Suhaida, M Hamidah & LG Saw

Tajuk/Title:

Malaysia plant red list—Peninsular Malaysia Dipterocarpaceae

KATEGORI/CATEGORY D: BUKU PANDUAN/HANDBOOKS

Editors : YE Tan, NPT Lim, KS Gan, TC Wong, SC Lim & M Thilagawaty

Tajuk/Title:

Testing methods for plantation grown tropical timbers

M. Insentif Penerbitan dalam Jurnal Berimpak Faktor dan Terkemuka
Incentive for Publications in Impact Factor and Renowned Journals

KATEGORI: INDIVIDU/CATEGORY: INDIVIDUAL

Bil. No.	Nama/Name	Faktor Impak Akumulatif Accumulative Impact Factor	Hadiah/Prize (RM)
1	Dr Rafeadah Rusli	4.502	1000
2	Dr Tnah Lee Hong	2.741	500
3	Dr Lee Soon Leong	2.741	500
4	Nazura Zainuddin	2.406	500
5	Zaihan Jalaludin	1.559	250
6	Dr Nurhanan Murni Yunos	1.430	250
7	Sreetheran a/l Maruthaveeran	1.405	250

KATEGORI: BAHAGIAN/CATEGORY: DIVISION

Bil. No.	Bahagian/Divisions	Faktor Impak Akumulatif Accumulative Impact Factors	Hadiah/Prize (RM)
1	Pertama/First Keluaran Hutan Forest Products	7.432	2000
2	Kedua/Second Bioteknologi Perhutanan Forest Biotechnology	5.805	1000
3	Ketiga/Third Biodiversiti Hutan Forest Biodiversity	3.920	500

PENGURUSAN KEWANGAN DAN PENTADBIRAN

FINANCIAL AND ADMINISTRATION MANAGEMENT

Pengurusan Kewangan

Pendahuluan

Kedudukan dan prestasi kewangan Lembaga bagi tahun kewangan berakhir 31 Disember 2011 adalah memuaskan. Prestasi perbelanjaan Lembaga adalah sebanyak 90% iaitu RM89.8 juta berbanding pendapatan yang diterima berjumlah RM99.3 juta. Dengan perkataan-perkataan lain, Lembaga telah merekodkan lebih pendapatan atas perbelanjaan sebanyak RM9.5 juta. Berbanding dengan tahun lepas, jumlah perbelanjaan Lembaga ini hampir sama berbanding RM88.0 juta dalam tahun 2010. Walau bagaimanapun, pendapatan (2010: RM91.0 juta) dan lebih pendapatan atas perbelanjaan (2010: RM3.0 juta) yang dinyatakan di atas menunjukkan peningkatan ketara disebabkan pertambahan peruntukan khas pembangunan yang diterima, walau bagaimanapun projek tersebut masih dalam peringkat pelaksanaan dan pembayarannya belum dapat dilunaskan.

Perbelanjaan Lembaga meliputi perbelanjaan aktiviti operasi, penyelidikan dan pembangunan infrastruktur. Lembaga telah dan akan terus berusaha untuk mencapai kecemerlangan dalam pengurusan kewangannya melalui tanda aras Indeks Akauntabiliti Jabatan Audit Negara. Lembaga bukan sahaja berhasrat untuk memastikan pengurusan kewangannya diurus dengan cekap, teratur serta mematuhi peraturan dan prosedur yang ditetapkan malah diurus dengan penuh bertanggungjawab dan berintegriti bagi memberi nilai tambah kepada pihak pengurusan, pihak-pihak berkepentingan dan pengguna yang lain. Kebergantungan aktiviti operasi dan penyelidikan kepada kelulusan pembiayaan yang dimohon telah sedikit sebanyak memberi kesan kepada tahap pengurusan Institut dan penyelidikan yang ingin dijalankan.

Pendapatan

Kira-kira RM81.7 juta atau 82.2% daripada RM99.3 juta sumber kewangan Lembaga bagi tahun 2011 dibiayai oleh Kerajaan Persekutuan melalui geran tahunan Mengurus dan Pembangunan serta geran-geran lain yang disalurkan melalui mekanisma-mekanisma tertentu. Pada tahun 2011, Kerajaan telah meluluskan peruntukan Mengurus sebanyak RM50.5 juta, meningkat sebanyak RM7.8 juta atau 18.1% berbanding tahun 2010 iaitu RM42.7 juta. Kenaikan tersebut antara lain disebabkan oleh peruntukan bagi membayar imbuhan tetap tahunan pejawat awam Lembaga, bayaran tambahan premium tanah dan projek penyelenggaraan cerun. Bagi perbelanjaan Pembangunan dan geran-geran lain Kerajaan pula, Lembaga telah menerima peruntukan sebanyak RM31.2 juta berbanding RM22.0 juta pada tahun 2010.

Financial Management

Introduction

The Board's financial position and performance for the year ending 31 December 2011 was very encouraging. The Board's expenditure performance was 90% or RM89.8 million against revenue of RM99.3 million. In other words, the Board had recorded a surplus of revenue over its expenditure amounting to RM9.5 million. Comparing to last year's figures, the total expenditure was about similar to last year's, which was RM88.0 million in 2010. However, there was a substantial increase in revenue (2010: RM91.0 million) and subsequent increase in surplus of revenue over its expenditure (2010: RM3.0 million), brought about mainly by the special development allocation projects received. However, the projects were still in the implementation stages and the fund had not yet able to be disbursed.

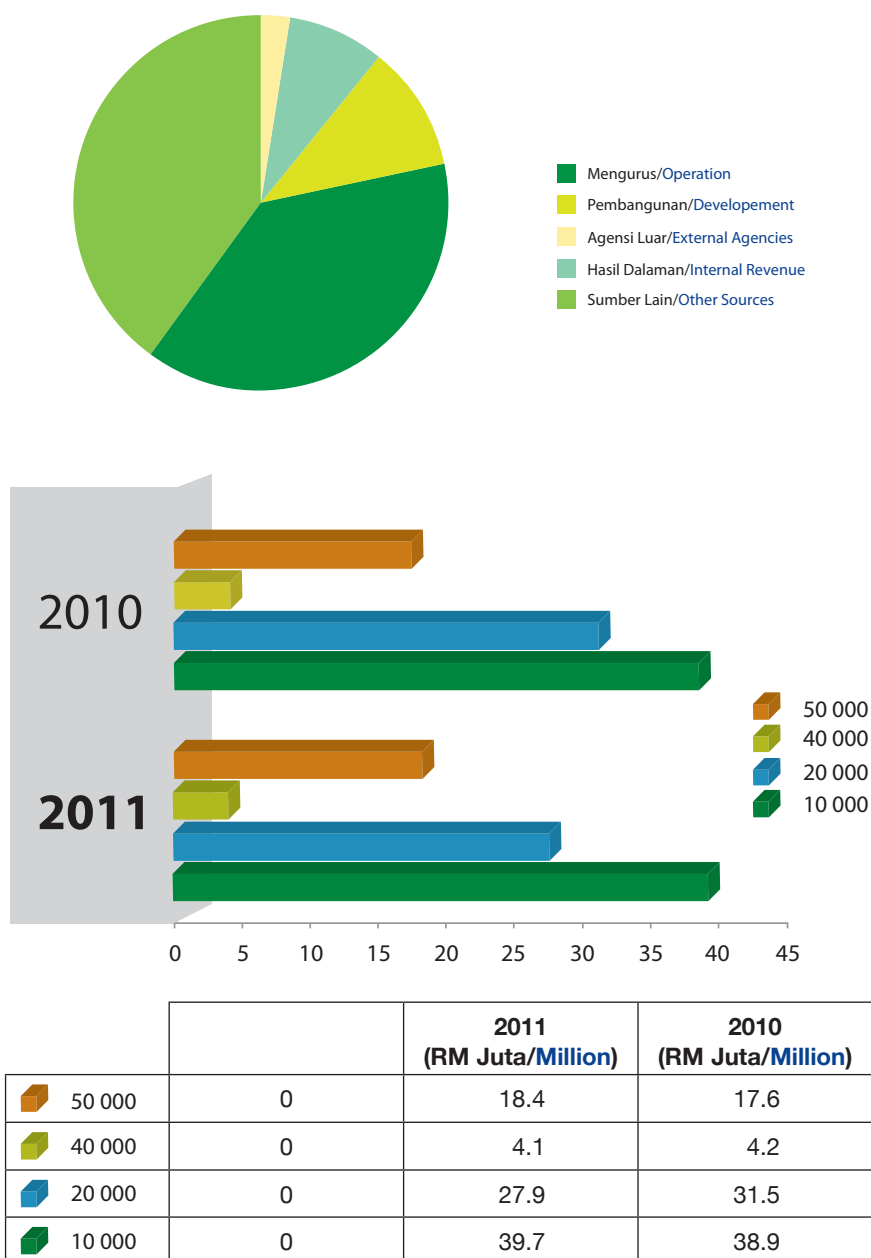
The Board's total expenditure was inclusive of expenses for its daily operation, research and infrastructure development. The Board had and will continue to pursue excellence in financial management by bench marking it with the Accountability Index set by the Auditor General's Office. The Board has envisaged that finance must not only be managed efficiently, systematically and following all procedures and regulations, but must also be managed with integrity and responsibility to give added value to the management, stakeholders and other users. The dependency of operation and research activities on the approval of the required budget, in a way had impacted the level of management of the Institute and its research planning.

Revenue

About RM81.7 million or 82.2% from RM99.3 million financial resources received in 2011 was from the Federal Government, given through its annual Operation and Development budget and also other types of grant through various mechanisms. In 2011, the government had approved an operation budget of RM50.5 million, an increase of RM7.8 million or 18.1% compared with 2010, which was RM42.7 million. The increase was for the staff annual fixed allowance, land premium expenses and cost of maintaining slope. For development and other government grants, the Board had received an allocation for RM31.2 million compared with RM22.0 million in 2010.

Di samping itu, Lembaga turut menerima sumbangan kewangan kewangan daripada badan, agensi dan syarikat dari dalam dan luar negara (RM7.1 juta) dan pendapatan hasil janaan sendiri (RM6.2 juta) dan sumber-sumber lain kesemuanya berjumlah RM17.6 juta. Angka ini menunjukkan penurunan sebanyak RM8.7 juta atau 33.0% berbanding dengan RM26.3 pada tahun 2010. Namun begitu, pertambahan penyaluran geran kerajaan yang telah dinyatakan di atas telah menjadikan jumlah keseluruhan pendapatan yang diperoleh Lembaga pada tahun 2011 sebanyak RM99.3 juta, meningkat sebanyak RM8.3 juta atau 9.0% berbanding RM91.0 juta pada tahun 2010.

On top of that, the Board also received contributions from local and overseas bodies, agencies and companies (RM7.1 million) and from internal generated revenue (RM6.2 million) and other sources of revenue, in all totalling RM17.6 million. This figure shows a decrease of RM8.7 million or 33.0% compared with RM26.3 million in 2010. However, the increased in Government grant received had resulted overall total revenue for the Board for 2011 to increased to RM99.3 million, an increase of 8.3 million or 9%, compared with RM91.0 million in 2010.



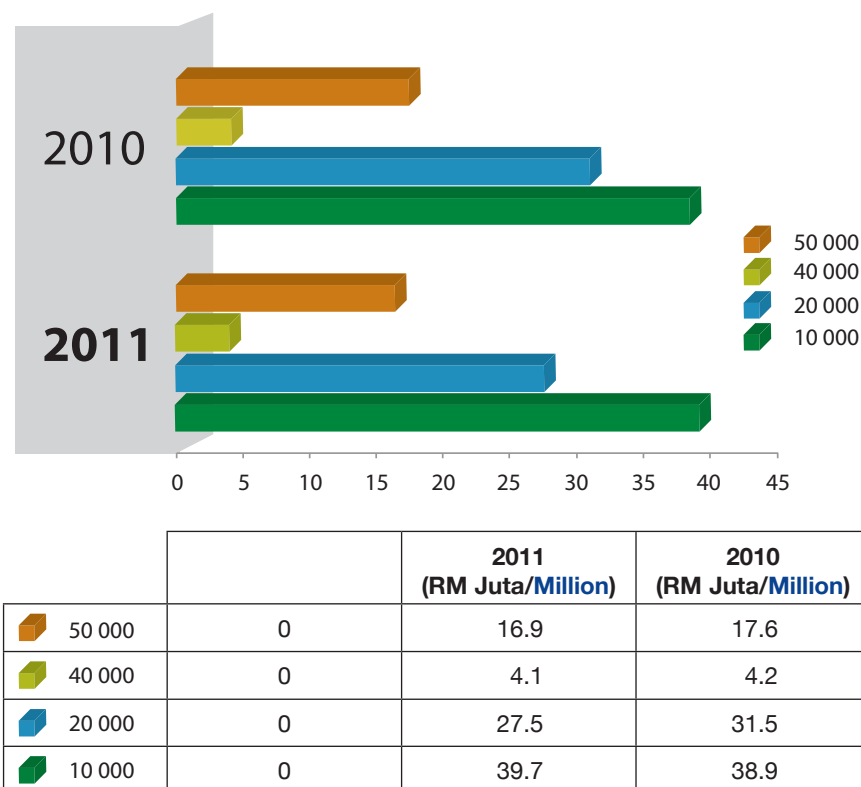
Rajah 1 Pecahan Sumber Kewangan 2011 dan Perbandingan Pendapatan Tahun 2011 dan 2010
Figure 1 Fraction of Source of Income 2011 and Comparison of Revenue 2011 and 2010

Perbelanjaan

Dari segi perbelanjaan, Lembaga telah membelanjakan sebanyak RM43.4 juta atau 48.4% daripada jumlah perbelanjaan pada tahun 2011 untuk pembayaran emolumen dan kenaikan pencen, hampir sama berbanding tahun sebelumnya sebanyak RM43.1. Perbelanjaan bagi perkhidmatan dan bekalan merekodkan penurunan sebanyak RM3.6 juta iaitu daripada RM31.5 juta pada tahun 2010 kepada RM27.9 juta pada tahun 2011. Ini antara lain disebabkan usaha FRIM untuk berbelanja secara berhemah bagi mengimbangi peruntukan yang diterima. Bagi perbelanjaan-perbelanjaan lain pula, ia menunjukkan peningkatan ketara sebanyak RM5.0 juta iaitu dari RM13.3 juta pada tahun 2010 kepada RM18.4 juta pada tahun 2011 atau peningkatan sebanyak 37.9%.

Expenditure

In terms of expenditure, the Board had spent RM43.4 million or 48.4% of the total expenditure for 2011 for emolument and pension contribution expenses, almost similar to 2010 of RM43.1 million. The expenditure for supplies and services recorded a decrease of RM3.6 million, which was from RM31.5 million in 2010 to RM27.9 million in 2011. Amongst others, this was due to prudent spending to balance out the amount of allocation received. For other expenses, a significant increase of RM5.1 million was shown, i.e. from RM13.3 million in 2010 to RM18.4 million in 2011 or an increase of 37.9%.



Rajah 2 Perbandingan Perbelanjaan Tahun 2011 dan 2010

Figure 2 Comparison of Expenditure for 2011 and 2010

Aliran Tunai dan Pelaburan

Lembaga tidak mengalami sebarang masalah aliran dan kecairan tunai dan telah dapat menjelaskan semua tanggungjawab kewangan pada masa yang ditetapkan. Terdapat pertambahan tunai dan kesetiaan tunai bagi tahun 2011 sebanyak RM8.3 juta berbanding negatif RM0.6 juta pada tahun sebelumnya, menjadikan kedudukan tunai Lembaga pada 31 Disember 2011 meningkat kepada RM67.4 juta berbanding masa yang sama tahun lepas berjumlah RM59.1 juta.

Cash Flow and Investment

The Board did not have any cash flow or liquidity problems and had always been able to fulfill all financial obligations on time. There was an increase in cash equivalent to RM8.3 million compared with the outflow of RM0.6 million last year, resulting in the Board's cash position as at 31 December 2011 having increased to RM67.4 million compared with the same time last year of RM59.1 million.

Lembaga juga telah melaburkan sebahagian besar baki tunai yang belum digunakan dalam institusi kewangan yang dibenarkan oleh Kementerian Kewangan. Pelaburan Lembaga pada akhir tahun 2011 berjumlah RM69.4 juta berbanding tahun sebelumnya RM70.6 juta. Petunjuk prestasi kewangan berdasarkan nisbah-nisbah kewangan penting menunjukkan keadaan kedudukan kewangan Lembaga adalah di tahap yang baik dan terkawal.

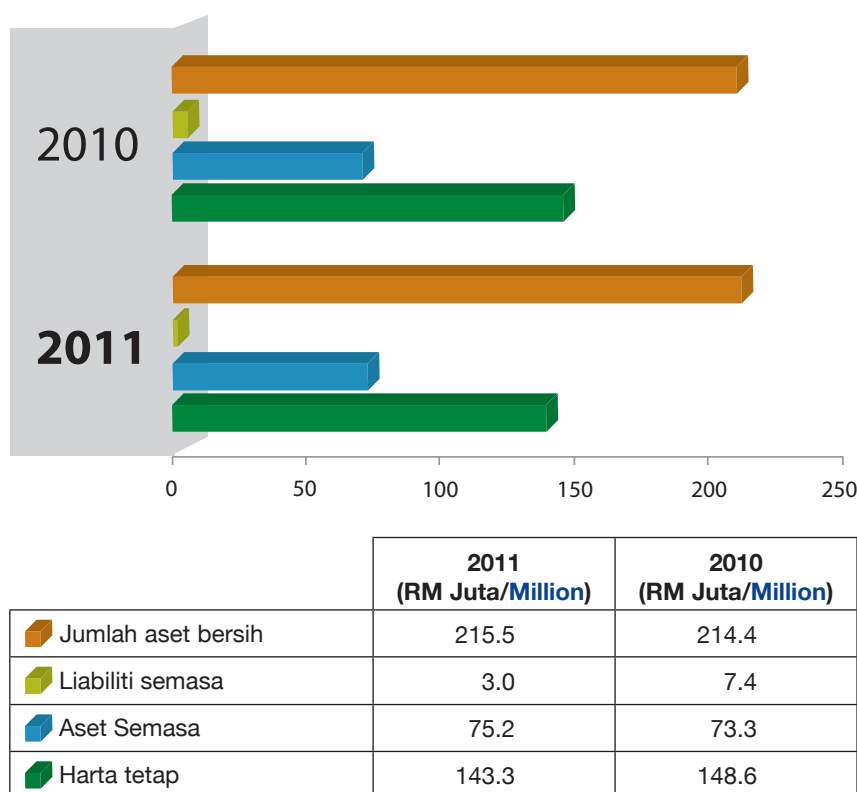
The Board had invested most of the cash still not to be used in financial Institutions approved by the Ministry of Finance. The Board's total investment at the end of 2011 was RM69.4 million compared with RM70.6 million in the previous year. The financial performance indicator reflected by key financial ratios shows that the Board's financial position was healthy and manageable.

Kunci Kira-Kira

Nilai buku aset bersih Lembaga pada akhir tahun 2011 adalah sebanyak RM216.1 juta, mencatatkan peningkatan sebanyak RM1.6 juta berbanding dengan RM214.5 juta pada tahun 2010. Dua komponen besar aset Lembaga ialah hartanah, mesin dan peralatan serta pelaburan jangka pendek dan simpanan tetap. Walau pun pelaburan jangka pendek dan aset tetap menurun akibat usia aset yang bertambah, ianya telah diseimbangi oleh pertambahan simpanan tetap Lembaga, meningkat sebanyak RM4.7 kepada RM63.3 juta dan penurunan tanggungan semasa daripada RM7.4 juta dalam tahun 2010 kepada RM3.0 juta sahaja pada tahun 2011.

Balance Sheet

The Board's net asset book value at the end of 2011 was RM216.1 million, recording an increase of RM1.6 million compared with RM214.5 million in 2010. Two major categories of the Board's assets were property, machinery and equipment; and short-term investments and fixed deposits. Although the amount of short-term investments and fixed assets had decreased due to aging of the fixed assets, it had been cancelled off with the increase in fixed deposit, in which there was an increase of RM4.7 million, to RM63.3 million and also the decrease in current liabilities from RM7.4 million in 2010 to RM3.0 million only in 2011.



Rajah 3 Perbandingan Kunci Kira-Kira Bagi Tahun 2011 dan 2010

Figure 3 Comparison of Balance Sheet for 2011 and 2010

LAPORAN KETUA AUDIT NEGARA

Ketua Audit Negara telah memperakukan penyata kewangan Lembaga tahun 2011 dengan memberi sijil bersih dan berpendapat bahawa Penyata Kewangan tersebut memberi gambaran yang benar dan saksama terhadap kedudukan kewangan Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia pada 31 Disember 2011, hasil operasi dan aliran tunai untuk tahun tersebut berdasarkan piawaian perakaunan yang diluluskan.

Projek Pembangunan

Pelbagai projek pembangunan telah dilaksanakan oleh FRIM pada 2011. Beberapa projek telah dimulakan pada tahun sebelumnya. Antaranya ialah:

AUDITOR GENERAL'S REPORT

The Auditor General had certified the Board's Financial Statement for 2011 with a clean audit report and in their opinion the statement had given a true and fair view of the financial position of Malaysian Forestry Research and Development Board as at 31 December 2011, its operation and cash flows for that year in accordance with approved accounting standard.

Development Projects

Various development projects were undertaken by FRIM in 2011. Some of the projects were initiated in the previous years. They were:

Bil No	Projek Project	Jururunding Consultant	Nilai Kontrak Contract value (RM)	Tahun Year	Objektif Objective	Impak Impact
1	Pembinaan 60 unit kuarters penjawat awam FRIM Construction of 60 unit FRIM staff quarters	Perunding ZMS Sdn Bhd DRM Architect Pan Sejati Sdn Bhd	14 500 000	2008–2011	Menggantikan kuarters lama sedia ada yang akan dirobohkan To replacing old quarters that would be demolished	Menjamin keselesaan tempat tinggal kepada staf dan keluarga Ensuring comfortable living places to the staff members and families
2	Pembinaan Kompleks Pusat Inkubator Bio-Usahawan Construction of Bio-entrepreneur Incubator Centre Complex	MZ Design Consultancy	1 850 000	2009–2011	Menyediakan pusat inkubator baharu yang menumpukan pada aktiviti pengeluaran produk daripada kultur tisu To provide a new incubator centre that focuses on the production of products from tissue culture	Menghasilkan ramai usahawan dalam industri kultur tisu Producing more entrepreneurs in tissue culture industry
3	Peningkatan kemudahan pelancongan di kawasan FRIM, Kepong Upgrading tourism facilities in FRIM campus, Kepong		1 389 270	2011–2012	Meningkatkan kemudahan infrastruktur untuk tujuan rekreasi dan pelancongan To upgrade infrastructure facilities for recreational and tourism	Memberi kemudahan dan keselesaan kepada pengunjung di samping meningkatkan imej FRIM Providing facilities and comfort to visitors as well as enhancing FRIM's image

Bil No	Projek Project	Jururunding Consultant	Nilai Kontrak Contract value (RM)	Tahun Year	Objektif Objective	Impak Impact
4	Pembinaan kilang penyelidikan dan pemantauan kualiti bahan tanaman herba di SPF Maran, Pahang Construction of a research mill and monitoring of herbal plant materials at the Maran SPF, Pahang	JPS Maran, Pahang	188 009	2010–2011	Mewujud dan membangunkan ladang herba contoh dengan amalan pertanian baik To establish a sample of herbal plantation with good plantation practice	Penyediaan kelengkapan kemudahan infrastruktur dan alatan; menjalankan aktiviti penyelidikan teknologi lepas tuai serta membantu pihak industri yang kurang berkemampuan Providing infrastructure facilities and equipment; doing research activity on post-harvested technology and assisting incapable industries
5	Menaik taraf bangunan D11 dan bengkel rotan untuk dijadikan Makmal TPC California Air Resources Board (CARB) FRIM Upgrading the D11 Building and Rattan Workshop for FRIM's California Air Resources Board (CARB) TPC laboratory	–	218 400	2010–2011	Menaik taraf bangunan untuk kemudahan CARB dan penyelidikan bahan bukan kayu To upgrade a building for CARB and non-wood research facilities	Menyediakan kemudahan kemudahan Climatic Chamber Third Party Certifier (TPC) di bawah CARB Providing a Climatic Chamber Third Party Certifier (TPC) facility under CARB
6	Membina dan menyiapkan pagar chain-link termasuk kerja berkaitan di SPF Selandar Melaka Construction of the chain-link gates and other related works at Selandar SPF, Melaka	–	87 050	2011	Untuk menjamin keselamatan tanah hak milik FRIM To ensure the safety of FRIM's land	M enghalang aktiviti pencerobohan dan tanah hak milik FRIM dapat dijaga dengan baik Avoiding land intruding activities and safeguarding FRIM's land title

Bil No	Projek Project	Jururunding Consultant	Nilai Kontrak Contract value (RM)	Tahun Year	Objektif Objective	Impak Impact
7	Membersih dan merata tapak pejabat serta menambah baik jalan masuk ke tapak pejabat SPF Jeli, Kelantan <i>Cleaning and levelling the office base land and improving the road to the office site of Jeli SPF, Kelantan</i>	–	120 000	2011–2012	Untuk memajukan kawasan sebagai tapak penyelidikan berkonsep perladangan hutan, perhutanan tani dan perladangan pelbagai spesies buluh <i>To develop the area as a research plot for forest plantations, agro-forestry and various bamboo species plantations</i>	Berpotensi untuk perkembangan kecemerlangan penyelidikan saintifik dan teknologi hutan serta kawasan rekreasi dan tarikan pelancongan <i>Potential for the development of excellence in scientific research and forest technology; and a recreational and tourism attraction site</i>

Pada 2011, FRIM terus menjadi tumpuan pelawat termasuklah orang kenamaan, saintis serta orang awam dari dalam dan luar negara yang berminat untuk mempelajari, memahami dan menikmati sendiri pelbagai aktiviti dan kemudahan yang ditawarkan di FRIM. Antaranya termasuklah:

In 2011, FRIM continued to attract visitors including VIPs, scientists and the public, local and overseas, who were interested to learn, understand and enjoy various activities and facilities offered by FRIM. Among them were:



Dato' Dr Abd Latif (kanan sekali) bersama-sama pelawat dari JIRCAS, Jepun
Dato' Dr Abd Latif (far right) with the visitors from JIRCAS, Japan

BIL NO	PELATUT VISITORS	TARIKH DATE
1	Jawatankuasa Belanjawan Parlimen Jerman Parliament Budget Committee, Germany	8 Januari/January
2	Safuan Group Berhad & Kangwon National University (KNU), South Korea	7 Februari/February
3	UPM ke FMBioSis (FRIM-FMBioSis-MTDC) UPM to FMBioSis (FRIM-FMBioSis-MTDC)	10 Februari/February
4	Hiroshima University & Kobelco Construction Co Ltd	3 Mac/March
5	Prof Okamoto, Prof Dr Toshinori Okuda, Mr Tanaka & Mr Okuda	
6	Malaysian Timber Council (MTC) & Ceylon Institute of Builders (CIOB), Sri Lanka	3 Mac/March
7	Tuan Magnagna Christian, Menteri Air & Hutan Gabon, Afrika & Pegawai-Pegawai Kanan Gabon Mr Magnagna Christian, Minister of Water & Forest, Gabon, Africa & Gabon Senior Officials	3 Mac/March
8	Politeknik Johor Bahru, Diploma Reka Bentuk Industri (Semester 6), Jabatan Rekabentuk & Komunikasi Visual Johor Bahru Polytechnic, Diploma in Industrial Design (6th Semester), Design & Visual Communications Department	4 Mac/March
9	YB Datuk Dr Marcus M Mojigoh (ADUN Putatan, Sabah) Bersama Belia & Beliawanis YB Datuk Dr Marcus M Mojigoh (Member of State Assembly Putatan, Sabah) with Youth Group	8 Mac/March
10	Profesor Sayed Azam-Ali, Vice-Provost (Research and Internationalisation), Universiti Nottingham Kampus Malaysia (UNMC), Semenyih	8 April

BIL NO	PELAWAT VISITORS	TARIKH DATE
11	Puan Aidi Nora Ismail, Timbalan Pengarah Teknologi Maklumat (SUK Negeri Sembilan), Pasukan GEO-EGMS Pejabat Setiausaha Kerajaan (SUK) Negeri Sembilan Mdm Aidi Nora Ismail, Deputy Director of Information Technology, Negeri Sembilan State Secretary), GEO-EGMS Group, Negeri Sembilan State Secretary Office	19 April
12	Jabatan Muzium Negara Malaysia (Kursus Pengurusan Herbarium) Malaysian National Museum Department (Herbarium Management Course)	25-29 April
13	Department of Forest Inspection, Ministry of Agriculture and Forestry, Laos	26 April
14	Peserta-Peserta Kursus Pengurusan Herbarium dari Jabatan Muzium Negara Malaysia Participants of Herbarium Management Course from Malaysian National Museum Department	28 April
15	Pegawai Bahagian Pewartaan dan Penguatkuasaan, Jabatan Warisan Negara Officials from Gazettement and Enforcement Division, National Heritage Department	19 Mei/ May
16	Peserta Bengkel Pembentukan Sifir Isi Padu Participants of "Pembentukan Sifir Isi Padu" Workshop	24-25 Mei/ May
17	Pengerusi MPOB/MPOB Chairman	1 Jun/ June
18	Peserta Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia Participants of the National Seminar on R&D Projects for Coastal Forest in Malaysia	7-8 Jun/ June
19	Peserta Talk on Global Climate Change Participants of the Talk on Global Climate Change	9 Jun/ June
20	Peserta Langkawi International Dialogue 2011 Participants of the Langkawi International Dialogue 2011	20 Jun/ June
21	Delegasi Vietnam/ Delegation from Vietnam	21 Jun/ June
22	Ketua Setiausaha Kementerian Pelancongan Malaysia, Dato' Dr Ong Hong Peng Secretary General, Ministry of Tourism Malaysia, Dato' Dr Ong Hong Peng	28 Jun/ June
23	Pejabat Tanah & Galian Selangor/ Land & Minerals Office	29 Jun/ June
24	Jabatan Bomba dan Penyelamat Putrajaya/ Department of Fire and Rescue, Putrajaya	22 Julai/ July
25	Program Kembara Bersama Media/ Travel with the Media Programme	28-29 Julai/ July
26	Ministry of Agriculture and Forestry, Department of Forestry, A Sustainable Forestry Management and Rural Development, Vientiane, Laos	22 Ogos/ August
27	YB Menteri NRE/ Minister of the NRE	23 Ogos/ August
28	Serahan cek oleh The Institute of Internal Auditors kepada Malaysia Convention & Exhibition Bureau (MyCEB)/FRIM Cheque presentation by The Institute of Internal Auditors to the Malaysia Convention & Exhibition Bureau (MyCEB)/FRIM	25 Ogos/ August
29	Panel Penilai Anugerah Penarafan Bintang 2011 Star Rating Award 2011 Evaluation Panels	27 September
30	Agensi Inovasi Malaysia (AIM)/ Malaysian Innovations Agency	27 September
31	H.E. Park Hee Tae, Speaker of The National Assembly of the Republic of Korea	28 September
32	Mr Jose Trinidad Suazo (Minister of National Institute of Conservation and Forest Development, Protected Areas and Wildlife (ICF), Honduras)	20 Oktober/ October

BIL NO	PELAWAT VISITORS	TARIKH DATE
33	Prof Sebastian Engelstaedter, Oxford Univeristy	21 Oktober/October
34	YB Menteri NRE Ke SPF Bidor/Minister of NRE to Bidor SPF	1 November
35	Lawatan Sambil Belajar Pelajar Tahun 3, Program Teknologi & Industri Serat Kayu, Universiti Malaysia Sabah (UMS) Year 3 Students Educational Visit, Wood Fiber Technology & Industry, Universiti Malaysia Sabah (UMS)	11 November
36	Jawatankuasa Penganjur MIA-AFA Conference 2011 Organizing Committee of MIA-AFA Conference 2011	14 November
37	Delegasi dari Kesatuan Eropah European Union Delegation	18 November
38	JIRCAS, Jepun/JIRCAS, Japan	17 Disember/December

PERJAWATAN

ESTABLISHMENT

PELANTIKAN

Pada tahun 2011, FRIM telah melantik seramai tiga orang Pegawai Penyelidik (Pengurusan dan Profesional) dan enam orang penjawat awam Kumpulan Sokongan. Mereka terdiri daripada:

APPOINTMENTS

In 2011, a total of three new Research Officers (Management and Professional) and six staff members (Support Group) were appointed. The details are as follows:

	Tarikh Iantikan Date of appointment
Pegawai Penyelidik Gred Q43/Research Officer Grade Q43	
Dr Tnah Lee Hong (Caw. Genetik, Bhg. Bioteknologi Perhutanan/Genetic Branch, Forest Biotechnology Div.)	3 Januari/January
Zunoliza Abdullah (Prog. Fitokimia, Bhg. Tumbuhan Ubatan/Phytochemistry Prog., Medicinal Plants Div.)	3 Januari/January
Pegawai Penyelidik Gred Q41/Research Officer Grade Q41	
Tan Ai Lee (Prog. Sumber Biologi, Bhg. Tumbuhan Ubatan/Biology Resources Prog., Medicinal Plants Div.)	3 Januari/January
Pembantu Taman/Ladang Gred G17/Gardens/Plantations Assistant Grade G17	
Muzaini Faizal Mostofar (Taman Botani Kepong/Kepong Botanical Gardens (KBG))	3 Januari/January
Pengawas Hutan Gred G11/Forrester Grade G11	
Amir Sabri Baharom (Prog. Hutan Ladang, Bhg. Bioteknologi Perhutanan/Forest Plantations Prog., Forest Biotechnology Div.)	3 Januari/January
Roslan Abdul (SPF Mata Ayer, Perlis/Mata Ayer SPF, Perlis)	3 Januari/January
Wan Adenan Wan Ishak (KPSL/Promotions by appointment) (Prog. Hutan Asli, Bhg. Perhutanan & Alam Sekitar/Natural Forest Prog., Forestry & Env. Div.)	1 Januari/January
Pekerja Awam Khas Gred R3/Special General Worker Grade R3	
Angan Atan (KPSL/Promotions by appointment) (Prog. Biodiversiti Flora, Bhg. Biodiversiti Hutan/Flora Biodiversity, Forest Biodiversity Div.)	1 Januari/January
Yahaya Hamid (KPSL/Promotions by appointment) (Prog. Hutan Ladang, Bhg. Bioteknologi Perhutanan/Forest Plantations Prog., Forest Biotechnology Div.)	1 Januari/January

KENAIKAN PANGKAT

PROMOTIONS

Seramai 55 orang Kakitangan FRIM telah dinaikkan pangkat pada tahun 2011. Mereka ialah:

A total of 55 FRIM staff members were promoted in the year 2011. The details are as follows:

Nama/Name	Gred/Grade	Tarikh/Date
Dr Mohd Nor Mohd Yusoff	Timb. Ketua Pengarah (Penyelidikan) Deputy Director General (Research) Gred Utama/Special Grade VU6 Jusa 'B'	19 September
Dr Hj Ahmad Fauzi Puasa	Pegawai Penyelidik Gred Q54 Research Officer Grade Q54	1 Januari/January
Dr Ling Sui Kiong		
Norhayati Nordin		
Azman Hassan		
Dr Mohd Ilham Adenan		
Dr Ismariah Ahmad		
Dr Salmiah Ujang		
Dr Mohd Noor Mahat		
Dr Mohd Omar Mohd Khaidzir		
Dr Wan Asma Ibrahim		
Dr Raja Barizan Raja Sulaiman		
Mohd Arshad Saru		
Adnan Mohamad		
Dr Gary William Theseira	Pegawai Penyelidik Gred Q52 Research Officer Grade Q52	1 Mac/March
Noorsiha Ayop		1 Mei/May
Abdul Jabbar Hj Sabli	Pegawai Tadbir Gred N52 Administrative Officer Grade N52	1 Julai/July
Dr Christine Dawn Fletcher	Pegawai Penyelidik Gred Q48 Research Officer Grade Q48	1 Januari/January
Dr Ho Wai Mun		1 Jun/June
Dr Khairul Awang		
Dr Rafeadah Rusli		1 Ogos/August
Dr Pin Kar Yong		
Dr Pin Kar Yong	Pegawai Penyelidik Gred Q44 Research Officer Grade Q44	24 Februari/February
Dr Fadzureena Jamaludin	Pegawai Penyelidik Gred Q44 Research Officer Grade Q44	1 Februari/February
Zamri Mohd Zangi	Pegawai Tadbir Gred N44 Administrative Officer Grade N44	1 Julai/July
Nor Azura Ahmad Murad	Pegawai Undang-Undang Gred L44 Legal Officer Grade L44	
Norridah Aziz	Pembantu Tadbir (Kew) Gred W26 Admin. Assist. (Finance) Grade W26	1 April

Nama/Name	Gred/Grade	Tarikh/Date
Mohd Zulfadli Mat Yasin	Pembantu Taman/Ladang Gred G22 Nursery/Plantation Assist. Grade G22	1 Januari/January
Mohd Zain Mazlan	Tukang K2 Gred R22 Carpenter K2 Grade R22	
Zakiah Mohamed	Pembantu Tadbir (Kew) Gred W22 Admin. Assist. (Finance) Grade W22	1 Mei/May
Zuriati Ahmadin	Pembantu Penyelidik Gred Q22 Research Assistant Grade Q22	1 Julai/July
Salmah Abd Karim	Pemb. S/U Pej. Gred N22 (KUP) Office Secretary Assist. Grade N22 Personal to Holder (PTH)	1 Mei/May
Nor Ashikin Mohd Zabri	Pemb. Tadbir (Kew) Gred W22 (KUP) Admin. Assist. (Finance) Grade W22 (PTH)	
Suzana Eshak	Pemb. Tadbir (Kew) Gred W22 (KUP) Admin. Assist. (Finance) Grade W22 (PTH)	
Muhammad Asri Lias	Pembantu Penyelidik Gred Q22 (KUP) Research Assistant Grade Q22 (PTH)	1 Julai/July
Sabariah Ramuddin		
Hamzah Mamat		
Ahmad Sharafi Othman		
Samsuri Toh Harun		
Samsul Bahrin Abdullah		
Mohammad Faridz Zollpatah		
Zamri Mohamad Nor		1 Ogos/August
Azmei Marzuki	Pemb. Tadbir (P/O) Gred N22 (KUP) Admin. Assist. (Mgmt/Operational) Grade W22 (PTH)	1 Januari/January
Mohd Yatim Abd. Aziz	Pelukis Pelan Rendah Gred J14 (KUP) Grade J14 (PTH)	
Azman Shah Ramlee	Pemandu Kenderaan Gred R6 (KUP) Driver Grade R6 (PTH)	9 Mei/May
Rosmadi Salim	Pembantu Am Pejabat Gred N4 (KUP) Office General Assistant (PTH)	1 Januari/January
Mohd Ghaus Hussein		1 September
Zaidi Azis	Pekerja Awam Gred R4 (KUP) General Worker Grade R4 (PTH)	1 Januari/January
Saari Ibrahim		
Ayau Kanit		
Apuk Kasim		
Fan Yoke Kuan		
Jamal Abd Ghani		
Selva Kumar a/l Raman		
Razani Zakaria		
Zairulhisham Suid		2 Januari/January

Nota/Notes: KUP = Khas untuk Penyandang, PTH = Personal to Holder

PEMANGKUAN JAWATAN

ACTING APPOINTMENT

Nama Name	Jawatan Pemangkuan Acted Post	Tarikh Date
Wan Rahmah Wan A. Raof	Timbalan Ketua Pengarah (Operasi) Deputy Director General (Operational) Gred Utama 'B' VU6 Premier Grade 'B' VU6	1 Mei/May–30 April 2012
Dr Ismail Harun	Pegawai Penyelidik Gred Utama 'C' VU7 Research Officer Premier Grade	1 Ogos/August–31 Julai/July 2013
Dr Norwati Muhammad		
Dr Mohd Zaki Hj. Abdullah		9 Mei/May–8 Mei/May 2013
Dr Pin Kar Yong		1 Ogos/August 2011
Dr Nor Hasnida Hassan		
Dr Vimala Subramaniam		1 Januari/January– 31 Disember/December
Dr Norlia Basherudin		
Dr Norwati Adnan		1 Februari/February– 31 Februari/February
Dr Gary William Theisera		1 Januari/January–31 Disember/December
Dr Fadhillah Zainudin		17 Mac/March 2010 –16 Mac/March 2012
Dr Lee Chai Ting		3 Januari/January–2 Januari/January 2013
Dr Mohd Tamizi Mustafa		9 Mei/May–8 Mei/May 2013
Dr Sik Huei Shing	Pegawai Penyelidik Gred Q48 Research Officer Grade Q48	22 Jun/June 2010 – 21 Jun/June 2012
Dr Mohd Farid Ahmad		16 Disember/December 2010 – 15 Disember/December 2012
Wahayu Abdul Wahab	Pegawai Penerangan Gred S44 Information Officer Grade S44	1 Julai/July – 30 Jun/June 2013

PELANTIKAN SECARA PINJAMAN

APPOINTMENT BY SECONDMENT

Nama Name	Jawatan Dipinjamkan Seconded Post	Tarikh Date
Dr Che Abdul Rahim Hj Nik	KSU 2, NRE Gred Utama 'A' VU5 Secretary General 2, NRE Premier Grade 'A' VU5	15 April
Mohd Zamshari Abd Rahman	Pengarah Bahagian Komersialisasi dan Inovasi, Gred Utama 'C' VU7 Director Commercialization and Innovation Division, Premier Grade 'C' VU7	1 April 2011–31 Mac/March 2013
Nor Azman Hussein	Ketua Pusat Pempiawaan Herba, Syarikat BIOTROPICS Head of Herbal Standardisation Centre, Syarikat BIOTROPICS	1 Januari/January
Jumaaton Abu Bakar	Akauntan Gred/Accountant Grade W44	23 Ogos/August

ANUGERAH ANJAKAN GAJI

Seramai **tiga** orang Pegawai Penyelidik dan **24** orang kakitangan Kumpulan Sokongan telah menerima anjakan gaji pada tahun 2011.

THE SALARY INCREMENT AWARD

During the year three Research Officers and 24 staff members from the Support Group received the salary increment.

Kumpulan Pengurusan dan Profesional Management and Professional Group	Kumpulan Sokongan Support Group
Dr Ani Sulaiman Wan Mohd Shukri Wan Ahmad Zahari Othman	Saripah Barom Zuriati Ahmadi Nor Marzuina FK Nasyir Madzlan Zainuddin Zaitihaiza Khamaruddin Muzalina Muhamad Yahya Marhani Mohd Norin Nizan Mohd Janah Mahat Mohd Judin Mohamad Bohari Ehwani Amran Haron Mohd Hanafiah Ahmad Wan Adanan Wan Ishak Irwan Mohd Taib Zairul Hisham Suid Latifamir Ibrahim Mat Salan Mat Rosli Shukor Mohd Arif Khamis Mat Ain Vasuthevan a/l Narayana Mohd Amirul Ezzuan Mohd Yatim Samsudin Abdul Hamid Mohamad Adnan Mohd Idris Abdul Muhaimin Mohd Razali

PELETAKAN JAWATAN

Pada tahun 2011, seorang Penolong Pegawai Penyelidik telah diberi pelepasan dengan izin untuk berkhidmat di Jabatan Standard Malaysia dan dua orang telah meletak jawatan—seorang Pegawai Penyelidik, seorang lagi Pekerja Awam. Mereka terdiri daripada:

RESIGNATIONS

In 2011, one Research Officer and two staff members of the Supporting Group resigned from the Institute. The details are as follows:-

Peletakan jawatan Resignation	
Perkara Item	Tarikh Date
PELEPASAN JAWATAN DGN IZIN/RELEASED WITH PERMISSION Noraidah Subakin	15 Ogos/August
PELETAKAN JAWATAN/RESIGNATION Kueh Hock Leng Dr Kodi Isparan Kandasamy	26 April

PERSARAAN/MENINGGAL DUNIA

Seramai 12 orang kakitangan bersara dan seorang meninggal dunia pada tahun 2011 iaitu:

RETIREMENT/DECEASE

Twelve staff members retired and one deceased in the year 2011. The details are as follows:

Persaraan Retirement	Tarikh Date
Persaraan Wajib Mandatory Retirement Muhammad Deraman Abdul Molok Abd Ghani Arshad Omar Hamidon Ahmad Dato' Dr. Abdul Rasid Ab Malik Mohd Sahrie Mohd Som Ahmad Ismail Salehin Jantan Persaraan Pilihan Optional Retirement Mustapa Data Dr Mohd Dahlan Jantan Dr Ab Rasip Ab Ghani Ab Wahid Mohamad	23 April 28 April 21 Ogos/August 4 September 18 September 27 September 15 Oktober/October 27 November 1 Mei/May 1 Mei/May 1 Jun/June 1 Julai/July
Meninggal Dunia Deceased Ahmad Ebak	30 Januari/January

LATIHAN**Latihan Akademik**

Pada tahun ini, seramai 14 orang pegawai FRIM berjaya menamatkan pengajian dari universiti tempatan dan luar negara. Mereka termasuklah sembilan pegawai yang berjaya memperoleh ijazah Doktor Falsafah dan lima orang mendapat Ijazah Sarjana.

TRAINING**Academic Training**

During the year, 14 officers successfully completed their academic training from local and overseas universities. The degrees included nine PhD and five MSc holders.

Bil. No.	Nama Name	Ijazah Degree	Universiti University
1	Dr Mastura Mohtar	PhD	Universiti Kebangsaan Malaysia
2	Dr Mohd Tamizi Mustafa		Universiti Sains Malaysia
3	Dr Rafeadah Rusli		University of Manchester, UK
4	Dr Mohd Rosli Haron		Universiti Putra Malaysia
5	Dr Roszaini Kadir		University of Wales, Bangor, UK
6	Dr Samsudin Musa		Universiti Kebangsaan Malaysia
7	Dr Zaihan Jalaludin		University of Wales, Bangor, UK
8	Dr Suffian Misran		University of Wales, Bangor, UK
9	Dr Siti Aisah Shamsuddin		Universiti Teknologi Malaysia

Bil. No.	Nama Name	Ijazah Degree	Universiti University
10	Nor Haliyan Tan Syilan	MSc	Universiti Teknologi Mara
11	Suhana Rafidah Md Yusof		Universiti Kebangsaan Malaysia
12	Nada Badrudin		Universiti Malaya
13	Rafidah Abd Rahman		Universiti Malaya
14	Mohd Parid Mamat		Universiti Putra Malaysia

LATIHAN AWAM

Pada tahun 2011 sebanyak enam siri kursus teknikal telah diadakan. Satu kursus khas untuk PACOS Trust, iaitu sebuah badan NGO telah diadakan di Penampang, Kota Kinabalu, Sabah dan dihadiri oleh wakil-wakil komuniti di Sabah. Manakala lima siri lagi telah diadakan di Kuala Lumpur. Keseluruhannya seramai 128 orang telah menghadiri kursus teknikal dalam bidang-bidang tertentu iaitu tapak semaian, pengecaman spesies pokok hutan, landskap dan penyelenggaraan pokok serta teknik dan pengurusan herbarium. Jumlah penyertaan melebihi 25% daripada jumlah yang disasarkan untuk tahun ini.

Program bersepadu ini selain berjaya menjana pendapatan sampingan menerusi yuran perkhidmatan iaitu sebanyak RM147 852, perkhidmatan tadbir urus latihan FRIM juga secara tidak langsung mendapat keyakinan dan kepercayaan pihak-pihak yang berkepentingan.

Kursus Induksi Umum

Sebanyak 14 siri kursus telah dilaksanakan pada 2011 dengan jumlah peserta seramai 877 orang dari 33 agensi. Menerusi program ini FRIM berjaya menjana pendapatan sampingan menerusi yuran perkhidmatan. Pendapatan kasar keseluruhan program ini ialah sebanyak RM986 850. Secara tidak langsung FRIM dapat menjana pendapatan hasil daripada pendapatan kasar kedua-dua program iaitu sebanyak RM1 134 702.

PUBLIC TRAINING

Technical Training Programme

In 2011 six series of technical courses were held. A special course for PACOS Trust, an NGO, was held in Penampang, Kota Kinabalu, Sabah, and was attended by representatives from various communities in Sabah while five series were held in Kuala Lumpur. A total of 128 people attended the technical courses in nursery practice, identification of forest tree species, landscaping and tree maintenance, and herbarium techniques and management. The total participation had increased by 25% of the total target for this year.

This integrated programme had not only managed to generate additional income through the service fees of RM147 852, but also managed to gain the confidence and trust of our stakeholders.

General Induction Course

A total of 14 series of courses were held in 2011 drawing 877 participants from 33 agencies. FRIM managed to generate extra income through the service fees. The gross income of the entire programme is RM986 850. FRIM indirectly generated revenue from the gross incomes of both programmes amounting to RM1 134 702.

PENERBITAN

Pada tahun 2011, FRIM menerbitkan sejumlah 37 judul baharu bagi menyebarkan maklumat hasil penyelidikannya. Antaranya ialah empat keluaran *Journal of Tropical Forest Science*, empat keluaran *FRIM in Focus* dan dua keluaran *Conservation Malaysia*. *Journal of Tropical Forest Science* merupakan jurnal bertaraf antarabangsa dan satu-satunya jurnal di Malaysia yang mula-mula memperoleh faktor impak. Nilai faktor impak bagi *Journal of Tropical Forest Science* telah bertambah daripada 0.323 pada tahun 2010 kepada 0.519 pada tahun 2011. *FRIM in Focus* merupakan surat berita FRIM yang memperihalkan dalam bahasa mudah tentang penyelidikan utama yang dijalankan di FRIM. Kedua-dua *Journal of Tropical Forest Science* dan *FRIM in Focus* boleh dicapai secara dalam talian. *Conservation Malaysia* pula memperihalkan tentang isu pemuliharaan tumbuhan dan haiwan yang terkini di Malaysia. Dua buah buku mewah diterbitkan pada tahun 2011. Buku mewah yang berjudul *Wild Orchids of Peninsular Malaysia*, kaya dengan gambar yang mempamerkan lebih daripada 450 spesies orkid asli di Semenanjung Malaysia.

Pada bulan Ogos, Cawangan Penerbitan telah menganjurkan pertandingan silang kata sempena sambutan Ulang Tahun Kedai Buku FRIM yang ke-9. Sambutan yang diterima sangat memberangsangkan. Silang kata ini telah berjaya membantu peserta mempelajari sedikit sebanyak tentang judul-judul penerbitan FRIM.

Mulai 2 Januari, Kedai Buku FRIM tidak lagi membekalkan beg plastik kepada pelanggan sejajar dengan pengisytiharan kampus FRIM sebagai kawasan bebas polisterin dan plastik. Sebaliknya pelanggan diberikan beg jerami secara percuma bagi setiap pembelian RM100 dan ke atas. Berikutan kempen sifar plastik ini, Cawangan Penerbitan telah menggunakan sampul surat kertas dan kotak dalam kerja-kerja pengeposan.

Senarai mel bagi pemberian percuma *FRIM in Focus* dikembangkan untuk merangkumi menteri, timbalan menteri, ketua setiausaha kementerian, menteri besar, setiausaha kerajaan negeri, ketua jabatan kerajaan negeri, perpustakaan awam negeri, perpustakaan sekolah menengah di negeri Selangor, stesen radio dan televisyen dan ahli-ahli APAFRI. Susulan daripada perkembangan senarai mel *FRIM in Focus*, bilangan cetak *FRIM in Focus* telah bertambah dua kali ganda berbanding tahun 2010.

PUBLICATIONS

In 2011, FRIM published a total of 37 new titles to disseminate information on its research findings. Among them are four issues of the *Journal of Tropical Forest Science*, four issues of *FRIM in Focus* and two issues of *Conservation Malaysia*. *Journal of Tropical Forest Science* is an international refereed journal and one of the first journals in Malaysia which has an impact factor. The impact factor of the *Journal of Tropical Forest Science* increased from 0.323 in 2010 to 0.519 in 2011. *FRIM in Focus* is a newsletter detailing the research works at FRIM in simple language. Both the *Journal of Tropical Forest Science* and *FRIM in Focus* are available on-line. *Conservation Malaysia* focuses on current conservation issues of flora and fauna in Malaysia. Two coffee-table books were published in 2011. One of them entitled *Wild Orchids of Peninsular Malaysia* is a richly illustrated book showcasing more than 450 indigenous orchids in the country.

In the month of August, the Publications Branch organised crossword puzzle competition in conjunction with its 9th anniversary celebration. The response from customers was overwhelming. The crossword puzzle has attracted buyers to know more about the different titles of books at FRIM.

Effective 2 January, FRIM bookstore no longer provided plastic bags to customers. This is in line with the declaration at the beginning of the year of FRIM as a campus free from polystyrene and plastic. Instead customers were given free tote bag for purchases above RM100. The Publications Branch switched to using paper envelopes and boxes for postal services following the no plastic campaign.

The mailing list for *FRIM in Focus* has been expanded to cover ministers, their deputies, secretary generals, head of states, secretaries of state government, head of departments of state government, public libraries of states, libraries of all secondary schools in Selangor, radio and television stations and APAFRI members. As a result, the print run for *FRIM in Focus* has increased two-folds compared with 2010.



Jenis penerbitan Types of publications	Judul Title	Bil. No.
Journal of Tropical Forest Science	JTFS23(1-4)	4
Malayan Forest Records	Flora of Peninsular Malaysia Series II: Seed Plants, Volume 2 Tapping the Wealth From Karas (<i>Aquilaria malaccensis</i>) Tree Revision of Malaysian Species of Boletales s.l. (Basidiomycota) Described by E.J.H. Corner (1972, 1974)	3
FRIM in Focus	March, June, September, Disember	4
Research Pamphlet	FRIM: A Sanctuary for Threatened Trees Botanical Gazetteer for Peninsular Malaysia	2
FRIM Technical Information Handbook	Penggunaan Morfo Untuk Pengurusan Data Saintifik Penyakit, Perosak dan Gangguan Tanaman Tongkat Ali	2
Siri Alam dan Rimba	A Guidebook to the Macrofungi of Fraser's Hill	1
Tree Flora of Sabah and Sarawak	Tree Flora of Sabah and Sarawak Vol. 7	1
FRIM Reports	Masalah Sosio-Ekonomi Penanaman Bakau dan Ru di Semenanjung Malaysia Perubahan Hutan Paya Laut di Negeri Perak, Johor dan Pahang Shuttle Radar Topographic Mission Data as Alternative Height Information for Malaysia	3
Special Publications	Wild Orchids of Peninsular Malaysia FRIM in the Media: Celebrating 25 Years of Excellence FRIM Through the Lenses	3

Jenis penerbitan Types of publications	Judul Title	Bil. No.
Conservation Malaysia	Conservation Malaysia Issue No. 13, 14	2
Proceedings	Proceedings of the Pasoh International Symposium 2010: Celebrating 25 Years of Lowland Tropical Research, 10-11 November 2010 Proceedings of the Regional Workshop on the Sharing of Findings From the Activities Implemented in Indonesia and Malaysia Under the ITTO-CITES Project on Ensuring International Trade in CITES-Listed Timber Species is Consistent With Their Sustainable Management and Conservation Proceedings of the International Symposium on Forestry and Forest Products 2010: Addressing Global Concerns and Changing Societal Needs; 5-7 October 2010, Kuala Lumpur Harnessing the Tropical Herbal Heritage: Recent Advances in R&D and Commercialization. Proceedings of the Seminar on Medicinal and Aromatic Plants, 3-4 August 2010	4
Annual Report	Annual Report 2010	1
Other Publications	High Resolution Airborne Hyperspectral Data for Mapping of Ramin Distribution in Peat Swamp Forest Completion Report-Generation of Spatial Distribution Maps of Ramin (<i>Gonystylus bancanus</i>) Using Hyperspectral Technology and Determination of Sustainable Level of Ramin in Production Forests of Peninsular Malaysia Completion Report-Regional Workshop on Sharing of Findings From the Activities Implemented in Indonesia and Malaysia Under the ITTO-CITES Project on Ensuring International Trade in CITES-Listed Timber Species is Consistent With Their Sustainable Management and Conservation Technical Information on Optimum Harvesting Regimes of Peat Swamp Forest in Peninsular Malaysia Population Dynamics and Optimum Harvest of <i>Gonystylus bancanus</i> in Production Peat Swamp Forest of Peninsular Malaysia FRIM Strategic Plan 2011-2020 Sistem Arahan Pengurusan dan Pentadbiran FRIM	7
Total		37

Pelbagai penerbitan yang dihasilkan oleh penjawat awam FRIM pada 2011 ialah:

Various types of publications by FRIM's staff members during the year were:

BUKU/ BOOKS

- 1 ABDUL RASHID, A.M. & AHMAD ZUHAI, Y. Tapping the Wealth from Karas (*Aquilaria malaccensis*) Tree. Malayan Forest Records No. 50, Forest Research Institute Malaysia, Kepong. 89 pp.
- 2 AMINAH, H. & AZIAN, M. Laporan Jawatankuasa Teknikal mengenai Penyelidikan dan Pembangunan (R&D) – Program Penanaman Bakau dan Spesies-spesies yang Sesuai di Pesisiran Pantai Negara bagi Tahun 2009. Institut Penyelidikan Perhutanan Malaysia dan Kementerian Sumber Asli dan Alam Sekitar. 49 pp.

- 3 AMINAH, H., AHMAD FAUZI, M.S. & AB. RASIP, A.G. Standard Operating Procedure (SOP) on Nursery Technique for Forest Planting Stocks Production. Malaysian Timber Industry Board (MTIB). 60 pp.
- 4 GAN, K.S., MAHMUDIN, S. & MOHD NOR, M.Y. (Eds.) Proceedings of International Symposium on Forestry & Forest Products: Addressing Global Concerns and Changing Societal Needs. 5–7 October 2010, Kuala Lumpur. 345 pp.
- 5 GAN, K.S., TAN, Y.E. & LIM, S.C. (Eds.) Proceedings of the Seminar and Workshop on Improved Utilization of Tropical Plantation Timbers. 23–25 March 2011, Kuala Lumpur. 119 pp.
- 6 ISMAIL, P. & ISMAIL, H. (Eds.) Technical Information on Optimum Harvesting Regimes of Peat Swamp Forest in Peninsular Malaysia. ITTO-CITES Project. Forest Research Institute Malaysia, Kepong. 87 pp.
- 7 ISMAIL, P., ISMAIL, H. & ABD. RAHMAN, K. Population Dynamics and Optimum Harvest of *Gonystylus bancanus* in Production Peat Swamp Forest of Peninsular Malaysia. ITTO-CITES Project. Forest Research Institute Malaysia, Kepong. 42 pp.
- 8 KHAIRUL AZWAN, M., AUDI HANI, A., HAMDAN, O., MOHD AZAHARI, F., KHALI AZIZ, H. & SHAMSUDIN, I. Perubahan Hutan Paya Laut di Negeri Perak, Johor dan Pahang. FRIM Reports No. 95. Forest Research Institute Malaysia, Kepong. 21 pp.
- 9 KHALI AZIZ, H. ISMAIL, H. ISMAIL, P., MOHD AZAHARI, F. & ABD RAZAK, O. (Eds.) Proceedings of the regional workshop on the Sharing of Findings from the activities implemented in Indonesia and Malaysia under the ITTO-CITES project on ensuring international trade in CITES-listed timber species is consistent with their sustainable management & conservation, 1–4 December 2010, Kuantan. 112 pp.
- 10 KHALI AZIZ, H., SHAMSUDIN, I., ISMAIL, P. & MOHD AZAHARI, F. Generation of Spatial Distribution Maps of Ramin (*Gonystylus bancanus*) Using Hyperspectral Technology and Determination of Sustainable Level of Harvest of Ramin in Production Forests of Peninsular Malaysia. ITTO Project Completion Report. Forest Research Institute Malaysia, Kepong. 27 pp.
- 11 KHALI AZIZ, H., SHAMSUDIN, I., ISMAIL, P. & MOHD AZAHARI, F. Regional Workshop on the Sharing of Findings from the Activities Implemented in Indonesia and Malaysia Under the ITTO-CITES Project on Ensuring International Trade in CITES-Listed Timber Species is Consistent With Their Sustainable Management and Conservation. ITTO Completion Report. Forest Research Institute Malaysia, Kepong. 34 pp.
- 12 KIEW, R., CHUNG, R.C.K., SAW, L.G., SOEPADMO, E. & BOYCE, P.C. (Eds.) Flora of Peninsular Malaysia Series II: Seed Plants, Volume 2. Malayan Forest Records No. 49. Forest Research Institute Malaysia, Kepong. 235 pp.
- 13 KIEW, R., SHARP, I., CHUNG, R.C.K., & CHUA, L.S.L (Eds.). ONG, P.T. et al. Wild Orchids of Peninsular Malaysia. Forest Research Institute Malaysia, Kepong, Selangor, and Natural Resources & Environment. 196 pp.
- 14 LEE, S.S. (Ed.). Horak, E. Revision of Malaysian Species of Boletales s.l. (Basidiomycota) Described by E.J.H. Corner (1972, 1974). Malayan Forest Records No. 51. Forest Research Institute Malaysia, Kepong. 283 pp.
- 15 LEE, S.S. (Ed.). Kiew et al. (Eds.) Flora of Peninsular Malaysia. Series II: Seed Plants, Volume 2. Malayan Forest Records No. 49. Forest Research Institute Malaysia, Kepong. 235 pp.
- 16 LIM, N.P.T., TAN, Y.E., GAN, K.S. & LIM, S.C. (Eds.) Properties of *Shorea macrophylla* (Engkabang jantung) Planted in Sarawak. Forest Research Institute Malaysia. 90 pp.
- 17 LIM, S.C., GAN, K.S. & TAN, Y.E. (Eds.) Properties of *Acacia mangium* Planted in Peninsular Malaysia, Forest Research Institute Malaysia. 104 pp.
- 18 MASTURA, M., ADIANA, M.A., HADA MASAYU, I. & PIN, K.Y. (Eds.) Proceedings of the Seminar on Medicinal and Aromatic Plants 2010: Harnessing the Tropical Herbal Heritage: Recent Advances in R&D and Commercialisation. 3–4 August 2010, Forest Research Institute Malaysia, Kepong. 275 pp.
- 19 MOHD AZAHARI, F., KHALI AZIZ, H. & HAMDAN, O. High Resolution Airborne Hyperspectral Data for Mapping of Ramin Distribution in Peat Swamp Forest. FRIM-ITTO-CITES Publication. Forest Research Institute Malaysia, Kepong. 39 pp.
- 20 ONG, P.T., O'BYRNE, P., YONG, W.S.Y. & SAW, L.G. Wild Orchids of Peninsular Malaysia. Forest Research Institute Malaysia, Kepong, Selangor and Ministry of Natural Resources & Environment. 196 pp.
- 21 SOEPADMO, E., SAW, L.G. & CHUNG, R.C.K. (Eds.). Tree Flora of Sabah and Sarawak Volume 7. Forest Research Institute Malaysia, Kepong, Selangor, Sabah Forestry Department, Sandakan, and Sarawak Forestry Department, Kuching, Sarawak. 450 pp.
- 22 TAN, Y.E., GAN, K.S. & LIM, S.C. (Eds.) Anatomical Features, Quality and Mechanical Properties of 15-year-old *Tectona grandis* (teak) Planted in Sabah, Forest Research Institute Malaysia. 33 pp.

- 23 THI, B.K., LEE, S.S., ZAINUDDIN N. & CHAN, H.T. A Guidebook to the Macrofungi of Fraser's Hill. Siri Alam dan Rimba No. 14, Forest Research Institute Malaysia, Kepong. 93 pp.

BAB DI DALAM BUKU/CHAPTER(S) IN A BOOK

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- 126 SITI MUNIRAH, M.Y. Distribution of *Rafflesia* population in Upper Perak, Peninsular Malaysia. Paper presented at the Eleventh World Congress on Parasitic Plants, 6–12 June 2011, Bari.
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- 141 ZAMREE, M.S., PIN K.Y. & RASADAH M.A. Research and development of MAPs: FRIM's Experience. Paper presented at the 'Lawatan Sambil Belajar Degasi dari UNICEF Ethiopia ke NRE', 21 July 2011, Wisma Sumber Asli, Putrajaya.
- 142 ZARIDAH, M.Z., NOR AZAH, M.A., MAILINA, J., ABDUL MAJID, J., MOHD. FARIDZ, Z., NIK YASMIN, N.Y., MOHD. IRMANSHAH, M. & ROHANI, A. Biopesticidal study of plant's essential oils against *Aedes aegypti*. Paper presented at the International Symposium of Women in Science and Engineering (WISE2011), 29–30 September 2011, Kuala Lumpur.
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POSTER/POSTERS

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- 2 AHMAD NAZARUDIN, M.R., TSAN, F.Y., NORMANIZA, O. & ADZMI, Y. Phenological growth stages of a landscape tree, *Xanthostemon chrysanthus*. Poster presented at the MSPPC 2011, 21–23 November 2011, Johor Bahru.
- 3 AINUN, Z.M.A., RAFIDAH, D., RUSHDAN, I., JALALUDDIN, H., LUQMAN, C.A., NURUL IZZATI, M.Z. & HAZWANI HUSNA, A., Writing and printing grade paper from kenaf-EFB mixed fibres. Poster presented at the 'Pameran Reka Cipta, Penyelidikan dan Inovasi', 19–21 July 2011, Universiti Putra Malaysia, Serdang.
- 4 AMINAH, H., ABDUL RAZAK, M.Y., AHMAD FAUZI, M.S., HAMZAH, M., ABDUL RAHIM, O. & MOHAMAD ADI FAIZ, A.F. Environmental friendly green herbal door gift. Poster presented at the 'Hari Rekapipta FRIM, 7 December 2011', Forest Research Institute Malaysia, Kepong.

- 5 ANI, S., HAMDAN, H., MOHD NASIR, H. & NIK ADLIN, N.M.S. Struktur anatomi spesies hutan paya laut terpilih. Poster presented at the 'Seminar Kebangsaan Projek-projek Penyelidikan dan Pembangunan (R&D) Bagi Hutan Pesisiran Pantai di Malaysia 2011', 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
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- 10 AZHARIZAN, M.N. Pontoon: Produk berpotensi dari bakau (*Rhizophora* Sp). Poster presented at the 'Seminar Kebangsaan Projek-Projek R&D bagi Hutan Pesisiran Pantai di Malaysia', 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
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- 14 AZYYATI, A.K. & NAIMAH, C.L. Interpretasi persekitaran: mengubah perilaku manusia terhadap alam sekitar. Poster presented at the 'Pameran Sempena Minggu Kesedaran Alam Sekitar UiTM', Fakulti Undang-undang, 16–18 November 2011, Shah Alam.
- 15 AZYYATI, A.K., NAIMAH, C.L. & NOOR AZLIN, Y. Activities at FRIM. Poster presented at the Malaysia Tourism Fair 2011, 20–22 May 2011, Kuala Lumpur.
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- 19 CHONG, Y.M., PHILIP, E. & ABDUL RAHIM, N. Greenhouse gas emissions from land use change in Malaysia. Poster presented at the 22nd Malaysian Society of Plant Physiology Conference, 21–23 November 2011, Johor Bahru.
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- 21 FARAH SHAHANIM, M.M., RAJA BARIZAN, R.S., NASRULHAQ BOYCE, A. & BARAKBAH, S.S. A case study on chengal growth performance related to the eco-physiological aspects in Tekai Forest Reserve. Poster presented at the International Symposium on Rehabilitation of Tropical Rainforest Ecosystems 2011, 24–25 October 2011, Kuala Lumpur.
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- 25 HAMDAN, H., NIK ADLIN, N.M.S., ANWAR U.M.K. & GAN, K.S. Potensi bakau kurap sebagai pergola. Poster presented at the 'Seminar Kebangsaan Projek-Projek Penyelidikan & Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia', 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
- 26 HEMA THOPLA, G., GETHA, K., ANNIE TAN, G.Y., LILI SAHIRA, H., MUHD SYAMIL, A. & NUR FAIRUZ, M.Y. Quantitative determination of heavy metal tolerance in actinobacteria using metal toxicity assay. Poster presented at the International Postgraduate Conference on Biotechnology 2011(IPCB 2011), 15–18 December, Universiti Malaysia Terengganu, Terengganu.
- 27 HO, W.M. & ANG, L.H. Rehabilitation of ex-tin mine and carbon sequestration potential in Malaysia. Poster presented at the Australia New Zealand Institute of Forestry (ANZIF) Conference, 2–5 May 2011, Auckland.
- 28 ISMAIL, P., TARIQ MUBARAK, H. & AZIAN, M. Isi kandungan dan struktur dirian hutan paya laut di Renj Sungai Kerang, Matang. Perak. Poster presented at the 'Seminar Kebangsaan Projek-Projek Penyelidikan & Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia', 7–8 June 2011, Forest Research Institute Malaysia, Kepong
- 29 JALALUDDIN, H., AHMAD AZIZI, M., RUSHDAN, I., PARIDAH, M.T., SEYED RASHID, F.S., HOSSEIN, R., AINUN, Z.M.A. & NAZLIA, G., Improvement of old corrugated carton via mechanical treatment. Poster presented at the Malaysia Technology Expo (MTE) 2011, 17–19 February 2011, Kuala Lumpur.
- 30 JEYANNY, V., FAKHRI, M.I., WAN RASIDAH, K., ADI FADZLY, A.K., SUHAIMI, W.C., AZIAN, M. & ROZITA, A. Periodic changes in a deteriorating mangrove belt in Sg. Besar, West Malaysia. Poster presented at the 22nd Pacific Science Congress, 14–17 June 2011, Kuala Lumpur.
- 31 KHAIRUL AZWAN, M., HAMDAN, O., AUDI HANI, A. & KHALI AZIZ, H. Faktor dan kesan perubahan hutan paya laut di Semenanjung Malaysia. Poster presented at the 'Seminar Kebangsaan Projek-Projek Penyelidikan & Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia', 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
- 32 KHAIRUL KAMILAH, A.K., ZULKHAIRI, A., AZRINA, A., NORHAIZAN, M.E., MOHD SHAHIDAN, M.A., ZAMREE, M.S., HADA MASAYU, I., NOOR RASYILA, M.N., RASADAH, M.A., MOHD KAMAL, N.H., NOR AMALINA & NUR SAKINAH, I. Nutritional composition and antioxidants activity of Malaysian rice grains. Poster presented at the Malaysian Dietician Association Scientific Conference, 20–22 July 2011, Kuching.
- 33 KHALI AZIZ, H., MOHD AZAHARI, F. & HAMDAN, O. Hyperspectral imaging for mapping of endangered peat swamp forest species in Malaysia: a case study of *Gonystylus Bancanus*. Poster presented at the Training Workshop on Forest Mapping Using Geospatial Technology in The Asia-Pacific Region, 3–12 January 2011, Nanning, China.
- 34 MAHANIM, S.M.A., PUAD, E., WAN ASMA, I., RAFIDAH, J., SHAHARUDDIN, H., SHAMSURI, M.S. & AHMAD SHARAFI, O. High surface area of bamboo activated carbon. Poster presented at the CHEMRAWN XIX: Nineteenth IUPAC International Conference on Chemical Research Applied to World Needs, 27–29 September 2011, Kuala Lumpur.
- 35 MAHMUDIN, S., Green pulp and paper products. Poster presented at the 2nd International Greentech & Eco Products Exhibition and Conference Malaysia (IGEM 2011), 7–10 September 2011, Kuala Lumpur Convention Centre, Kuala Lumpur.
- 36 MAHMUDIN, S., Green pulp and paper products. Poster presented at the Malaysia International Commodity Conference & Showcase 2011 (MICCOS 2011), 28–30 October 2011, Serdang, Selangor.
- 37 MAILINA, J., NOR AZAH, M.A., SITI HUMEIRAH, A.G., SAIDATUL HUSNI, S., ABD. MAJID, J., NIK YASMIN, N.Y., MOHAMAD FARIDZ, Z.P. & MOHD. IRMAN SHAH, M. SPME technique for detection of volatile compounds from fresh samples of *Alpinia galangal*. Poster presented at the 13th International Symposium on Advances in Extraction Technologies (ExTech), 27–29 September 2011, Kuala Lumpur.

- 38 MOHAMAD FAKHRI, I., WAN RASIDAH, K., SUHAIMI, W.C., JEYANNY, V. & ROZITA, A. Kadar pergerakan lumpur kesan daripada penempatan struktur pemecah ombak (Geotiub) di Sg. Hj. Dorani. Poster presented at the 'Seminar Kebangsaan Projek-projek Penyelidikan & Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia', 7–8 Jun 2011, Forest Research Institute Malaysia, Kepong.
- 39 MOHD ARRABE', A.B., NORAINI, T., NURNIDA, M.K. & RUZI, A.R. The cork warts anatomical characteristics in *Rhizophora* species. Poster presented at the Simposium Ekspedisi Saintifik PPL 2011: Bukit Sawak dan Pesisir Utara Pulau Langkawi. 29–30 November 2011. Kelab Golf Danau, Universiti Kebangsaan Malaysia, Bangi.
- 40 MUHAMMAD HAFFIZ, J., NORHAYATI, I., LILI SAHIRA, H., MUHD SYAMIL, A., GETHA, K. & MOHD ILHAM, A. Chemical profiling and antitrypanosomal activity of total alkaloid from *Dyera costulata*. Poster presented at International Postgraduate Conference on Biotechnology 2011(IPCB 2011), 15–18 December 2011, Universiti Malaysia Terengganu, Terengganu.
- 41 MUHAMMAD SYAMIL, A., GETHA, K., LILI SAHIRA H. & HEMA THOPLA, G. Isolation of antitrypanosomal active compound from actinobacteria strain FACC-A032. Poster presented at International Postgraduate Conference on Biotechnology (IPCB) 2011, 15–18 December, Universiti Malaysia Terengganu, Terengganu.
- 42 NAIMAH, C.L. & AZYYATI, A.K. Kesedaran alam sekitar: ke arah kelestarian alam. Poster presented at the Pameran Sempena Minggu Kesedaran Alam Sekitar UiTM, Fakulti Undang-undang, 16–18 November 2011, Shah Alam.
- 43 NAIMAH, C.L., NURFAZLIZA, K., NIK AZYYATI, A.K. & AZAHARI, M.Y. Pengenalan projek penanaman pokok hutan. Poster presented at the 'Bengkel kesedaran projek penanaman pokok hutan di sekolah seluruh Malaysia', 13–14 April 2011, Johor Bharu.
- 44 NG, K.K.S., LEE, S.L. & SHIMIZU, K. High-throughput SNP identification, verification, and utility for population genetics in a non-model species *Shorea leprosula* (Dipterocarpaceae). Poster presented at The University Research Priority Program System Biology/Functional Genomics Meeting, 2–4 October 2011, Grindelwald, Switzerland.
- 45 NIK ADLIN, N.M.S., WAN TARMEZE, W.A. & KHAIRUL, A. Entertainment-ready arbor seat. Poster presented at the 22nd International Invention, Innovation & Technology Exhibition, ITEX 2011, 20–22 May 2011, Kuala Lumpur.
- 46 NIK ADLIN, N.M.S., WAN TARMEZE, W.A. & KHAIRUL, A. Modular outdoor furniture. Poster presented at the 22nd International Invention, Innovation & Technology Exhibition, ITEX 2011, 20–22 May 2011, Kuala Lumpur.
- 47 NIK ADLIN, N.M.S., WAN TARMEZE, W.A., KHAIRUL, M. & SHAMSUDDIN, I. Produk-produk dari kayu bakau (*Rhizophora* spp). Poster presented at the Seminar Kebangsaan Projek-Projek Penyelidikan & Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia, 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
- 48 NIK ADLIN, N.M.S., WAN TARMEZE, W.A., KHAIRUL, M. & TENGKU AHMAD, T.A.J. Modular furniture from bakau and other high density timbers. Poster presented at the Malaysian Technology Expo, MTE 2011, 17–19 February 2011, Kuala Lumpur.
- 49 NIK ADLIN, N.M.S., WAN TARMEZE, W.A., KHAIRUL, M. & TENGKU AHMAD, T.A.J. Modular outdoor furniture from bakau wood. Poster presented at the Malaysia International Commodity Conference & Showcase (MICCOS), 28–30 October 2011, Serdang.
- 50 NIK AZYYATI, A.K., NAIMAH C.L., SHAWN, C., AZAHARI, M.Y., FAKHRUL AFFENDI, O. & MOHD. SEIFUL, S. Nature craft for environmental learning. Poster presented at early childhood education conference and workshop: creative teaching and learning of young children, 7–8 October 2011, Kuala Lumpur.
- 51 NIK AZYYATI, A.K., NURFAZLIZA, K., NAIMAH, C.L. & AZAHARI, M.Y. Pemantauan dan penilaian projek penanaman pokok hutan. Bengkel Kesedaran Projek Penanaman Pokok Hutan di Sekolah Seluruh Malaysia. 13–14 April 2011, Johor Bharu.
- 52 NOOR RASYILA, M.N., ZAMREE, M.S., KHAIRUL KAMILAH, K.A., HADA MASAYU, D. I., PIN, K.Y., MOHD. SHAHIDAN, M.A., MOHD. HAPIZUL, U.L. & MASITAH, M.T. Herbs as part of your diet: potential *Garcinia atroviridis* products for body weight maintenance. Poster presented at Malaysian Dietitians' Association Conference and 17th AGM. 20–22 July 2011, Sarawak.
- 53 NOR AZAH, M.A., MAILINA, J., SITI HUMEIRAH, A.G., ABD. MAJID, J., MOHD. FARIDZ, Z.P. & MOHAMAD NASIR, M.A. Chemical constituents of essential oils from the genus *Aquilaria* (Thymelaceae). Poster presented at the Regional Symposium of Malaysia Analytical Sciences (SKAM 24), 21–23 November 2011, Langkawi, Kedah.

- 54 NOR AZAH, M.A., SAIDATUL HUSNI, S., MAILINA, J., ABD. MAJID, J., MOHAMMAD FARIDZ, Z.P., NIK YASMIN, N.Y., NOOR ROSLIZA, R., ZUHAIRA, S. & KIKIC, I. Comparison of essential oils and extracts of *Alpinia galangal* extracted with distillation and supercritical fluid carbon dioxide techniques. Poster presented at the 13th International Symposium on Advances in Extraction Technologies (Ex Tech), 27–29 September 2011, Kuala Lumpur.
- 55 NOR DATIAKMA, M. A., MARZALINA, M., NORALIZA, A., HAMZAH, M.S., SYED ZAHIR IDID, S.O.I., DOUSTJALALI, S.R. & MASTURA, M. 2-Dimensional Gel Electrophoresis (2-DE) profile of methicilin resistance *Staphylococcus aureus* (MRSA). Poster presented at International Postgraduate Conference on Biotechnology 2011 (IPCB2011). 15–18 Dec 2011, Universiti Malaysia Terengganu, Terengganu.
- 56 NORAISHAH, S., SAMSUDIN, M. & PHILIP, E. Importance of mangrove forest in climate change. Poster presented at the International Conference on Tropical Forest amidst Globalisation and Climate Change, 29–30 November 2011, Serdang.
- 57 NORALIZA, A., MARZALINA, M., MOHD AFENDI, H. & TARIQ MUBARAK, H. Teknik pengendalian dan penyimpanan biji benih spesies terpilih persisiran pantai. Poster presented at the Seminar Kebangsaan Projek-Projek Penyelidikan & Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia, 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
- 58 NORHAYATI, I., GETHA, K., LILI SAHIRA, H., MUHD HAFIZ, J., MOHD ILHAM, A., SITI SYARIFAH, M.M. & MOHD HAFIDZ HADI, A. Evaluation of antitrypanosomal activity of Malaysian plant extracts. Poster presented at the International Conference on Natural Products (ICNP 2011), 13–16 November 2011, Putrajaya.
- 59 NORSUHAINA, Z., ABD RASHID, L., ZUNOLIZA, A., MOHD RADZI, A., AHMAD SHUKRI, A., MOHAMAD KHAIR, M.A., JULIZA, M. & NURAINI, A.M. Antioxidant activity of the extracts of *Averrhoa carambola* fruits. Poster presented at the International Conference on Natural Products (ICNP 2011), 13–16 November 2011, Putrajaya.
- 60 NURFAZLIZA, K., AZAHARI, M.Y., NIK AZYYATI, A.K. & NAIMAH, C.L. Prosedur penanaman pokok hutan. Paper presented at the 'Bengkel Kesedaran Projek Penanaman Pokok Hutan di Sekolah Seluruh Malaysia', 13–14 April 2011, Johor Bharu.
- 61 NURHANAN, M.Y., HUQ, F., BEALE, P. & YU, J.Q. Selected platinum and phytochemicals combination causing synergistic inhibitory effects in ovarian cancer cells. Poster presented at the MOSTI/IKM International Symposium on Women in Science and Engineering (WISE 2011), 29–30 September 2011, Putra World Trade Centre, Kuala Lumpur.
- 62 NURHANAN, M.Y., NOR HAYATI, A. & SITI SYARIFAH, M.M. The anti-cancer activities of *Prismatomeris malayana* Ridley against selected cancer cell lines. Poster presented at the International Conference on Natural Products (ICNP 2011), 13–16 November 2011, Putrajaya.
- 63 NURNIDA, M.K. & NORAINI, T. Kajian struktur anatomi hipodermis daun famili Rhizophoraceae di kawasan paya bakau. Poster presented at the Seminar Kebangsaan Projek-projek Penyelidikan & Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia, 7–8 June 2011, Kepong.
- 64 NURSHAHIDAH, M.R., NORAINI, T., NURNIDA, M.K., RUZI, A.R., AMALIA, NABILAH, M. & MOHD ARRABE', A.B. Systematic significance of leaf venation in genus *Carallia*. Poster presented at University Malaysia Terengganu Annual Seminar (Umtas 2011), 11–13 July 2011, Kuala Terengganu.
- 65 NUZIAH, H., FAUZIAH, A. & LEE, C.Y. Identification of three different varieties of *Labisia pumila* by HPTLC densitometer. Poster presented at the International Conference on Natural Products (ICNP 2011), 13–16 November 2011, Putrajaya.
- 66 ONG, B.K., NORULAIMAN, Y., NOR AZAH, M.A., SAIFUL AZMI, J., VIMALA, S., ROHANA, S., SAIDATUL HUSNI, S., MAILINA, J. & NORHAYATI, A. Natural preservative developed from *Syzygium* species. Poster presented at the BioMalaysia Conference and Exhibition, 21–23 November 2011, Kuala Lumpur.
- 67 ONG, C.B. & TAN, Y.E. Adhesive bonding. Poster presented at the International Furniture Market (IFM), 6–10 September 2011, Serdang.
- 68 OSMAN, A., WINTER, A. & ANDREAS, H. Biochemical characterization of parasite annexins. Poster presented at the MOSTI/IKM International Symposium on Women in Science and Engineering (WISE 2011), 29–30 September 2011, Putra World Trade Centre, Kuala Lumpur.
- 69 PATAHAYAH, M., MOHAMAD AZANI, A., LEE, S.S. & MOHD. ZAKI, H. Biomass accumulation of mycorrhizal-inoculated *Acacia* spp. grown on Sandy Beach (BRIS) soils. Poster presented at International Conference New Perspective of Tropical Forest Rehabilitation. 17–20 September, Universitas Gadjah Mada, Yogyakarta, Indonesia.

- 70 PUAD, E., AHMAD SHARAFI, O., SHAMSURI, M.S. & NORDIN, P. High combustion fuel from rice straw. Poster presented at the International Invention, Innovation & Technology Exhibition (ITEX), 20–22 May 2011, Kuala Lumpur.
- 71 PUAD, E., WAN ASMA, I., SHAHARUDDIN, H., MAHANIM, S. & RAFIDAH, J. Biodiesel dari sumber hutan. Poster paper presented at the 'Hari Inovasi NRE', 14 November 2011, Putrajaya.
- 72 PUAD, E., WAN ASMA, I., SHAHARUDDIN, H., MAHANIM, S. & RAFIDAH, J. Biodiesel from bintangor laut (*Calophyllum Inophyllum* L.) Potential liquid fuel from the forest. Poster paper presented at the Hari Inovasi NRE, 14 November 2011, Putrajaya.
- 73 PUAD, E., WAN ASMA, I., SHAHARUDDIN, H., MAHANIM, S. & RAFIDAH, J. Pellet jerami padi – produk biotena dari sisa pertanian. Poster presented at the Malaysia Technology Expo, 14–16 February 2011, Kuala Lumpur.
- 74 PUAD, E., WAN ASMA, I., SHAHARUDDIN, H., MAHANIM, S., RAFIDAH, J., AHMAD SHARAFI, O. & SHAMSURI, M.S. Mesin serba boleh briket arang. Poster presented at the Malaysia Technology Expo, 14–16 February 2011, Kuala Lumpur.
- 75 RAFIDAH, J., SAKANISHI, K., MIYAZAWA, T., MOHD NOR, M.Y., WAN ASMA, I., PUAD, E., SHAHARUDDIN, H. & MAHANIM, S.M.A. A potential of oil palm trunk fiber as a gasification feedstock for syngas production. Poster presented at the Nineteenth European Biomass Conference and Exhibition, 6–10 June 2011, Berlin.
- 76 RAFIDAH, J., WAN ASMA, I., PUAD, E., MAHANIM, S.M.A., SHAHARUDDIN, H., AZMALISA, T., NURUL FAHIZA, A.Z., AHMAD SHARAFI, O. & SHAMSURI, M.S. Optimization of sugar production from Malaysian rice straw using response surface methodology (RSM). Poster presented at the CHEMRAWN XIX: Nineteenth IUPAC International Conference on Chemical Research Applied to World Needs, 27–29 September 2011, Kuala Lumpur.
- 77 ROSHAN JAHN, M.S., AZURA, A., ILHAM A., MUHAMMAD HAFFIZ, J. & ANEE SURYANI, S. Optimizing metal chelating activity of *Erythroxylum cuneatum* using response surface methodology. Poster presented at the International Post Graduate on Biotechnology (IPCB) 2011, 15–18 December 2011, Universiti Malaysia Terengganu, Terengganu.
- 78 ROZITA, A., WAN RASIDAH, K., MOHAMMAD FAKHRI, I., JEYANNY, V. & SUHAIMI, W.C. Ciri-ciri tanah sesuai di hutan paya laut Tanjung Piai, Johor. Poster presented at the Seminar Kebangsaan Projek-Projek Penyelidikan (R&D) bagi Hutan Persisiran Pantai di Malaysia. 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
- 79 RUSHDAN, I., Malaysian Experience in research, development and commercialization of pulp and paper from oil palm empty fruit bunches. Poster presented at the Nineteenth European Biomass Conference and Exhibition 2001: From Research to Industry and Markets, 6–10 June 2011, Berlin, Germany.
- 80 SALBIAH, M., LING, S.K., TAN, H.P. & TAN, A.L. Differentiation of three *Melastoma* species in Peninsular Malaysia using 1D- and 2D-IR correlation spectroscopy. Poster presented at the International Conference on Natural Products (ICNP 2011), 13–16 November 2011, Putrajaya.
- 81 SITI HUMEIRAH, A.G., NOR AZAH, M.A., MAILINA, J., SAIDATUL HUSNI, S., ABDUL MAJID, J., NIK YASMIN, N.Y., MOHD. FARIDZ, Z.P. & MOHD. IRMAN SHAH, M. Aromatic oils-their potential constituents as safer personal care products ingredients. Poster presented at the International Symposium on Women in Science and Engineering (WISE), 29–30 September 2011, Kuala Lumpur.
- 82 SITI SYARIFAH, M.M., NURHANAN MURNI, Y., ABDUL RAHMAN, P.S., NORHAYATI, I. & LILI SAHIRA, H. Cardiac glycoside from the leaves of *Rauvolfia* family as a potential anticancer agent. Poster presented at the International Conference on Natural Products (ICNP 2011), 13–16 November 2011, Putrajaya.
- 83 WAN TARMEZE, W.A., NIK ADLIN, N.M.S. & KHAIRUL, A. Acoustical arbor seat. Poster presented at the Malaysian Technology Expo, MTE 2011, 17–19 February 2011, Kuala Lumpur.
- 84 ZAIRUL AMIN, R., KHAIRUL, M. & GAN, K.S. Kadar perolehan penggergajian kayu bakau. Poster presented at the Seminar kebangsaan projek-projek Penyelidikan & Pembangunan bagi Hutan di persisiran pantai di Malaysia, 7–8 June 2011, Forest Research Institute Malaysia, Kepong.
- 85 ZAKI INSAN, B., IBRAHIM, H., RIZMAN IDID, M. & SAM, Y.Y. Distribution and morphological description of selected species among three closely related genera. A poster presented at the 16th Biological Sciences Graduate Congress. 11–13 December 2011, National University of Singapore, Singapore.
- 86 ZAMREE, M.S., MOHD FARHAN, A.R., SOH, S.Y., LUQMAN, A., CHUAH, PIN, K.Y., RASADAH, M.A. & ZULKHAIRI, A. The effects of different extraction solvents on extraction yield, Rosmarinic acid and Sinensetin concentration and anti-inflammatory activity of *Orthosiphon stamineus* leaves. Poster presented at National Conference on Biopharmaceuticals and Healthcare, 4–5 November, 2011, Bangalore, India.

- 87 ZARIDAH, M.Z., NOR AZAH, M.A., MAILINA, J., NOR ZAHIRA, Z.B., MOHD IRMAN SHAH, M., MOHD FARIDZ, Z. & IBRAHIM, J. Comparative studies on the chemical composition of the essential oils of *Clausena excavata* from Perlis. A poster presented at the International Conference on Natural Products, 14–16 November 2011, Putrajaya.
- 88 ZARIDAH, M.Z., NOR AZAH, M.A., ABD. MAJID, J., MOHD. FARIDZ, Z., NIK YASMIN, N.Y. & ROHANI, A. Larvicidal effect of essential oils of *Citrus hystrix* and *Citrus aurantifolia* against *Aedes aegypti* and *Culex quenequefasciatus*. Poster presented at the 47th Annual Conference of Malaysia Society of Parasitology and Tropical Medicine, 3–4 March 2011, Kuala Lumpur.
- 89 ZARIDAH, M.Z., NOR AZAH, M.A., ABDUL MAJID, J., MOHD. FARIDZ, Z., NIK YASMIN, N.Y., MOHD. IRMANSHAH, M. & ROHANI, A. Larvicidal activity of *Ocimum tenuiflorum* and its major chemical constituents. Poster presented at the 47th Malaysian Society of Parasitology and Tropical Medicine (MSPTM) Annual Scientific Conference, 3–4 March 2011, Bukit Jalil, Kuala Lumpur.
- 90 ZARIDAH, M.Z., NOR AZAH, M.A., MAILINA, J., NOR ZAHIRA, Z.B., MOHD IRMAN SHAH, M., MOHD FARIDZ, Z.P. & IBRAHIM, J. Comparative studies on the chemical composition of the essential oils of *Clausena excavata* from Perlis. Poster presented at the International Conference on Natural Products (ICNP), 13–16 November 2011, Putrajaya.

TESIS/THESES

- 1 LOK, E.H. Nutrition and nitrogen-fixation in Malaysian *Pterocarpus indicus* Willd. PhD thesis, Murdoch University, Perth, Western Australia.
- 2 LOKMAL, N. Genotype by environment interaction and genotypic stability in growth and wood properties of *Acacia mangium*. PhD thesis, Universiti Sultan Zainal Abidin, Terengganu, Malaysia.
- 3 MASTURA, M. Penilaian potensi sebatian kimia dan gabungan terpilih sebagai agen anti-*Staphylococcus aureus* rintang methicillin (MRSA). PhD thesis, Universiti Kebangsaan Malaysia, Bangi, Malaysia.
- 4 MOHAMAD JEMAIN, M.R. *In vitro* α-amylase and α-glucosidase inhibitory activities of selected Malaysian plants and *in vivo* antidiabetic properties of *Knema glauca*. MSc thesis, Universiti Teknologi MARA, Shah Alam, Malaysia.
- 5 MOHD. ROSLI, H. Histological and molecular investigations of the shoot apical meristem of teak (*Tectona grandis* Linn. F.). PhD thesis, Universiti Putra Malaysia, Selangor, Malaysia.
- 6 MOHD. ZAKI, A. Penilaian fenotip dan pemilihan famili sib separa pada meranti tembaga (*Shorea leprosula* (miq.)). PhD thesis, Universiti Kebangsaan Malaysia, Bangi, Malaysia.
- 7 NADA, B. Ecology and behaviour of fireflies (Coleoptera: Lampyridae) along the Selangor River, Kuala Selangor, Peninsular Malaysia. MSc thesis, Universiti Malaya, Kuala Lumpur, Malaysia.
- 8 NOOR AINI, Z. Trade barriers in forest industry between Malaysia and Europe. PhD thesis, Paris Institute of Technology for Food, Life and Environmental Sciences, Paris, France.
- 9 RAFEADAH, R. Interfacial micromechanics of natural cellulose whisker polymer nanocomposites using Raman spectroscopy. PhD thesis, University of Manchester, Manchester, United Kingdom.
- 10 RAFIDAH, A.R. Revision of *Chirita* (Genseriaceae) for Peninsular Malaysia. MSc thesis, Universiti Malaya, Kuala Lumpur, Malaysia.
- 11 ROSZAINI, K. Wood extractives as natural preservatives against termites and fungi. PhD thesis, Bangor University, United Kingdom.
- 12 SUFFIAN, M. Factors affecting the enhancement of Acacia hybrid particleboard. PhD Thesis, Bangor University, United Kingdom.

E-PENERBITAN/E-PUBLICATIONS

- 1 BEAUDROT, L., DU, Y., RAHMAN KASSIM, A., REJMÁNEK, M., HARRISON, R.D. Do epigeal termite mounds increase the diversity of plant habitats in a tropical rain forest in Peninsular Malaysia? *PLoS ONE* 6(5): e19777. doi:10.1371/journal.pone.0019777
- 2 FAREDAH, A., EMRIZAL, HASNAH, M.S., FADZUREENA, J., NIK MUSAADAH, M., RASADAH, M.A., DAYAR & HASSAN, Y.A. Antimicrobial and anti-inflammatory activities of *Piper porphyrophyllum* (Fam. Piperaceae). *Arabian Journal of Chemistry* doi: 10.1016/j.arabjc.2010.12.032.
- 3 Guidelines for *in situ* conservation of tree genetic resources (Feature). *Bioversity International APO Newsletter* No. 56 (<http://aponewsletter.bioversityinternational.org/>)
- 4 HILL, C.A.S., KEATING, B., JALALUDIN, Z. & MAHRDT, E. A rheological description of the water vapour sorption kinetics behaviour of wood invoking a model using a canonical assembly of Kelvin-Voigt elements and a possible link with sorption hysteresis. *Holzforchung* doi: 10.1515/HF.2011.115.
- 5 ISHAK, M.R., LEMAN, Z., SAPUAN, S.M., RAHMAN, M.Z.A & ANWAR, U.M.K. Characterization of sugar palm (*Arengapinnata*) fibres tensile and thermal properties. *Journal of thermal Analysis and Calorimetry* doi: 10.1007/s10973-011-1785-1
- 6 NAJIB, M.S., TAIB, M.N., ALI, N.A.M., ARIP, M.N.M. & JALIL, A.M. Classification of agarwood grades using ANN. International Conference on Electrical Control and Computer Engineering 2011, 21–22 June 2011, Pahang. IEE Xplore Digital library ISBN: 978-1-61284-229-5.
- 7 ROSZAINI, K. & MIKE, D.H. Comparative termite resistance of 12 Malaysian timber species in laboratory tests. *Holzforchung* doi: 10.1515/HF.2011.116.
- 8 WILLIS, C., WANG, C.K., OSMAN, A., SIMON, A., PICKERING, D., MULVENNA, J., RIBOLDI-TUNICLIFFE, A., JONES, M.K., LOUKAS, A. & HOFMANN, A. Insights into the membrane interactions of the saposin-like proteins Na-SLP-1 and Ac-SLP-1 from human and dog hookworm. *PLoS ONE* doi: 10.1371/journal.pone.0025369.

Berikut ialah senarai pegawai FRIM Gred 27 dan ke atas (Hanya kelulusan tertinggi sahaja dimasukkan):

The followings are the list of FRIM officers Grade 27 and above (Only the highest education background are listed):

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PhD (UPM)

Setiausaha Pejabat Office Secretary

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Wan Rahmah Wan A. Raof (KMN) (Dari Mei/From May),
Memangku jawatan VU6, Gred Utama 'B', M.HRD (UPM)

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Audit Dalam/Internal Audit

Juruaudit/Auditor

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Mohd. Rozmi Mohamed Arif, Dip. Acc. (UiTM)

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Pegawai Penyelidik/Research Officers

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Management (UKM)

Suharti Samod, BSc (UPM)

Pegawai Teknologi Maklumat Kontrak Contract Information Technology Officer

Nor Haliyan Tan Shilan, MSc IT (UiTM)

Unit Pengurusan Korporat Corporate Communication Unit

Ketua/Head

Norhayati Nordin, MSc (Sussex)

Pegawai Penerangan Information Officer

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

Pegawai Media/Media Officer

Toh An Nee, B. Mass Comm. (USM)

APAFRI

Setiausaha Eksekutif Executive Secretary

Dr Sim Heok Choh, PhD (Idaho)

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Akauntan/Accountant

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Pegawai Tadbir/Administrative Officer

Mazdiana Mohd. Zain, B. Corp Admin (Hons) (Comp. Sect)

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Nurul Husna Zaidi, MSc (UKM)

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**Pegawai Penyelidik
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**Pegawai Penyelidik Kontrak
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Wan Mohd Shukri Wan Ahmad, MSc (UPM)

Mohd Nasir Husin, MSc (UKM)

Dr Serafina Christine Fletcher, PhD (UKM)

Nur Hajar Zamah Shari, MSc (UPM)

Salleh Mat, MSc (UPM)

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Azeyla Ahmad BSc (Hons) (UKM) (Sehingga Januari/[Until January](#))

Farah Shahanim Mohamed Mohidin, MSc (UKM)

Joann Christine Luruthusamy, MSc (UM)

Mohd. Razman Salim, BSc (UPM)

Siti Normaslina Mohd. Tarli BSc (UMT) (Sehingga Jun/[Until June](#))

Elizabeth Butod BSc (UMS) (Sehingga September/[Until September](#))

Musalmah Nasardin, BSc (UPM)

Elini@Minsah Odzlan BSc (UPM) (Sehingga Mei/[Until May](#))

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Assistant Research Officers**

Sadali Sahat

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Ahmad Nazarudin Mohd. Roseli, MSc (UPM)

Noorsiha Ayop, BSc (Hons) (UM)

Sreetheran Maruthaveeran, MSc (UPM)

Nik Azyyati Abdul Kadir, BSc (UPM)

Nik Adlin Nik Mohamed Sukri, BSc (UTM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Nurfazliza Kamarulbaharin MSc (UKM) (Sehingga Julai/
Until July)

Nazimatul Azma Nazeri, BSc For. (UPM)

Sharmillah Saleh, BSc (UMS)

Penolong Pegawai Penyelidik
Assistant Research Officers

Mohd. Afendi Husin, Dip. Agric. (UPM)

Azahari Hj. Mohd. Yusoff, Dip. Landscape Design (UiTM)

Naimah Che Long, BSc (UPM)

Wan Mohd Nafizul Hal Alim Wan Ahmad, Dip. Electrical
Engineering (UM)

Program Geoinformasi
Geoinformation Programme

Ketua/Head

Dr Khali Aziz Hamzah, PhD (Reading)

Tan Sek Aun, MSc (UPM)

Hamdan Omar, MSc (UTM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Mohd Azahari Faidi, MSc (UTM)

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

Audi Hani Abdullah, BSc (UTM)

Khairul Azwan Mohamad, BSc (UMT)

Penolong Pegawai Penyelidik
Assistant Research Officers

Rodziah Hashim, Dip. Sc. (UiTM)

Abdul Azhan Shah Idris, Dip. For. (UPM)

Program Perubahan Iklim dan Perhutanan
Climate Change and Forestry Programme

Ketua/Head

Dr Elizabeth Philip, PhD (UM), (Dipinjamkan ke/Seconded
to NRE, 1 Jun/June)

Dr Samsudin Musa, PhD (UKM)

Pegawai Penyelidik/Research Officers

Azian Mohti, MSc (UPM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Noraishah Safee, MSc (UKM)

Chong Yen Mee, BSc (Hons) (UMS)

Azri Azfra Mohd Zaini, BSc (UM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Nazaruddin Ramli, Dip. Agric. (UPM)

Mohd Rizal Mohd Kassim, Dip. Plantation (UiTM)

Program Kualiti Air
Water Quality Programme

Ketua/Head

Dr Abd Rahman Kassim, PhD (Oregon State)

Pegawai Penyelidik
Research Officers

Dr Siti Aisah Shamsuddin, PhD (UTM)

Mohd. Ghazali Hasan, M. Agric. Sc. (UPM)

Marryanna Lion, MSc (UPM)

Saiful Iskandar Khalit, MSc (UPM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Shahrulzaman Idris, Dip. For. (UiTM)
Mohd. Md. Sahat

Pegawai Penyelidik Kontrak
Contract Research Officer

Ahmad Firdaus Zainuddin, BSc (UPM)

Taman Botani Kepong
Kepong Botanic Garden

Ketua/Head

Adnan Mohammad, MSc (London)

Pegawai Penyelidik
Research Officers

Muhammad Farid Abdul Rashid, M. For. (Oregon State)
Norsham Suhaina Yaakob, MSc (UKM)
Noorsiha Ayop, BSc (UM)
Azrina Yahaya, B. Town & Reg. Plan (UiTM)

Penolong Pegawai Penyelidik
Assistant Research Officer

Mohd. Shis Ibrahim, Dip. Comp. Sc. (UPM)
Khairuddin Kamaruddin

BAHAGIAN KELUARAN HUTAN
FOREST PRODUCTS DIVISION

Pengarah/Director

Dr Mohd Nor Mohd Yusoff (KMN), PhD (Manchester)
(Sehingga/[Until](#) September)
Dr Rahim Sudin (AMN, DSM), PhD (Sheffield) (Dari/[From](#) September)

Program Biokomposit dan Perlindungan Kayu
Bio-Composites and Wood Protection Programme

Ketua/Head

Dr Rahim Sudin (AMN, DSM), PhD, (Sheffield)

Pegawai Penyelidik/Research Officers

Salamah Selamat, BSc (Hons) (UKM)
Dr Salmiah Ujang, PhD (Portsmouth)
Hashim W. Samsi, MSc (UPM)
Dr Roszaini Kadir, PhD (Bangor)
Dr Zaihan Jalaludin, PhD (Edinburgh)

Dr Suffian Misran, PhD (Bangor)

Dr Rafeadah Rusli, PhD (Manchester)

Mohamad Nasir Mat Arip, MSc (UKM)

Dr Mohd Khairun Anwar Uyup, PhD (UPM)

Tumirah Khadiran, MSc (UKM)

Shahlinney Lipeh, MSc Entomology (UKM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Khairul Azmi Jabar, MSc (USM)

Mohd Yusouf Abd. Latif, MSc (UIAM)

Siti Nor Ain Tamiran BSc (UiTM) (Dari/[From](#) September)

Noor Azrieda Abd. Rashid BSc (Hons) (UiTM)
(Dari Mac/[From](#) March)

Penolong Pegawai Penyelidik
Assistant Research Officers

Habibah Mohamad (PPN), Dip. Ind. Chem. (UiTM)
Nor Azian Mohd Kasby, Dip. Civil Eng. (UTM)
Baharuddin Kamaruddin, BSc (UPM)
Rozaida Latip, Dip. Wood Tech. (UiTM)
Siti Rafidah Mahmud, Dip. Wood Tech. (UiTM)

Program Pemprosesan Termaju dan Reka Bentuk
Advance Processing and Design Programme

Ketua/Head

Dr Tan Yu Eng, PhD (Brighton)

Pegawai Penyelidik
Research Officers

Dr Mohamad Omar Mohamad Khaidzir, PhD (Sheffield)
Mohd. Arshad Saru, B. Eng. (Sunderland)
Abdul Hamid Saleh, MSc (UiTM)
Ong Chee Beng, MSc (UPM)
Dr Khairul Awang, PhD (USM)
How Seok Sean, MSc (UPM)
Siti Zaliha Ali, B. Eng. (Hons) (UIAM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Mohd. Jamil Abdul Wahab, B. Eng. (Hons) (UM)
Izran Kamal, MSc (UPM)
Yanti Abdul Kadir, BSc For. (UPM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Zawawi Kassim, Dip. Sc. (UiTM)
Noor Nazreen Nasir, Dip. Elec. Eng. (UiTM)
Roszalli Mohd.

Pembantu Teknik/Technical Assistant

Ya'akob Zahari, Dip. Mech. Marine Eng.
(Politeknik Ungku Omar)

Program Pulpa dan Kertas
Pulp and Paper Programme

Ketua/Head

Mahmudin Saleh, MSc (UiTM)

Pegawai Penyelidik
Research Officers

Dr Rushdan Ibrahim, PhD (Manchester)
Sharmiza Adnan, MSc (UKM)
Latifah Jasmani, MSc (UKM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Zaitun Said, Dip. Wood Tech. (UiTM)
Azizi Abd. Jalil, Dip. Wood Tech. (UiTM)
Noraidah Subakin BSc (Hons) (UKM) (Sehingga Ogos /
Until August)

Program Biotenaga
Bioenergy Programme

Ketua/Head

Dr Wan Asma Ibrahim, PhD (UPM)

Pegawai Penyelidik
Research Officers

Puad Elham, MSc (UPM)
Shaharuddin Hashim, BSc (USM)
Rafidah Jalil, MSc (UKM)
Mahanim Sarif @ Mohd. Ali, MSc (USM)

Program Teknologi Mesra Alam
Green Technology Programme

Ketua/Head

Dr Gan Kee Seng, PhD (Strathclyde)

Pegawai Penyelidik
Research Officer

Dr Sik Huei Shing, PhD (UKM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Zairul Amin Rabidin, B. Eng. (Hons) (UM)
Khairul Maseat, BSc (Hons) (UiTM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Ahmad Ismail (Sehingga/Until Oktober)

Program Kualiti Kayu dan Hasil Bukan Kayu
Wood Quality and Non-Wood Products Programme

Ketua/Head

Dr Hamdan Husain, PhD (Wales)

Pegawai Penyelidik
Research Officers

Dr Ani Sulaiman, PhD (Reading)
Mohd. Tamizi Mustafa, MSc (USM)
Nordahlia Abdullah Siam, MSc (UPM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Lim Seng Choon (PPN, AMP),
(Sehingga/Until Februari), MSc (Wales)

Penolong Pegawai Penyelidik
Assistant Research Officer

Emlee Mohd. Taib

Penolong Pegawai Penyelidik Kontrak
Contract Assistant Research Officer

Mohd Izani Ishak, Dip. Mech. Eng.
(Politeknik Sultan Salahuddin Abdul Aziz Shah)

MyScrim Project/Project MyScrim

Pengarah Projek/Project Manager

Dato' Dr Hj Marzalina Mansor, PhD (UKM)

Pegawai Penyelidik/Research Officer

Dr Wan Tarmeze Wan Ariffin, PhD (Birmingham)

BAHAGIAN BIOTEKNOLOGI PERHUTANAN
FOREST BIOTECHNOLOGY DIVISION
Pengarah/Director

Dr Norwati Muhammad, PhD (Reading)

Program Bioteknologi
Biotechnology Programme
Ketua/Head

Dr Norwati Muhammad, PhD (Reading)

Pegawai Penyelidik
Research Officers

Dr Kodi Isparan Kandasamy PhD (London) (Sehingga/
[Until](#) April)

Dr Lee Soon Leong, PhD (UKM)

Dr Mohd Rosli Haron, PhD (UPM)

Dr Lee Chai Ting, PhD (UPM)

Dr Norwati Adnan, PhD (UKM)

Dr Nor Hasnida Hassan, PhD (UKM)

Dr Norlia Basherudin, PhD (UPM)

Dr Kevin Ng Kit Siong, PhD (UM)

Nashatul Zaimah Noor Azman, MSc (London)

Haliza Ismail, MSc (UPM)

Dr Siti Salwana Hj. Hashim, PhD (UKM)

Dr Ng Chin Hong, PhD (UKM)

Dr Tnah Lee Hong, PhD (UM)

Nor Asmah Hassan, MSc (UKM)

Nadiah Salmi Nadzri, BSc (Hons) (UKM)

Noraliza Alias, BSc (Hons) (UPM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Siti Suhaila A. Rahman, MSc (UPM)

Yap Jing Wei (Sehingga/[Until](#) September), B. Biotech.
 (Hons) (Tasmania)

Nurul Farhanah Zakaria, BSc (UPM)

Nadzirah Amiruddin (Dari/[From](#) 1 November), MSc (UKM)

Program Hutan Ladang
Forest Plantation Programme
Ketua/Head

Dr Hj Ahmad Zuhaidi Yahya (AMN), PhD (Dublin)

Pegawai Penyelidik/Research Officers

Dr Hashim Md. Noor (AMP), PhD (Wales)

Dr Ang Lai Hoe, PhD (Aberdeen)

Dr Wan Rasidah Wan Abdul Kadir, PhD (Ghent)

Tuan Hj. Abd. Razak Othman, MSc (UKM)

Rosdi Koter, MSc (UPM)

Dr Lok Eng Hai, PhD (Murdoch Uni., Western Australia)

Dr Ho Wai Mun, PhD (Seoul)

V. Jeyanny Vijayanathan, MSc (UPM)

Rozita Ahmad, BSc (Hons) (USM)

Mohamad Fakhri Ishak, BSc For. (UPM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Suhaimi Wan Chik, Dip. Agric. (UPM)

Amir Saaifuddin Kassim, BBA (Hons) (UiTM)

Penolong Pegawai Penyelidik Kontrak
Contract Assistant Research Officer

Tang Lai Kuen, BSc (TARC)

Program Membaikbiak Tumbuhan
Plant Improvement Programme
Ketua/Head

Dr Ab Rasip Ab Ghani (AMP), PhD (UKM)
 (Sehingga Mac/[Until](#) March)

Dr Mohd Noor Mahat (AMN), PhD (UPM)
 (Dari Mac/[From](#) March),

Pegawai Penyelidik/Research Officers

Dr Aminah Hamzah (KMN), PhD (Edinburgh)

Mohd Lokmal Ngah, MSc (UKM)

Dr Mohd Zaki Abdullah, PhD (UKM)

Ahmad Fauzi Mohd. Shariff, BSc (UPM)

Farah Fazwa Md Ariff, MSc (UKM)

Mohd Adi Faiz Ahmad Fauzi, BSc Indust. Statistic (UUM)
 (Dari Januari/[From](#) January)

Penolong Pegawai Penyelidik
Assistant Research Officers

Azril Deenor Md Dan, Dip. Microbio. (UiTM)

Muhammad Farhan Zolkifle Dip. Kej. Elektronik (Politeknik Shah Alam) (Dari Jun /From June)

Penolong Pegawai Taman/ Ladang
Assistant Garden/Plantation Officer

Mohd Ramly Mohd. Saleh, Dip. Agric. (UPM)

BAHAGIAN BIODIVERSITI HUTAN
FOREST BIODIVERSITY DIVISION

Pengarah/Director

Dr Saw Leng Guan, PhD (Reading)

Program Biodiversiti Flora
Flora Biodiversity Programme

Ketua/Head

Dr Richard Chung Cheng Kong FLS, PhD (UM)

Pegawai Penyelidik/Research Officers

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

Chew Ming Yee, BSc For. (UPM)

Nor Ezzawanis Abdullah Thani, MSc (UKM)

Ummul Nazrah Abdul Rahman, MSc (UKM)

Syahida Emiza Suhaimi, BSc For. (UPM)

Avelinah Julius, MSc (UMS)

Siti Munirah Mat Yunoh, MSc (UKM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Dr E. Soepadmo, PhD (Cambridge)

Dr Ruth Kiew, PhD (Cantab.)

Rafidah Abdul Rahman, MSc (UM)

Tan Hui Sin BSc For. (UPM) (Sehingga Mei /Until May)

Nadiah Idris, BSc (Hons.) (UKM)

Yao Tze Leong, BSc For. (UPM)

Lim Chung Lu, BSc For. (UPM)

Joanne Tan Pei Chih, BSc Hort. (UPM)

Ong Poh Teck, BSc (UPM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Kamarudin Saleh

Kamarul Hisham Mustafa, Dip. Agric. Sc.

Program Biodiversiti Fauna
Fauna Biodiversity Programme

Ketua/Head

Dr Laurence G. Kirton, PhD (London)

Pegawai Penyelidik/Research Officers

Dr Pan Khang Aun, PhD (Salford)

Shawn Cheng, MSc (Imperial College)

Nada Badruddin, B. App. Sc. (Hons) (USM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Dr Grace Tabitha Lim, PhD Entomology (Virginia Tech)

Phon Chooi Khim, MSc (USM)

Veronica Khoo Swee Imm, BSc (Hons) (USM)

Ong Su Ping, BSc (Hons) (USM)

Nur Zati Akma Mustafa, B. Biomedical Sc. (Hons) (UKM)

Mohammad Shahfiz Azman, BSc (Hons) (UNIMAS)

Nor Azlin Mohd Fauzi, MSc (UKM)

Kaviarasu A/L Munian, BSc (Hons) (UPM)

Penolong Pegawai Penyelidik
Assistant Research Officer

Azmi Mahyuddin

Program Kesihatan dan Pemuliharaan Hutan
Forest Health and Conservation Programme

Ketua/Head

Dr Lee Su See (AMN), PhD (Aberdeen)

Pegawai Penyelidik/Research Officers

Dr Lillian Chua Swee Lian, PhD (Bath)

Dr Gary William Theseira, PhD (Mississippi)

Dr Mohd. Farid Ahmad, PhD (USM)

Patahayah Mansor, BSc For. (UPM)

Hamidah Mamat, MSc (Geoinformatics) (UTM)

Lau Kah Hoo, MSc (UKM)

Thi Bee Kin, MSc (UKM)

Suhaida Mustafa, BSc For. (UPM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Chan Yoke Mui, MSc (UM)
 Wendy Yong Sze Yee, MSc (UPM)
 Aslina Baharum, MSc IT (UiTM)
 Nazura Zainuddin MSc (UM) (Sehingga Oktober/[Until October](#))
 Chan Hong Twu, MSc (UM)

BAHAGIAN HASILAN SEMULA JADI
NATURAL PRODUCTS DIVISION
Pengarah/Director

Dr Rasadah Mat Ali (AMP), PhD (London)

Setiausaha Pejabat
Office Secretary

Jesmini Mat Ali, Dip. Sec. Science (UiTM)

PROGRAM SUMBER BIOLOGI
BIOLOGY RESOURCE PROGRAMME
Pegawai Penyelidik
Research Officers

Mohd Shahidan Mohd. Arshad, BSc (Hons) (UM)
 Hada Masayu Ismail @ Dahlan, B. Process & Food Eng. (Hons) (UPM)
 Tan Ai Lee, MSc (UKM)

Pegawai Penyelidik Kontrak
Contract Research Officer

Nurnida Mohd Kamal, MSc (UKM)

Penolong Pegawai Penyelidik
Assistant Research Officer

Sharmizi Ismail, Dip. Plant. Indust. Mgmt. (UiTM)

Penolong Pegawai Penyelidik Kontrak
Contract Assistant Research Officer

Mastura Mat Yasin, Dip. Civil Eng. (UiTM)

PROGRAM FITOKIMIA
PHYTOCHEMISTRY PROGRAMME
Pegawai Penyelidik
Research Officers

Dr Ling Sui Kiong, PhD (Nagasaki)
 Fauziah Abdullah, MSc (UKM)
 Nor Hayati Abdullah, MSc (UM)
 Zunoliza Abdullah, PhD (USM)
 Abdul Rashid Li, MSc (UiTM)
 Adiana Mohd Adib, MSc (UTM)

Penolong Pegawai Penyelidik
Assistant Research Officers

Mohd Radzi Ahmad, Dip. MLT (UKM)
 Nuziah Hashim, Dip. Ind. Chem. (UiTM)
 Salbiah Man, Dip. Ind. Chem. (UiTM)
 Abdull Rashih Ahmad

PROGRAM BIOAKTIVITI
BIOACTIVITY PROGRAMME
Pegawai Penyelidik
Research Officers

Dr Nik Musa'adah Mustapha, PhD (London)
 Dr Vimala Subramaniam, PhD (UM)
 Dr Mastura Mohtar, PhD (Biomedical Science) UKM
 Zaridah Mohd. Zaki, M. Health Sc. (UKM)
 Chee Beng Jin, MSc (UPM)
 Mazura Pizar, MSc (UKM)
 Saiful Azmi Johari, MSc (UPM)
 Dr Fadzuraena Jamaluddin, PhD (UPM)
 Mary Khoo Gaik Hong, MSc (UPM)
 Mohamad Jemain Mohamad Ridhwan, MSc (UiTM)

Pegawai Penyelidik Kontrak
Contract Research Officers

Shalini Markandan, B. BMed. Sc. (Hons) (MSU)

Penolong Pegawai Penyelidik
Assistant Research Officers

Rohana Sahdan, Dip. Microbio. (UiTM)
 Mazurah Mohamed Isa, Dip. Microbio. (UiTM)

PROGRAM PEMBANGUNAN PRODUK HERBA HERBAL PRODUCTS DEVELOPMENT PROGRAMME

Pegawai Penyelidik Research Officers

Dr Nor Azah Mohamad Ali, PhD (UPM)
Mailina Jamil, MSc (UKM)
Saidatul Husni Saidin, MSc (UPM)
Norulaiman Yusoff, MSc (UPM)
Ong Boo Kean, MSc (UPM)

Penolong Pegawai Penyelidik Assistant Research Officers

Abdul Majid Jalil, Dip. Chem. Eng. (UTM)

Penolong Pegawai Penyelidik Kontrak Contract Assistant Research Officers

Azrina Aziz, BSc (UiTM)

PUSAT TEKNOLOGI HERBA HERBAL TECHNOLOGY CENTRE

Pegawai Penyelidik Research Officers

Zamree Md. Shah, MSc (UPM)
Dr Pin Kar Yong, PhD (UPM)
Noor Rasyila Mohamed Noor, MSc (UPM)

Pegawai Penyelidik Kontrak Contract Research Officers

Khairul Kamilah Abd Kadir, BSc (Hons) (UPM)
Mohd Kamal Nik Hasan, MSc (Hons) (UPM)

PUSAT PENEMUAN UBATAN DRUG DISCOVERY CENTRE

Pegawai Penyelidik Research Officers

Dr Getha Krishnasamy, PhD (UM)
Dr Nurhanan Murni Yunos, PhD (Sydney)
Asiah Osman, MSc (UKM)
Nor Datiakma Mat Amin, MSc (IIUM)
Norhayati Ismail, BSc (Hons) (UPM)
Lili Sahira Husin, BSc (Hons) (UPM)
Siti Syarifah Mohd Mutalip, BSc (Hons) (UPM)

Pegawai Penyelidik Kontrak Contract Research Officers

Hema Thopla Govender, BSc (Hons) (UNISEL)
Roshan Jahn Mohd Salim, MSc (UIA)
Nur Fairuz Mat Yasin, BA (Hons) (UPM)
Muhammad Haffiz Jauri, MSc (UTM)
Muhammad Syamil Azahar, MSc (UTM)
Anee Suryani Sued, MSc (UKM)

BAHAGIAN PENTADBIRAN ADMINISTRATION DIVISION

Pengarah/Director

Abdul Jabbar Hj Sabli, MBA (UKM)

Setiausaha Pejabat Office Secretary

Suzrina Shamsuddin, Dip. Sec. Science (UiTM)

Cawangan Pentadbiran General Administration

Ketua/Head

Zamri Mohd. Zangi, BSc (Hons) (UUM)

Penolong Pegawai Tadbir Assistant Administrative Officers

Md. Nasir Dayat (PPN, PJK)
Nazly Jamaludin

Cawangan Perolehan Procurement Branch

Ketua/Head

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

Cawangan Pembangunan dan Penyelenggaraan Development and Maintenance Branch

Ketua/Head

Pegawai Tadbir/Administrative Officer

Noorsuhanis Abdul Latif, B. (Hons) (UiTM)

Penolong Juruukur Bahan/Assistant Quantity Surveyor

Jamal Abdul Razak, Dip. Qty. Survey (UiTM)

Penolong Pegawai Penyelidik
Assistant Research Officer

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

Penolong Jurutera/Assistant Engineer

Norhusaini Abdullah, Dip. Power Elect. Eng. (UTM)

BAHAGIAN KEWANGAN
FINANCE DIVISION

Pengarah/Director

Tuan Hj Mohd Zamshari Hj Abd Rahman, MBA (UIAM)

Setiausaha Pejabat
Office Secretary

Sarina Hussin, Dip Sec. Science (UiTM)

Akauntan/Accountant

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

Saizatul Maheran Ramle, B. Acc. (Hons) (UiTM)

Penolong Akauntan/Assistant Accountants

Norbaite Saharudin, Dip. Bus. Stud. (UiTM)

Emylia Ayoub, Dip. Banking (UiTM)

Zainorasri Yahya, Dip. Acc. (UiTM)

BAHAGIAN SUMBER MANUSIA
HUMAN RESOURCE DIVISION

Pengarah/Director

Imaludden Abdullah (KMN), B. Is. (UKM).

Cawangan Perjawatan dan Perkhidmatan
Establishment and Services Branch

Ketua/Head

Mohd. Asmawee Ismail, B. HRM (Hons) (UUM)

Penolong Pegawai Tadbir
Assistant Administration Officer

Nurazani Abdul Rasid, B. HRM (Hons) (UUM)

Cawangan Kompetensi dan Peperiksaan
Competency and Examination Branch

Ketua/Head

Azuarni Abdul Adzis, BA (Hons) (UPM)

Cawangan Pembangunan Modal Insan
Human Capital Development Branch

Ketua/Head

Liza Ismail, M. (Human Res. Dev.) (UPM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Ruziah Ripin, BSc (Human Res. Dev.) (UPM)

Cawangan Perkhidmatan Psikologi
Branch of Psychological Services

Ketua/Head

Mohd Akhir Abd Rahman

BAHAGIAN PERKHIDMATAN TEKNIKAL
TECHNICAL SERVICES DIVISION

Pengarah/Director

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

Cawangan Penerbitan/Publications Branch

Ketua/Head

Norhara Hussein, BSc (Hons) (USM)

Pegawai Penyelidik
Research Officers

Ho Yuen Foon, MSc (UM)

Sarifah Kunju Ahmad, M. Biotech. (UM)

Pegawai Penyelidik Kontrak
Contract Research Officer

Ida Suraini Abd. Shukor, MBA Gen. Mgmt. (UIA)

Cawangan Teknologi Maklumat
Information Technology Branch

Ketua/Head

Zahari Othman, BSc (Hons) Info. Tech. (ITM)

Pegawai Penyelidik
Research Officers

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

Maizura Ishak, BSc Comp. (Hons.) (UTM)

Nurul Hilal A. Tarmidzi, BSc (Hons) Info Tech. (UNISEL)

Pegawai Teknologi Maklumat Kontrak
Contract Information Technology Officer

Intan Dalina Rafidah Othman, B. Multimedia (UUM)

Penolong Pegawai Teknologi Maklumat
Assistant Information Technology Officers

Siti Zaleha Abdul Goni, Dip. Interac. Multimedia (UniKL)

Omar Ali Abdul Rahim, Dip. Comp. Sc (Poly. Ungku Omar)

Intan Farah Wahida Khabir, Dip. Comp. Sc (UiTM)

Nordaiman Shairi, Dip. Comp. Sc (UPM)

Cawangan Perpustakaan/Library

Ketua/Head

Mohamad Zaki Hj Mohd. Isa, M. Lib. Sc (UIA)

Pegawai Penyelidik
Research Officer

Mastura Buang, M. Lib. Sc (UIA)

Cawangan Pameran
Exhibition Branch

Ketua/Head

Norain Mohd Arif, MSc Info. Tech. (UiTM)

Penolong Pegawai Penerangan
Assistant Information Officer

Azmarizawati Zainal Azhar, B. Mass Comm. (Hons) (UiTM)

Pereka Grafik/Graphic Artist

Rosdi Mohamad, Dip. Comp. Sc. Multimedia (UTM)

Cawangan Galeri dan Antikuiti
Gallery and Antiquity Branch

Ketua/Head

Noor Atizza Hj Mansor, MSc IT (UKM)

BAHAGIAN KOMERSIALISASI DAN INOVASI
COMMERCIALIZATION AND INNOVATION DIVISION

Pengarah/Director

Mohd. Zamshari Hj. Abd Rahman, MBA (UIAM)

Cawangan Pengurusan Harta Intelek dan Inovasi
Intellectual Property Management and Innovation Branch

Ketua/Head

Dr Woon Weng Chuen, PhD (Wales)

Penolong Pegawai Tadbir Kontrak
Contract Assistant Administrative Officer

Syed Othman Syed Omar, B. Bus. Adm. (Hons) (UPM)

Cawangan Komersialisasi dan Inkubasi
Commercialization and Incubation Branch

Ketua/Head

Azman Hassan, MSc (UKM)

Felo Kontrak/Contract Fellow

Jaafar Yahya, MBA (England)

Pegawai Penyelidik Kontrak
Contract Research Officer

Izanudin Zakaria, M. Biotek. (UM)

Pusat Perkhidmatan Setempat (PPS)

Ketua/Head

Azman Hassan, MSc (UKM)

Pegawai Penyelidik Kontrak
Contract Research Officer

Tan Lay Lean, BSc Math. with Econ. (UMS)

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