

MENANDA ARAS KECEMERLANGAN / BENCHMARKING EXCELLENCE

LAPORAN TAHUNAN MFRDB FRIM MFRDB FRIM ANNUAL REPORT 2014

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
FOREST RESEARCH INSTITUTE MALAYSIA



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



KEMENTERIAN SUMBER ASLI DAN ALAM SEKITAR
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT



© Institut Penyelidikan Perhutanan Malaysia 2015

Penyunting / Penterjemah / **Editors / Translators:**
Nik Zanariah Nik Mahmood, Abd. Latif Mohmod (Dato' Dr),
Ho Wai Mun (Dr) & Mohamad Zaki Mohd Isa

Ahli Jawatankuasa Kerja Laporan Tahunan MFRDB/FRIM
MFRDB/FRIM Annual Report Task Force
Marzalina Mansor, Dato' Dr (Pengerusi / **Chairperson**)
Nur Supardi Md.Noor, Dr (Pengerusi bersama / **Co-Chairman**)
Nik Zanariah Nik Mahmood (Setiausaha / **Secretary**)

Ahli Jawatankuasa / **Committee Members:**

- Nur Supardi Md.Noor, Dr
- Ho Wai Mun, Dr
- Gan Kee Seng, Dr
- Richard Chung Cheng Kong, Dr
- Siti Aisah Shamsudin, Dr
- Nor Azah Mohamad Ali, Dr
- Getha Krishnasamy, Dr
- Norlia Basherudin, Dr
- Rohana Abdul Rahman
- Rosniza Rawi
- Azuarni Abdul Adzis
- Nor Haliyan Tan Shilan
- Roshamida Ruslan
- Izan Norfarahni Ahmad
- Ruziah Ripin
- Toh An Nee
- Siti Shahida Mohd Shah

Penyumbang Gambar / **Photo Contributors:**
Yusni Idris, Asmar Hj Hassan, Zawiah Ngah,
Ong Poh Teck, Joanne Tan & Saw Leng Guan

Penghargaan / **Acknowledgements:**
Unit Komunikasi Korporat / **Corporate Communication Unit**

Laman sesawang / **Website**
<http://www.frim.gov.my>
Tel. / **Tel.:** 603-62797000
Faks. / **Fax.:** 603-62797878

Direka bentuk dan dicetak oleh / **Designed and printed by:**
D'Khairan Sdn Bhd Bandar Baru Bangi



KANDUNGAN CONTENTS

Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia Malaysian Forestry Research & Development Board (MFRDB)

5	Laporan Pengerusi/ Chairman's Report
10	Ahli Lembaga/ Board Members
12	Jawatankuasa Kewangan dan Perjawatan/ Finance and Establishment Committee
12	Jawatankuasa Audit/ Audit Committee
13	Jawatankuasa Kecil Lembaga—Projek Kerjasama dengan Agensi Luar MFRDB Sub-Committee—Collaborations with External Agency
14	Panel Penasihat Penyelidikan/ Research Advisory Panel

Institut Penyelidikan Perhutanan Malaysia/Forest Research Institute Malaysia****

17	Laporan Ketua Pengarah/ Director General's Report
28	Pengurusan Tertinggi/ Top Management
30	Carta Organisasi/ Organisational Chart
32	Latar Belakang/ Background
32	Visi/ Vision
32	Misi/ Mission
32	Objektif/ Objectives
33	Fungsi/ Functions
34	Piagam Pelanggan/ Clients' Charter
34	Dasar Kualiti/ Quality Policy
35	Slogan Kualiti/ Quality Slogan
35	Slogan Persekitaran Berkualiti/ Quality Environment Slogan
35	Pelan Strategik FRIM/ FRIM Strategic Plan 2011–2020
36	Stesen-Stesen Penyelidikan FRIM (SPF)/ FRIM Research Stations
41	Perkhidmatan Teknikal/ Technical Services
55	Sorotan Aktiviti/ Highlight of Activities
62	Sorotan Berita tentang FRIM di Media Cetak Highlight of News about FRIM in Printed Media
65	Anugerah dan Pengiktirafan/ Awards and Recognitions
75	Objektif Kualiti/ Quality Objective
79	Sorotan Penyelidikan dan Pembangunan/ Highlight of Research and Development
123	Pengurusan Penyelidikan dan Pembangunan/ Research and Development Management
131	Inovasi dan Komersialisasi/ Innovation and Commercialisation
143	Kerjasama Penyelidikan/ Research Collaboration
149	Pemindahan Teknologi/ Technology Transfer
159	Hari Anugerah/ Awards Day
167	Pelawat Rasmi/ Official Visit
171	Pengurusan Kewangan/ Finance Management
175	Sistem Pengurusan Kualiti/ Quality Management System
179	Sumber Manusia/ Human Resource
207	Penerbitan/ Publications





LAPORAN PENGERUSI CHAIRMAN'S REPORT

Pertamanya, bersyukur saya ke hadrat Allah swt kerana dengan limpah kurnia-Nya saya masih berupaya untuk meneruskan tugas-tugas selaku Pengerusi Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia (MFRDB) di sepanjang tahun ini. Saya ingin menyampaikan setinggi-tinggi terima kasih kepada Menteri Sumber Asli dan Alam Sekitar (NRE), YB Dato' Seri G Palanivel atas sokongan berterusan serta memberikan sepenuh kepercayaan kepada saya untuk memimpin MFRDB.

Saya mengambil kesempatan ini untuk mengucapkan terima kasih serta tahniah kepada FRIM atas iltizam untuk melaksanakan usaha-usaha menaik taraf serta melandskap kawasan Zoo Negara bersempena dengan ketibaan beruang panda gergasi dari China. Saya sangat berbangga dengan usaha-usaha tersebut yang disempurnakan dengan cemerlang oleh pelbagai peringkat penjawat awam FRIM yang diketuai oleh Dato' Dr Abd. Latif Mohmod. Harapan saya agar fasa kedua kerja-kerja peningkatan taraf Zoo Negara menjadikannya zoo utama dan bertaraf dunia berjaya dilaksanakan dengan sumbangan kepakaran sedia ada di FRIM.

2014 merupakan tahun yang mencabar namun dengan izin Allah swt serta sokongan berterusan daripada semua ahli MFRDB, ditambah pula komitmen daripada penjawat awam yang diketuai oleh Dato' Dr Abd. Latif Mohmod, FRIM terus mengecapi pelbagai kejayaan seperti pada tahun-tahun yang lalu. MFRDB melaksanakan empat kali Mesyuarat Lembaga iaitu pada 13 Mac, 26

First and foremost, allow me to thank Allah swt for being able to continue as the Chairperson of the Malaysian Forestry Research and Development Board (MFRDB) for the whole of this year. I would like to express my gratitude to the Minister of Natural Resources and Environment (NRE), YB Dato' Seri G Palanivel for his continuous support and trust in me to lead the MFRDB.

I would like to take this opportunity to thank and congratulate FRIM for her commitment to undertake the upgrading and landscaping work of Zoo Negara in conjunction with the arrival of Giant Panda from China. It is with great pride to commend that the task has been well done with the full commitment from all levels of FRIM staff led by Dato' Dr Abd. Latif Mohmod. I hope that the second phase of upgrading work in Zoo Negara to make it into a primer zoo will be carried out successfully with conviction by all the experts available in FRIM.

Year 2014 has been a very challenging year but by the grace of Allah and with the support of all prominent Board Members in addition the commitments from FRIM staff led by Dato' Dr Abd. Latif Mohmod there is no lack of achievements and accomplishments as compared to previous years. MFRDB has had four Board Meetings: 13 March, 26 June, 10 September and 16 December. FRIM has clearly made great leap as a research, development and commercialisation (R, D & C) institution with significant contributions to the advancement and development of the country especially in the field of forestry and forest products.

Jun, 10 September dan 16 Disember. FRIM telah melonjak sebagai sebuah institusi penyelidikan, pembangunan dan komersialisasi (R, D & C) dengan menyumbang secara signifikan terhadap kemajuan dan pembangunan negara terutamanya dalam bidang perhutanan dan keluaran hutan. Setinggi-tinggi tahniah kepada Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod yang memimpin FRIM dengan penuh tanggungjawab dan berjaya membawa FRIM terus gah di persada antarabangsa.

Sorotan Prestasi

Sekali lagi FRIM berjaya melepasi sasaran yang ditetapkan pada 2014. FRIM bergantung pada dana-dana awam terutamanya dari Kementerian Sains, Teknologi dan Inovasi (MOSTI), Kementerian Pertanian dan Industri Asas Tani (MOA), Majlis Kayu-Kayan Malaysia (MTDC) dan lain-lain untuk menjalankan aktiviti R, D & C-nya. Pada 2014, usaha-usaha untuk mendapatkan dana sangatlah mencabar. Bagaimanapun, FRIM berjaya memperoleh dana penyelidikan berjumlah RM32 juta—lebih kurang sama dengan jumlah yang diperoleh pada 2013.

FRIM berjaya menganjurkan Pameran Herba Malaysia 2014 yang bertemakan “Herba dan Pengetahuan Tradisi: Warisan Negara”. Satu prototaip dalam bentuk kapsul dan krim dibangunkan berdasarkan satu spesies tumbuhan, dikodkan sebagai “TSBR087” untuk melindungi pengetahuan tradisi Orang Asli subetnik Semelai dari Tasik Bera, Pahang serta buku *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan dan Beraroma Orang Asli Semelai* dilancarkan. Lebih daripada 40 pempamer dari seluruh negara mempamerkan pelbagai produk herba daripada bahan mentah, persediaan tradisi, dan hasil-hasil penyelidikan serta khidmat ujian hinggalah kepada produk-produk bernilai tambah yang dapat bersaing di pasaran antarabangsa.

Dengan bangganya saya ingin menyampaikan setinggi-tinggi penghargaan atas pelbagai anugerah dan pengiktirafan yang diterima oleh FRIM pada 2014. Tahniah diucapkan kepada Dato' Dr Abd. Latif atas pelantikan beliau sebagai felo Akademi Sains Malaysia dalam kategori “Pertanian Biologi dan Sains Alam Sekitar”.

Tahniah juga kepada kumpulan HTD—rawatan suhu tinggi untuk kayu getah yang dibangunkan oleh FRIM yang telah pun memperoleh anugerah berganda diketuai oleh Dato' Dr Abd. Latif—kerana berjaya mengungguli Anugerah Harta Intelek Negara 2014 bagi Kategori Paten. Projek ini juga merupakan finalis di bawah Kategori Perkhidmatan dan Program Kerajaan bagi Anugerah Inovasi Antarabangsa 2014 “Commonwealth Association for Public Administration and Management (CAPAM)”.

Congratulations to Director General of FRIM, Dato' Dr Abd. Latif Mohmod, who has led FRIM with great passion and brought FRIM into the forefront in the international arena.

A Glimpse on the Performance

FRIM again has exceeded her targets in 2014. FRIM depends on public funds particularly from MOSTI, MOA, MTDC, etc to conducts all the R, D & C activities. This year the funds available were much smaller and it was very challenging to get research projects funded. However, FRIM had managed to secure research fund of about RM 32 million which was about the same amount obtained in 2013.

FRIM had successfully organised Herba Malaysia Exhibition 2014 (PHM2014), themed: “Herbs and Traditional Knowledge: National Heritage”. A prototype product in the form of capsule and cream, developed based on a plant species, coded as “TSBR087” to protect the traditional knowledge (TK) of Orang Asli sub-ethnic Semelai from Tasik Bera, Pahang and a new book, entitled “*Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan dan Beraroma Orang Asli Semelai*” were launched. Over 40 exhibitors from all over the country participated in the exhibition, displaying a variety of herbal products, ranging from raw materials, traditional preparations, and product research and testing services, to value-added products that can compete in international markets.

It is with great pride to acknowledge all the awards and recognitions received by FRIM in 2014. I congratulate Dato' Dr Abd. Latif for his election as a Fellow of Academy of Sciences Malaysia (ASM) under the category “Biological Agriculture and Environmental Sciences”. Heartiest congratulations to the HTD team led by Dato' Dr Abd. Latif himself; this multiple awards winning high temperature treatment system for rubberwood developed by FRIM managed to clinched the top prize of the National Intellectual Property Award 2014 (NIPA 2014) for the Patent Category. This project was also one of the finalists under Government Services and Programmes category for the Commonwealth Association for Public Administration and Management (CAPAM) 2014 International Innovations Awards. The prestigious CAPAM is a biennial congress organized by the Commonwealth Secretariat that attracted participation of more than 1200 delegates from 53 countries.

A forestry book written in our national language “*Hutan Hujan Tropika Semenanjung Malaysia*” by Khairuddin Kamarudin, a research assistant, was awarded Best Book Award under the Science,

Sebuah buku tentang perhutanan dalam bahasa Melayu bertajuk “Hutan Hujan Tropika Semenanjung Malaysia” oleh Khairuddin Kamarudin, seorang penolong pegawai penyelidik di FRIM, merangkul Anugerah Buku Terbaik kategori Sains, Teknologi dan Perubatan daripada Majlis Penerbitan Ilmiah Malaysia (MAPIM), Kementerian Pelajaran Malaysia 2013. Buku yang diterbitkan oleh Dewan Bahasa dan Pustaka ini menyorot kepentingan hutan kepada kehidupan kita dan sumbangan pemuliharaan hutan yang berkesan terhadap kesejahteraan hidup rakyat.

Di samping itu, tahniah juga kepada kumpulan penyelidik yang diketuai oleh Dr Rushdan Ibrahim kerana memenangi pingat emas bagi projek “*Mathematical Models for Alkaline Pulp and Paper Properties of Oil Palm Empty Fruit Bunch Fibre*” dan kumpulan yang diketuai oleh Dr Abdul Hamid Saleh yang menerima pingat perak bagi projek “*The Production of Moulded Rotary Veneer Bamboo (RoVBAM) Chair*” dan “*RoVBAM Plyboard for Panel Furniture and Interior Products*” kategori Reka Bentuk dan Inovasi di Ekspo Teknologi Malaysia ke-13; Tumirah Khadiran yang mengungguli pingat emas di Pameran Reka Cipta dan Inovasi Kejuruteraan Antarabangsa (i-ENVEX), kategori Bangunan, Pembinaan and Bahan (Kelas D) bagi projek “*Nanocapsule Organic Phase Change Material as Advanced Thermal Energy Storage for Energy Saving, Intelligent Building Application*”; serta kumpulan yang diketuai oleh Dr Mohd Khairun Anwar Uyup yang memenangi pingat emas Anugerah Biolnovasi 2014 bagi projek “*Exterior Grade Plybamboo*”.

Saya turut menghargai Sijil Kecemerlangan yang diterima FRIM dari TripAdvisor 2014 serta penyenaian FRIM sebagai salah satu “Tujuh Keajaiban dalam Ekopelancongan di Malaysia” bersama-sama Gunung Mulu di Sarawak; Taman Negara Pulau Pinang, Teluk Bahang; Taman Negeri Royal Belum, Perak; Taman Negara; Cameron Highlands, Pahang; dan Pulau Perhentian, Negeri Terengganu. Ini merupakan petunjuk bahawa FRIM berjaya mencetak namanya di peta pelancongan negara sebagai destinasi yang wajib dilawati.

Di samping itu, tahniah kepada Dr Sik Huei Shing yang terpilih sebagai penerima Anugerah Kecemerlangan Penyelidikan Kedokteran dan Dr Lee Chai Ting bagi anugerah poster terbaik Bahagian 2: Fisiologi dan Genetik yang bertajuk “*Discovery of Genic Microsatellite Markers from Transcriptome Sequences of Eurycoma longifolia Root*”, keduanya di Kongres Dunia *International Union of Forest Research Organizations (IUFRO) XXIV*.

Kesemua anugerah dan pengiktirafan yang diterima dengan jelas membuktikan bahawa FRIM merupakan

Technology and Medicine Category at the Malaysian Scholarly Publication Council (MAPIM)–Ministry of Education Malaysia 2013. The book, published by Dewan Bahasa dan Pustaka (DBP), highlights the importance of forests to our lives and the contribution of effective forest conservation to the people’s prosperity and well-being.

I applaud: the team headed by Dr Rushdan Ibrahim for winning gold medal for the project “*Mathematical Models for Alkaline Pulp and Paper Properties of Oil Palm Empty Fruit Bunch Fibre*” and team headed by Dr Abdul Hamid Saleh for silver medals for projects “*The Production of Moulded Rotary Veneer Bamboo (RoVBAM) Chair*” and “*RoVBAM Plyboard for Panel Furniture and Interior Products*” under Design and Innovation category in the 13th Malaysia Technology Expo; Tumirah Khadiran for winning gold medal in Pameran Reka Cipta dan Inovasi Kejuruteraan Antarabangsa (i-ENVEX) under Building, Construction and Materials (Class D) category for project “*Nanocapsule Organic Phase Change Material as Advanced Thermal Energy Storage for Energy Saving, Intelligent Building Application*”; and team headed by Dr Mohd Khairun Anwar Uyup for winning gold medal in Biolnnovation Awards 2014 for project “*Exterior Grade Plybamboo*”.

I laud the Certificate of Excellence by TripAdvisor 2014 received by FRIM and the listing of FRIM as one of the “Seven Wonders of Eco-tourism in Malaysia” together with Taman Negara Gunung Mulu di Sarawak; Taman Negara Pulau Pinang, Teluk Bahang; Taman Negeri Royal Belum, Perak; Taman Negara; Cameron Highlands, Pahang; dan Pulau Perhentian, Negeri Terengganu. This indicates that FRIM has successfully been placed as a must-visit destination in our country.

I congratulate Dr Sik Huei Shing for been the recipient of the IUFRO Outstanding Doctoral Research Award and Dr Lee Chai Ting for the best poster award for Division 2: Physiology and Genetics entitled “*Discovery of Genic Microsatellite Markers from Transcriptome Sequences of Eurycoma longifolia Root*” at the XXIV IUFRO World Congress.

All awards and recognitions received clearly prove that FRIM is an institution with invaluable human capacity comprised of highly-qualified scientists. The Board will continually support all the chosen fields of R&D in forestry and forest products so that FRIM will continue to be relevant to all her stakeholders and contribute the economics development of our beloved country.

Impacts of expertise contribution at national and international levels. With the current technical pool,

sebuah institusi yang memiliki modal insan yang tidak ternilai dengan para saintis yang berkepakaran tinggi. Lembaga akan terus memberikan sokongan terhadap kesemua bidang R&D dalam perhutanan dan keluaran hutan agar FRIM akan tetap relevan kepada para pemegang taruh serta menyumbang kepada pembangunan ekonomi negara kita yang tercinta ini.

Impak Sumbangan Kepakaran di Peringkat Kebangsaan dan Antarabangsa

Dengan kumpulan teknikal sedia ada, para penyelidik FRIM sentiasa berada di hadapan untuk memberikan input teknikal di pelbagai forum dan inisiatif peringkat kebangsaan dan antarabangsa tentang isu-isu perhutanan dan alam sekitar yang mempunyai impak penting kepada pembangunan ekonomi negara. Tiga orang pakar FRIM terlibat secara berterusan dalam mesyuarat dan perundingan tentang isu-isu berkaitan perubahan iklim di peringkat antarabangsa. Lima orang pegawai FRIM pula terlibat dalam membangunkan Standard-standard Malaysia dan Antarabangsa tentang perhutanan dan keluaran hutan. Antaranya ialah penglibatan Dr Rahim Sudin sebagai Pengerusi Jawatankuasa Teknikal MTIB selaku Badan Pensijilan bagi Papan Lapis, Ahli Jawatankuasa Teknikal Standard Malaysia bagi Panel Berasaskan Kayu dan Kumpulan Pakar ISO/TC 89—Panel Berasaskan Kayu; serta penglibatan Dr Tan Yu Eng (mendiang) dalam Jawatankuasa Konsultatif bagi Standard dan Mutu (ACCSQ) dan Ahli Kumpulan Pakar ISO/TC 218—Struktur Kayu Balak.

Saya juga menyanjung tinggi para penyelidik FRIM, antaranya, Dr Lee Su See yang melibatkan diri sepenuhnya dalam penganjuran Kongres Dunia IUFRO XXIV dan menamatkan dengan jayanya penggal beliau sebagai Naib Presiden IUFRO wanita yang pertama. Dr Elizabeth Philip pula terlibat membangunkan peringkat rujukan bagi REDD+ Kebangsaan tentang keputusan-keputusan berdasarkan pembayaran, sumbangan dan penyertaan dalam merangka kedudukan Malaysia terhadap isu-isu perhutanan di mesyuarat-mesyuarat UNFCCC dan IPPC. Di samping itu, Dr Wan Rasidah Kadir pula merupakan wanita pertama dilantik sebagai Presiden Persatuan Sains Tanah Malaysia. Ini jelas membuktikan bahawa kepakaran FRIM diiktiraf oleh pihak luar dan diharap FRIM dapat terus mengekalkan kecemerlangan ini selama-lamanya.

Impak FRIM terhadap Industri

FRIM terus menyediakan bantuan teknikal dan input menerusi projek-projek perundingan kepada pelbagai pemegang taruh. Pada tahun ini, 56 projek berjumlah kira-kira RM3.2 juta telah dilaksanakan. Projek-projek perundingan ini menyediakan input-input

FRIM researchers are in the frontlines to provide technical inputs in both national and international fora and initiatives on forestry and environment issues that have significant impact to the economic development of the country. Three staff members were constantly involved in international meetings and negotiations on climate change related issues. A total of five FRIM staff was involved in developing Malaysian and International Standards on forestry and forest products. Notably Dr Rahim Sudin's involvement as Chairman of Technical Committee MTIB as Certification Body for plywood, member of Technical Committee Malaysian Standard for wood-based panel and Expert Group ISO/TC 89: Wood Based Panel, and Dr Tan Yu Eng's involvement in ASEAN Consultative Committee on Standards and Quality (ACCSQ) and member of Expert Group ISO/TC 218: Timber structures.

I applaud these researchers, among others, Dr Lee Su See who has involved fully in the successful organisation of the XXIV International Union of Forest Research Organisations (IUFRO) World Congress and concluded her term as Vice President of IUFRO, Dr Elizabeth Philip for developing the National REDD+ reference level for results based payments, contributions and participation in framing Malaysia's position on forestry issues at UNFCCC and IPPC meetings, Dr Wan Rasidah Kadir who was appointed as the first woman President of Malaysian Soil Science Society. It clearly shows that the expertise in FRIM is widely recognized and it is hoped that FRIM will continue to sustain her excellence.

Impacts of FRIM on the Industry

FRIM continues to provide technical assistances and inputs through consultancy projects to the various stakeholders. This year 56 projects totaling about RM 2.3 million were conducted. These consultancy projects had provided the very much needed technical inputs required by both the public and private bodies for development besides provided the hands-on opportunities for researchers to address current industrial issues. A total of 100 organisations/factories/individuals have benefited from various technical services offered by FRIM such as furniture testing, analysis of wood preservative and wood identification.

Fortification of the Institute

In an effort to enhance and support the implementation of research and development (R&D) in FRIM, especially young scientists and crucial topics, MFRDB has funded twelve research projects amounting to RM 330,000.00 under the Research, Pre-commercialization and Publications Grant (RPP).

teknikal bagi pembangunan yang sangat diperlukan oleh kedua-dua pihak awam dan swasta; di samping menyediakan peluang kepada para penyelidikannya untuk menangani isu-isu perindustrian semasa secara langsung.

Sebanyak 100 organisasi/kilang/individu pula mendapat faedah daripada pelbagai perkhidmatan teknikal yang ditawarkan oleh FRIM seperti ujian perabot, ujian awetan kayu serta pengecaman kayu.

Pemeriksaan Institut

Dalam usahanya untuk menyokong dan meningkatkan pelaksanaan R&D di FRIM, terutamanya saintis-saintis baharu dan bidang-bidang penting, MFRDB membiayai 12 projek penyelidikan berjumlah RM330,000 di bawah Geran Penyelidikan, Prakomersialisasi dan Penerbitan (RPP). Pemilihan penerima RPP diperketat bagi memastikan projek-projek penyelidikan ini akan menghasilkan impak yang signifikan atau projek yang mempunyai hasil sampingan daripada projek besar (*spin-off*) yang memerlukan dana lebih besar. Antara projek dibiayai RPP ialah "*Pharmacokinetic Study of Borapetoside B, Borapetoside C and Syringin from *Tinospora Crispa* Aqueous Extract in Rat*", "*Screening of Local White Rot Fungi for High Yield Cellulose Enzyme Production*" dan "*Enhancement of the Birdwings Population in FRIM by Planting Their Host and Nectar Plants*".

FRIM kini mempunyai sembilan stesen penyelidikan (SPF)—masing-masing mempunyai ciri-ciri unik bagi menjalankan aktiviti R&D dengan bidang yang khusus. FRIM akan berusaha untuk memaksimumkan aktiviti R&D di sini bagi menangani pelbagai isu seperti kepelbagaian tapak berkaitan dengan perbezaan jenis tanah, jenis hutan, cuaca dan sebagainya bagi perkembangan bahan tanaman dan pertumbuhannya. Bagi meningkatkan kemudahan penyelidikan, MFRDB meluluskan penubuhan SPF Pulau Kukup yang merangkumi kawasan seluas 647 ha. Dengan adanya tapak hutan bakau sendiri, R&D dalam ekosistem hutan bakau dalam jangka masa panjang dapat dirancang dan dilaksanakan demi negara tanpa sebarang masalah atau ketidaktentuan.

Akhir sekali, saya ingin mengucapkan setinggi-tinggi penghargaan dan terima kasih kepada Ahli-ahli Lembaga yang telah menyumbang bagi memastikan FRIM terus relevan kepada pelbagai pemegang taruh. Saya juga berharap kesemua Ahli Lembaga akan terus memberikan sokongan dan idea bagi meningkatkan kemajuan FRIM.

The selection for recipients of RPP was stringent to ensure that these research projects will provide significant impacts or spin-off project that will garner bigger fund. Among the R&D projects under the RPP in 2014 are: Pharmacokinetic Study of Borapetoside B, Borapetoside C and Syringin from *Tinospora Crispa* Aqueous Extract in Rat, Screening of Local White Rot Fungi for High Yield Cellulose Enzyme Production, and Enhancement of the Birdwings Population in FRIM by Planting their Host and Nectar Plants.

FRIM currently has nine SPFs and each has its own unique characteristics for specific scope of research and development activities. FRIM will strive to maximise the R&D activities in these facilities to address the various issues such as site variation with regards different soil type, forest type, weather, etc. for development of planting materials and growth. To further enhance the research facilities, MFRDB has approved the establishment of SPF Pulau Kukup. This site covers an area of 647 ha of which 800 ha are on mud-flats. With this very own mangrove forest site, longer term research and development in mangrove ecosystem could be planned and conducted for the benefit of the country without any hindrance and uncertainty.

Finally, I would also like to express my heartiest thanks to all Board Members who have conscientiously contributed to ensure that FRIM continues to be relevant to the various stakeholders. I hope that all current Board Members will continue to provide their supports and ideas to propel FRIM to greater height.



DATO' SRI ZOAL AZHA YUSOF (SSAP, PJN, DPSK, DSDK, DPMS, SIS)

PENGERUSI / CHAIRPERSON

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



AHLI LEMBAGA BOARD MEMBERS

Dari kanan ke kiri/Right to left:

Dato' Sheikh Othman Sheikh Abdul Rahman, En/Mr Zuraidi Husin, Tuan Hj Abang Mokhtar Abang Pawozan, En/Mr Azhar Noraini, Dr Jegatheswaran Ratnasingam, Dato' Sri Dr Hj Abd. Rahman Hj Abd. Rahim, Datuk Dr Hj Abdul Rahim Nik, Dato' Sri Zual Azha Yusof, Dato' Dr Abd. Latif Mohmod, En/Mr Pon Chia Hwee, En/Mr Gregory Mosigil, Tuan Hj Ir Wahid Jaafar, Dr Jalaluddin Harun, Dato' Mohamad Roslan Sakiman dan/and Tuan Hj Sapuan Ahmad

Pengerusi/Chairman

Kementerian Sumber Asli dan Alam Sekitar Malaysia
Ministry of Natural Resources and Environment Malaysia
YBHG. DATO' SRI ZOAL AZHA YUSOF (SSAP, PJN, DPSK, DSDK, DPMS, SIS)

Ahli dan Ahli Silih Ganti/Members and Alternate Members

Kementerian Sumber Asli dan Alam Sekitar Malaysia
Ministry of Natural Resources and Environment Malaysia
YBHG. DATUK DR ABDUL RAHIM HJ. NIK (DPMT, PMW, JSM, KMN, AMN)
PUAN/MDM WAN HASMAH WAN MOHD (AMN, KMN)
(Ahli silih ganti/Alternate member) (Sehingga 1 Ogos/Until 1 August)

Kementerian Kewangan Malaysia/Ministry of Finance Malaysia
EN/MR ZURAIDI HUSAIN
EN/MR MOHD ZAWAWI HASHIM (Ahli silih ganti/Alternate member)

Jabatan Perhutanan Semenanjung Malaysia
Forestry Department of Peninsular Malaysia

YBHG. DATO' SRI DR HJ ABD. RAHMAN HJ ABD. RAHIM (SSAP, DIMP, ANS)
YBHG. DATO' MASRAN MD SALLEH (BSK, BCM, ANS, SPMP, AMN)
(Sehingga 14 Februari/**Until 14 February**) (Ahli silih ganti/**Alternate member**)

Lembaga Industri Kayu-Kayan Malaysia/Malaysian Timber Industry Board (MTIB)

DR JALALUDDIN HARUN
PUAN/**MDM** HAJAH NORCHAHAYA HASHIM (Ahli silih ganti/**Alternate member**)

Persatuan Pekilang Panel Malaysia

Malaysian Panel-Products Manufacturer's Association (MPMA)
YBHG. DATO' SHEIKH OTHMAN SHEIKH ABDUL RAHMAN (DIMP, JP)

Persatuan Industri Kayu-Kayan Malaysia/Malaysian Wood Industries Association

EN/**MR** PON CHIA HWEE
EN/**MR** NG KAY YIP (Ahli silih ganti/**Alternate member**)

Persatuan Pengusaha Kayu & Perabot Bumiputera Malaysia

Malaysian Bumiputera Furniture & Wood Entrepreneurs Association

TUAN HJ IR WAHID JAAFAR
TUAN HJ AHMAD FAIZEL DATO' HJ ABDUL KARIM (Ahli silih ganti/**Alternate member**)

Unit Perancang Ekonomi/Economic Planning Unit

EN/**MR** AZHAR NORAINI

Universiti Putra Malaysia

PROF DR JEGATHESWARAN RATNASINGAM

Jabatan Hutan Sarawak/Forest Department of Sarawak

TUAN HJ SAPUAN AHMAD
TUAN HJ ABANG MOHD MOHTAR ABANG PAWOZAN (Ahli silih ganti/**Alternate member**)

Yayasan Sabah/Sabah Foundation

EN/**MR** GREGORY MOSIGIL
EN/**MR** CHARLES GARCIA (Ahli silih ganti/**Alternate member**)

Pejabat Setiausaha Kerajaan Negeri Selangor/Selangor State Secretary Office

YBHG. DATO' MOHAMAD ROSLAN SAKIMAN (DPMS, AMS, PJM)
EN/**MR** NOR AZMIE DIRON (Ahli silih ganti/**Alternate member**)

Institut Penyelidikan Perhutanan Malaysia/Forest Research Institute Malaysia

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

Mesyuarat MFRDB/MFRDB meetings:

1/2014: 13 Mac/**March**,
2/2014: 26 Jun/**June**,
3/2014: 10 September
4/2014: 16 Disember/**December**

JAWATANKUASA KEWANGAN DAN PERJAWATAN FINANCE AND ESTABLISHMENT COMMITTEE

Pengerusi/Chairman

Kementerian Sumber Asli dan Alam Sekitar
Malaysia

Ministry of Natural Resources and Environment
Malaysia

YBHG. DATO' SRI ZOAL AZHA YUSOF (SSAP, PJN,
DPSK, DSDK, DPMS, SIS)

Ahli dan Ahli Silih Ganti

Members and Alternate Members

Kementerian Sumber Asli dan Alam Sekitar
Malaysia

Ministry of Natural Resources and Environment
Malaysia

YBHG. DATUK DR ABDUL RAHIM HJ. NIK (DPMT,
PMW, JSM, KMN, AMN)

PUAN/MDM WAN HASMAH WAN MOHD (AMN, KMN)
(Ahli silih ganti/Alternate member)

(Sehingga 1 Ogos/Until 1 August)

Kementerian Kewangan Malaysia

Ministry of Finance Malaysia

EN/MR ZURAIIDI HUSAIN

EN/MR MOHD ZAWAWI HASHIM

(Ahli silih ganti/Alternate member)

Jabatan Perhutanan Semenanjung Malaysia

Forestry Department of Peninsular Malaysia

YBHG. DATO' SRI DR HJ ABD. RAHMAN HJ ABD.
RAHIM (SSAP,DIMP, ANS)

YBHG. DATO' MASRAN MD SALLEH (BSK, BCM, ANS,
DPMP, AMN)

(Sehingga 14 Februari/Until 14 February)

(Ahli silih ganti/Alternate member)

Persatuan Industri Kayu-Kayan Malaysia

Malaysian Wood Industries Association (MWIA)

EN/MR PON CHIA HWEE

EN/MR NG KAY YIP

(Ahli silih ganti/Alternate member)

Jabatan Perhutanan Sarawak

Forest Department of Sarawak

TUAN HJ SAPUAN AHMAD

TUAN HJ ABANG MOHD MOHTAR ABANG

PAWOZAN

(Ahli silih ganti/Alternate member)

Jabatan Perkhidmatan Awam Malaysia

Public Service Department of Malaysia

YBHG. DATO' MOHTAR MOHD ABD. RAHMAN (PMW,
DPMS)

Unit Perancang Ekonomi

Economic Planning Unit

EN/MR AZHAR NORAINI

Institut Penyelidikan Perhutanan Malaysia

Forest Research Institute Malaysia (FRIM)

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

Mesyuarat Jawatankuasa Kewangan dan
Perjawatan

Finance and Establishment Committee Meetings:

1/2014: 13 Mac/March;

2/2014: 26 Jun/June;

3/2014: 10 September;

4/2014: 16 Disember/December

JAWATANKUASA AUDIT AUDIT COMMITTEE

Pengerusi/Chairman

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

YBHG. DATUK DR ABDUL RAHIM NIK (DPMT, PMW,
JSM, KMN, AMN)

PUAN/MDM WAN HASMAH WAN MOHD (AMN, KMN)

(Sehingga 1 Ogos/Until 1 August)

(Ahli silih ganti/Alternate member)

Ahli dan Ahli Silih Ganti

Members and Alternate Members

Kementerian Kewangan Malaysia

Ministry of Finance Malaysia

EN/MR ZURAIIDI HUSAIN

EN/MR MOHD ZAWAWI HASHIM

(Ahli silih ganti/Alternate member)

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industry Board (MTIB)
DR JALALUDDIN HARUN
PUAN/MADAM HJH NORCHAHAYA HASHIM
(Ahli silih ganti/Alternate member)

Persatuan Pekilang Panel Malaysia
Malaysian Panel-Products Manufacturer's
Association (MPMA)
YBHG. DATO' SHEIKH OTHMAN SHEIKH ABDUL
RAHMAN (DIMP, JP)

Pejabat Setiausaha Kerajaan Negeri Selangor
Selangor State Secretary Office
YBHG. DATO' MOHAMAD ROSLAN SAKIMAN (DPMS,
AMS, PJM)

Persatuan Industri Kayu-Kayan Malaysia
Malaysian Wood Industries Association
EN/MR PON CHIA HWEE
EN/MR NG KAY YIP
(Ahli silih ganti/Alternate)

Mesyuarat Jawatankuasa Audit
Audit Committee Meetings:
1/2014: 4 April;
2/2014: 23 Mei/May;
3/2014: 2 Oktober/October;
4/2014: 9 Januari/January 2015

JAWATANKUASA KECIL LEMBAGA-PROJEK KERJASAMA DENGAN AGENSI LUAR BOARD SUB-COMMITTEE-COLLABORATION PROJECT WITH EXTERNAL AGENCY

Pengerusi/Chairman

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia (FRIM)
DATO' DR ABD LATIF MOHMOD (DIMP, JSM, KMN,
AMN)

Kementerian Sumber Asli dan Alam Sekitar Malaysia
Ministry of Natural Resources and Environment (NRE)
Malaysia
DATUK DR ABDUL RAHIM NIK (DPMT, PMW, JSM, KMN,
AMN)
PUAN/MDM WAN HASMAH WAN MOHD (AMN, KMN)
(Sehingga 1 Ogos/Until 1 August)
(Ahli silih ganti/Alternate member)

Jabatan Perhutanan Semenanjung Malaysia (JPMSM)
Forestry Department of Peninsular Malaysia
DATO' SRI DR HJ ABD. RAHMAN HJ ABD. RAHIM
(SSAP,DIMP, ANS)
DATO' MASRAN MD SALLEH (BSK, BCM, ANS, DPMP,
AMN) (Sehingga 14 Februari/Until 14 February)
(Ahli silih ganti/Alternate member)

Persatuan Pekilang Panel Malaysia
Malaysian Panel-Products Manufacturer's
Association (MPMA)
DATO' SHEIKH OTHMAN SHEIKH ABDUL RAHMAN
(DIMP, JP)

Persatuan Pengusaha Kayu-Kayan dan Perabot
Bumiputera Malaysia (PEKA)
Association of Malaysian Bumiputera Timber and
Furniture Entrepreneurs
TUAN HJ IR WAHID JAAFAR
TUAN HJ AHMAD FAIZEL DATO' HJ ABDUL KARIM
(Ahli silih ganti/Alternate member)

Universiti Putra Malaysia
PROF DR JEGATHESWARAN RATNASINGAM

Yayasan Sabah/Sabah Foundation
EN/MR GREGORY MOSIGIL
EN/MR CHARLES GARCIA
(Ahli silih ganti/Alternate member)

Mesyuarat Jawatankuasa/Committee Meetings:
1/2014: 26 Jun/June; 2/2014: 16 Disember/
December

PANEL PENASIHAT PENYELIDIKAN RESEARCH ADVISORY COMMITTEE (RAC) 2012–2015

Ahli Panel/Panel Members

Jawatankuasa Kecil Perhutanan dan Alam Sekitar Forestry and Environment Sub-Committee

YBHG. DATO' SHAHARUDDIN MOHAMAD ISMAIL
Felo Utama & Ketua Governans Air, Hutan dan
Sumber Asli, Universiti Kebangsaan Malaysia (UKM)

PROF DR MOHD NORDIN HAJI HASAN
International Council for Science (ICSU)
Regional Office for Asia and the Pacific

PROF DR TORU ASANO
School of Life Sciences
Tohoku University, Japan

Jawatankuasa Kecil Keluaran Hutan Forest Products Sub-Committee

DR RAZALI ABDUL KADIR
Chairman K-Special Sdn Bhd

DR DAVID JOHN COWN
Deputy Coordinator IUFRO Division 5 (Forest
Products), NEW ZEALAND

DR MOHAMAD JAMIL ABU HASAN
Chief Executive Officer, SPPT Engineering Sdn Bhd

Jawatankuasa Kecil Bioteknologi Perhutanan Forestry Biotechnology Sub-Committee

PROF DR MOHAMAD OSMAN
Coordinator, Plant Sciences Programme
Kulliyah of Sciences International Islamic University
Malaysia (IIUM)

DR CHRISTOPHER ERIC HARWOOD
CSIRO Sustainable Ecosystems, Tasmania, Australia

DR RUSLAN ABDULLAH
Yayasan Sime Darby

Jawatankuasa Kecil Biodiversiti Perhutanan Forest Biodiversity Sub-Committee

PROF DATO' DR ABDUL LATIFF MOHAMAD
Faculty of Science and Technology
Universiti Kebangsaan Malaysia (UKM)

PROF DR EDWINO S FERNANDO
College of Forestry and Natural Resources
University of the Philippines – Los Banos

PROF DR MOHD TAJUDDIN ABDULLAH
Faculty of Resources Science and Technology
Universiti Malaysia Sarawak (UNIMAS)

Jawatankuasa Kecil Keluaran Hutan Natural Products Sub-Committee

PROF DR SUKHDEV SWAMI HANDA
University Institute of Pharmaceutical Sciences,
Panjab University, India

PUAN/MADAM SHARIFAH FAUZIYAH SYED
MOHTHAR
Regulatory Affairs, Pharmaniaga Berhad

Jawatankuasa Kecil Komersialisasi dan Inovasi Commercialisation and Innovation Sub-Committee

EN/MR MOHAMMAD HAZANI HJ. HASSAN
Director, Technology Ventures Division
Malaysian Technology Development Corporation

EN/MR KAMAL KORMIN
Head, Patent Examination Section (Applied Science)
Intellectual Property Corporation of Malaysia (MyIPO)

Jawatankuasa Kecil Ekonomi dan Analisis Strategik/Economic and Strategic Analysis Sub-Committee

PROF DR JAMAL OTHMAN
Faculty of Economics and Management
Universiti Kebangsaan Malaysia (UKM)

DR HERMINIA A. FRANCISCO
Economy and Environment Program for Southeast
Asia (EEPSEA), Canadian International Development
Research Centre (IDRC), Manila





LAPORAN KETUA PENGARAH FRIM DIRECTOR GENERAL'S REPORT

2014 merupakan tahun yang penuh dengan aktiviti. Saya mengucapkan jutaan terima kasih kepada pihak MFRDB serta semua penjawat awam FRIM di atas iltizam serta kesungguhan yang memacu FRIM terus mengungguli persada dunia menerusi penyelidikan, pembangunan dan komersialisasi (R,D&C) hasil-hasil R&D perhutanan tropika dengan meraih pelbagai pencapaian dan pengiktirafan. Mengimbau 2014, terdapat beberapa aktiviti FRIM yang telah memangkin sempadan baharu dalam R, D & C perhutanan. Aktiviti ini termasuklah memeterai perjanjian sinergi dengan rakan, inovasi dan penyelidikan strategik yang telah menghasilkan anugerah dan pengiktirafan di peringkat kebangsaan dan antarabangsa; pada masa yang sama menyebarkan pengetahuan dan berkongsi teknologi.

Memperkasa R, D & C

Dengan 136 projek penyelidikan dan pembangunan yang masih aktif menjelang akhir 2014, FRIM terus memperkasa kedudukannya sebagai sebuah institusi penyelidikan perhutanan yang berjaya menempa nama di persada dunia. Daripada jumlah tersebut, 36 projek diluluskan pada 2014; 12 daripadanya dibiayai oleh Tabung Penyelidikan, Prakomersialisasi dan Penerbitan (RPP) di bawah MFRDB berjumlah RM330 000.

Dalam usaha untuk menghasilkan dokumen cadangan penyelidikan (DCP) yang mantap, bermutu dan seiring dengan kehendak dan aspirasi para penaja yang antara lain terdiri daripada Kementerian Sains, Teknologi dan Inovasi (MOSTI), Kementerian Pertanian dan Industri Asas Tani (MOA), Unit Perancang Ekonomi, Jabatan Perdana Menteri (EPU) dan Kementerian Perusahaan Perladangan dan Komoditi (MPIC), FRIM melaksanakan mesyuarat Jawatankuasa Penilai Institut (JPI). Tujuannya adalah untuk menambah baik DCP sebelum dihantar kepada pihak penaja. DCP tersebut dinilai oleh sekumpulan penyelidik kanan FRIM yang mempunyai kepakaran dan pengalaman yang luas dalam bidang R&D. Pada 2014, sebanyak 11 JPI diadakan dengan sejumlah 57 DCP dinilai, melebihi sasaran sebanyak 50 DCP. Di samping itu, Bahagian Perancangan Penyelidikan FRIM turut mengadakan latihan bagi memantapkan kemahiran penulisan cadangan penyelidikan kepada para penyelidikannya.



2014 is yet another eventful year for FRIM. I thank the Board members as well as all FRIM staff for your commitment which have sealed the year with more achievements and recognitions. Recalling 2014, there are series of FRIM events that have further catalysed new frontiers in forestry research, development and commercialisation (R,D&C). These events include the forging of synergistic collaborations with strategic partners, innovations and research that clinched both national and international awards and at the same time disseminating knowledge and sharing technologies.

Empowering Research

With 136 on-going research and development projects by the end of 2014, FRIM continues to uphold her role as a successful forestry research institution at international level. Of the total, 36 projects were approved in 2014 of which 12 were funded by MFRDB through the Research, Pre-commercialisation and Publication Grant (RPP) amounting to RM330 000.

Sorotan R, D & C

Pengurusan Ekopelancongan dan Pendidikan Alam Sekitar

Antara daya tarikan utama pengunjung ke FRIM ialah kesesuaian persekitaran semula jadinya sebagai pusat ekopelancongan. Bagi menambah baik pengurusan kawasan ekopelancongan di FRIM yang disenaraikan sebagai salah satu daripada “Tujuh Keajaiban Ekopelancongan di Malaysia” oleh The Star Online pada 2014, pengurusan yang berkesan dalam sektor ini amatlah perlu. Di bawah peruntukan dana RMK-10, sebanyak RM90,600 diperuntukkan pada 2014 untuk projek kajian yang berjudul “Pengurusan Ekopelancongan dan Pendidikan Alam Sekitar”. Salah satu daripada tiga komponen projek ini ialah kajian impak pejalan kaki dan basikal lasak ke atas denai di FRIM.

Kajian ini bertujuan untuk menilai impak daripada aktiviti rekreasi yang berkaitan dengan daya tampung fizikal terhadap denai-denai alam dan denai laluan basikal lasak di FRIM. Melalui komponen ini, impak kepadatan tanah terhadap tumbesaran tumbuh-tumbuhan dijalankan. Komponen ini menjurus ke arah penghasilan garis panduan pengurusan berasaskan daya tampung fizikal. Kajian mendapati bahawa kehadiran pelawat yang berlebihan bukan sahaja memberi kesan kepada kepuasan pengalaman, malahan boleh merosakkan persekitaran semula jadi.

Pembinaan Jambatan Hutan Mudah Alih

Di bawah projek pembangunan, satu lagi kajian untuk meringankan impak perhutanan ke atas alam sekitar sedang dijalankan. FRIM kini sedang membina satu reka bentuk alternatif yang menggunakan konsep mudah alih untuk mengurangkan kesan alam sekitar seperti gangguan tanah, pencemaran sungai, hakisan dan pemendapan akibat aktiviti pengusahasilan hutan. Prototaip pertama jambatan hutan mudah alih ini telah dihasilkan dan prototaip kedua yang lebih menekankan tambahan ciri keselamatan dan lebih ringan dijangka siap pada pertengahan tahun 2015. Jambatan ini dijangka dapat menyelesaikan masalah perhubungan ke dalam kawasan hutan. Penghasilan jambatan ini lebih menjimatkan berbanding dengan jambatan lain yang dibina secara kekal kerana kadar kerosakan lebih tinggi apabila terdedah kepada cuaca dan musim. Secara tidak langsung, aplikasi jambatan ini akan menyokong ke arah pengurusan hutan secara mampan.

FRIM has organised meetings on Institution Evaluation Committee (JPI) in an effort to produce significant and quality research proposals that are parallel to the priorities of sponsors, which include the Ministry of Science, Technology and Innovation (MOSTI), Ministry of Agriculture and Agro-based Industry (MOA), Economic Planning Unit, Prime Minister’s department (EPU) and Ministry of Plantation Industries and Commodities (MPIC). The purpose of these meetings was to improve the proposals before being sent to the sponsors. The proposals were evaluated by a group of senior researchers in FRIM with recognised expertise and vast knowledge in R&D. In 2014, 11 JPI meetings took place and a total of 57 proposals were evaluated, slightly more than the targeted number of 50 proposals. Besides, the Research Planning Division in FRIM also held trainings to improve the research proposal writing skill of researchers.

Highlights of R, D & C

Management of Eco-tourism and Environmental Education

FRIM is a popular ecotourism destination attributed to the unique natural environment found in the campus. Thus, there is a need to enhance the management of ecotourism in FRIM which has been listed as one of the “Seven Wonders of Eco-tourism in Malaysia” by The Star Online in 2014. A sum of RM90,600 was allocated in 2014 under the 10th Malaysia Plan to a research project entitled “Management of Eco-tourism and Environmental Education”. One of the three components in this project was the study on the impact of hikers and mountain bikers on nature trails in FRIM.

The aim of this study was to determine the impacts from related recreational activities in relation to the carrying capacity of the nature trails in FRIM. Through this component, the impacts of soil compaction towards plant growth was investigated. The findings will be used to formulate management guidelines based on physical carrying capacity. Results from this study showed that excessive number of visitors not only caused discomfort among users but also adversely affect the natural environment.

Development of Forest Mobile Bridge

Under the development project, another study to reduce the impact of forestry on the environment is being conducted. FRIM is currently constructing an alternative design using a mobile concept to reduce environmental impacts such as soil disturbances, stream pollution, erosion and sedimentation resulting from timber harvesting. The first prototype mobile forest bridge has been successfully produced and the second prototype with more emphasis on the

Proses Prarawatan Berkesan untuk Mengurangkan Saku Basah dalam Pengerangan Konvensional Acacia mangium

FRIM turut menjalankan kajian yang bertajuk “Proses Prarawatan Berkesan untuk Mengurangkan Saku Basah dalam Pengerangan Konvensional Acacia mangium”. Prarawatan menggunakan kaedah rendaman air panas terbukti berkesan mengurangkan berlakunya “saku basah” dengan ketara. Jadual pengeringan *A. mangium* dapat dioptimumkan, yakni tempoh pengeringan dapat dipendekkan kepada 14 hari apabila digunakan bersama-sama rendaman air panas. Amalan konvensional dalam industri ialah pengeringan udara selama dua bulan diikuti pengeringan tanur selama 40 hingga 45 hari untuk kayu akasia berketebalan 25 mm. Dengan teknik prarawatan dan jadual pengeringan yang dicadangkan, dijangka penggunaan kayu *A. mangium* untuk produk bernilai tambah akan meningkat dan menyumbang kepada pendapatan eksport negara.

Model Penghutanan Semula Bekas Ladang Getah, Memorandum Persefahaman antara FRIM dan Universiti Teknologi Malaysia

Dalam usaha untuk membangunkan dirian hutan baharu, FRIM berkerjasama dengan Jabatan Landskap, Universiti Teknologi Malaysia (UTM) untuk menjalankan projek jangka panjang dalam pemulihan dirian pokok getah tua dan hutan sekunder di dalam kampus UTM di Skudai, Johor sejak 2011. Penubuhan hutan tropika spesies kayu keras akan memberikan banyak faedah termasuk meningkatkan kepelbagaian dalam dirian pokok getah seluas 150 ha melalui pemuliharaan spesies langka atau terancam secara ex-situ dan sebagai dirian pokok spesies terpilih. Kawasan yang akan ditanam itu akan dijadikan sebagai hutan rekreasi dan latihan selain menjadi pusat rujukan pembangunan hutan baharu pada masa depan.

Melindungi Biodiversiti di Gunung Kanthan

Di samping itu, satu lagi kaji selidik FRIM berjaya menghasilkan senarai semak tumbuhan yang lengkap dan menjadikan spesimen herbarium sebagai rekod kekal. Senarai semak ini mencatatkan 223 spesies tumbuhan, termasuk 12 spesies terancam dan tiga spesies baharu iaitu *Gymnostachyum kanthanense* (Acanthaceae), *Meiogyne kanthanensis* (Annonaceae) dan *Vatica kanthanensis* (Dipterocarpaceae). Ketiga-tiga spesies baharu ini dinamakan ‘kanthanensis’ atau ‘kanthanense’ kerana hanya diketahui dari Gunung Kanthan dan tidak wujud di tempat lain di dunia.

additional security features and lighter in weight is expected to be completed middle of year 2015. The bridge is expected to save cost compared to other permanently built bridges that have higher rate of damage when expose to the weather and season. In other words, the bridge supports sustainable forest management.

Effective Pre-treatment Process to Eliminate Wet Pockets in Conventional Drying of Acacia mangium

FRIM has also conducted research on “Effective Pre-treatment Process to Eliminate Wet Pockets in Conventional Drying of *Acacia mangium*”. The hot water bath pre-treatment was found to lessen the occurrence of wet pocket significantly. The drying schedule for *A. mangium* has also been optimised and will shorten the drying duration to about 14 days when used with the hot water bath. Conventional practice in the industry is air drying for about two months followed by kiln drying for 40 to 45 days for 25 mm *A. mangium* boards. With the proposed pre-treatment and optimised drying schedule for *A. mangium*, the use of the timber for value-added products will contribute and increase export earnings of the country.

Reforestation Model of Ex-Rubber Plantation: A Memorandum of Understanding between FRIM and University Technology Malaysia

In an effort to develop new forest stands, the Landscape Department of University Technology Malaysia (UTM) and FRIM have agreed to collaborate since 2011 on a long-term reforestation project carried out on an old abandoned rubber stand and secondary forest located within the UTM campus in Skudai, Johor. The establishment of a mixed tropical hardwood species forest will be beneficial for enriching of biodiversity within the 150-ha area of abandoned rubber forests via ex-situ conservation of rare or threatened species and as stands of selected forest species. The selected planting sites will be developed as educational and recreational forest sites and as a referral centre for the development of new forests in the future.

Protecting Gunung Kanthan’ S Biodiversity

In another study by FRIM, we have succeeded in compiling a complete plant checklist and to make herbarium specimens as permanent records. The checklist recorded 223 plant species including 12 endangered species and three new species. After in-depth scientific investigation, the three new species described and published were *Gymnostachyum kanthanense* (Acanthaceae), *Meiogyne kanthanensis* (Annonaceae) and *Vatica kanthanensis* (Dipterocarpaceae). They are all named ‘kanthanensis’ or ‘kanthanense’ because they are known only from Gunung Kanthan and not elsewhere in the world.

Rantaian Nilai Industri Herba Terpilih

Industri herba dikenal pasti sebagai salah satu pemacu kegiatan ekonomi yang berpotensi memberi sumbangan penting kepada pertumbuhan ekonomi Malaysia bagi mencapai status negara maju menjelang tahun 2020 di bawah Program Transformasi Ekonomi (ETP). Sehingga kini, masih tiada satu pangkalan data yang mengandungi maklumat komprehensif industri herba. Bagi memenuhi aspirasi ini, kajian berkaitan rantaian nilai industri herba dilihat penting untuk memenuhi keperluan permintaan dan penawaran. Rentetan daripada inisiatif yang dijalankan oleh FRIM, Mesyuarat Jawatankuasa Pemandu NKEA Pertanian pada 2014 meluluskan peruntukan sebanyak RM1.96 juta bagi melengkapkan kajian rantaian nilai yang telah dijalankan. Objektif utama kajian ini adalah untuk membangunkan pangkalan data industri herba di peringkat hulu dan hiliran, mengenal pasti permintaan dan penawaran bahan mentah dan hasil produk herba, mengenal pasti jurang dalam landskap industri herba serta mengenal pasti isu dan cabaran dalam industri herba. Salah satu keberhasilan kajian ialah termetrainya perjanjian antara FRIM dan syarikat berasaskan herba untuk penghasilan produk herba.

Membangun dan Melaksana Rangka Kerja Kebangsaan berkaitan Capaian dan Perkongsian Faedah di Malaysia

Sejak kebelakangan ini, terdapat peningkatan dalam R,D&C berkaitan dengan pengetahuan tradisi (PT) dalam kepelbagaian biologi. Di bawah projek “Membangun dan Melaksana Rangka Kerja Kebangsaan berkaitan Capaian dan Perkongsian Faedah di Malaysia”, Program Pembangunan Bangsa-bangsa Bersatu memberi peruntukan berjumlah US\$533,000 bagi menyokong usaha pendokumentasian PT dan pembangunan produk prototaip dalam kalangan tiga komuniti Orang Asli di Semenanjung Malaysia. Tugasan FRIM melibatkan perjanjian berkaitan capaian dan perkongsian faedah, proses persetujuan memberi kebenaran dan protokol komuniti berkaitan dengan capaian dan perkongsian faedah bagi PT Orang Asli dan penduduk tempatan.

FRIM akan terus memperkasa aktiviti R&D-nya agar sentiasa relevan dengan kehendak semasa pihak pemegang taruh dengan mengutamakan penyelidikan yang berdaya saing dan menjadi penanda aras dalam komersialisasi hasil-hasil R&D yang dapat dimanfaatkan oleh rakyat Malaysia.

Value Chain of Selected Herbal Industry

The herbal industry has been identified as one of the economic catalyst that has great potential in contributing to the economic growth in Malaysia towards becoming a developed country by 2020 under the Economic Transformation Program. To date, there is yet a database with comprehensive information on the herbal industry. Thus, studies related to the herbal industry value chain are important in responding to the needs in supply and demand. Following the initiative by FRIM, the Agriculture NKEA Steering Committee Meeting has approved a funding of RM1.96 million to complete the study on herbal chain value. The main objectives are to develop a database on herbal industry at both upstream and downstream levels, to understand the supply and demand for raw materials dan herbal products, to identify gaps as well as issues and challenges in the industry. One of the outcomes in this study was the signing of an agreement between FRIM and a herbal company to produce herbal products.

Developing and Implementing a National Access and Benefit Sharing Framework in Malaysia

Recently, there is an increase in the R,D&C on biodiversity-related traditional knowledge (TK). The United Nations Development Programme has provided finance of US\$533,000 to support the TK documentation and prototype product development project among three Orang Asli communities in Peninsular Malaysia under the project “Developing and Implementing a National Access and Benefit Sharing Framework in Malaysia”. FRIM is involved in the demonstration of pilot Access and Benefit-sharing (ABS) agreements, Prior Informed Consent (PIC) processes and community protocol regarding ABS on TK of indigenous and local communities.

FRIM will consistently empower R&D activities to stay relevant to the needs of stakeholders by prioritising research with impact and by setting a benchmark in commercialisation of R&D findings for the benefit of all Malaysians.

Perkongsian Berwawasan

Dalam memastikan FRIM kekal relevan dengan isu-isu berkaitan hutan dan perhutanan yang sedia ada dan baru muncul, usaha-usaha kerjasama merupakan platform bagi menghimpunkan kepakaran dan sumber-sumber di samping bertindak sebagai penghubung bagi jurang yang wujud antara penyelidikan dan kebolehgunaannya. Sehubungan dengan itu, pada 2014, sebanyak 10 memorandum persefahaman (MoU)/perjanjian telah dimeterai meliputi pelbagai kerjasama; antara lain adalah dalam pembangunan produk, penyelidikan, pembinaan keupayaan dan pemuliharaan.

Memorandum persefahaman antara FRIM dan Furniture Industry Technology Center (FITEC) ditandatangani untuk bekerjasama dalam reka bentuk perabot dan pembangunan produk. FRIM sedia untuk berkongsi kepakaran dalam bidang reka bentuk dan ujian di lapangan bagi bahan mentah untuk membantu memastikan kualiti produk perabot tempatan menepati standard antarabangsa. Bagi mempromosi program pensijilan produk perabot, satu lagi MoU dimeterai dengan Persatuan Pengusaha Industri Perabot Bumiputera Malaysia (PETRA) bagi memastikan mutu perabot menepati keperluan standard pasaran tempatan dan antarabangsa. Di samping itu, FRIM sedang bekerjasama dengan Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd (KPKKT) menerusi satu perjanjian bagi membangunkan kaedah geospasial dalam pengurusan hutan untuk pengurusan sumber hutan secara mampan bukan sahaja di Terengganu malah di negeri-negeri lain.

Pada tahun yang sama, FRIM menandatangani MoU dengan dua universiti iaitu Kyoto University dan University of Zurich untuk bekerjasama dalam penyelidikan perhutanan. FRIM turut berganding bahu dengan syarikat The Lifeline Initiative bagi memperkukuh, mempromosi dan bekerjasama di Borneo menerusi Program Kerjasama Pendidikan Alam Sekitar, pertukaran maklumat tentang penubuhan tapak semeaian dan aktiviti penghutan semula di Sabah dan Sarawak. Di samping itu, ia dapat meningkatkan kesedaran terhadap pemuliharaan alam sekitar dalam kalangan pelajar di kawasan luar bandar di Sabah dan Sarawak. Dengan meningkatnya permintaan ke atas bahan tanaman herba yang bermutu, satu MoU tiga pihak yang melibatkan FRIM, Jabatan Pertanian (DOA) dan Syarikat Zalekah Simat ditandatangani bertujuan untuk menghasilkan bahan mentah bermutu yang menepati standard Amalan Pertanian Baik Malaysia/Skim Organik Malaysia (MyGAP/SOM) serta meningkatkan pendapatan pengusaha tempatan.

Visionary Partnerships

In ensuring that FRIM remain relevant to existing and emerging forest and forestry issues, collaborative effort becomes an essential platform that garners expertise and resources besides bridging gaps between research and application. As such, in the year 2014, a total of 10 memoranda of understanding (MoU)/agreement (MoA) were signed covering a wide range of cooperation from the product development, research, capacity building and conservation among others.

The MoU between FRIM and the Furniture Industry Technology Center (FITEC) was signed to collaborate in furniture design and product development. We are ready to share our expertise in the field of design and field testing of raw materials to help ensure the quality of local furniture products meet the international standards. Meanwhile, to promote the furniture products certification programme, another MoU was signed with the Bumiputera Furniture Industry Entrepreneurs Association Malaysia (PETRA) in an effort to ensure that the quality of products meets standard requirements of national and international markets. In addition, FRIM is collaborating with Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd (KPKKT) through a MoA to develop geospatial methods for forest management to enable sustainable management of forest resources not only in Terengganu but also in other states.

In the same year, we have signed MoUs with two universities namely Kyoto University and University of Zurich to cooperate in forestry research. FRIM also join hands with The Lifeline Initiative to strengthen, promote and develop cooperation in Borneo through joint Environmental Education Programmes, exchange of information regarding nursery establishment, and reforestation activities in Sabah and Sarawak besides increasing awareness on environmental conservation among students in rural areas of Sabah and Sarawak. With increasing demands for quality herb materials, a tripartite MoU involving FRIM, Department of Agriculture (DOA) and Syarikat Zalekah Simat was signed with aims to produce quality raw materials that meet the standards of Malaysian Good Agricultural Practice/Malaysian Organic Scheme (MyGAP/SOM) and to raise income of local entrepreneurs.

Memupuk Budaya Inovasi

Tatkala FRIM membawa R&D ke peringkat antarabangsa, kaedah dan teknologi turut dikongsi di dalam negara bagi memperkasa industri perhutanan serta meningkatkan perlindungan dan pemuliharaan hutan. Hari Inovasi yang merupakan acara tahunan di FRIM secara berterusan menggalakkan budaya mereka cipta dan inovasi dalam kalangan penjawat awam penyelidikan dan bukan penyelidikan. Acara ini bertujuan untuk menghargai penjawat awam FRIM atas usaha-usaha mereka dalam menjana inovasi bermutu tinggi di samping menggalakkan perkongsian idea yang inovatif dan kreatif. Pada tahun ini sahaja, FRIM memfailkan tujuh paten dan mendaftarkan 26 pendedahan reka cipta. FRIM turut memeterai pelesenan 12 teknologi kepada syarikat swasta tempatan sebagai tambahan kepada 17 output penyelidikan yang berpotensi untuk dikomersialkan.

Bagi meningkatkan kecekapan para penyelidik, FRIM terus menggalakkan penjawat awamnya untuk melanjutkan pelajaran pasca-ijazah. Pada tahun ini, empat orang berjaya memperoleh ijazah PhD (Dr Norhayati Abdullah, Dr Mazura Pizar, Dr Sam Yen Yen dan Dr V Jeyanny), dan lima orang pegawai menamatkan pengajian di peringkat ijazah Sarjana (Nur Fairuz Mat Yassin, Mohd Jamil Abd Wahab, Nurul Hilal Ahmad Tarmidzi, Lim Chung Lu dan Hema Thopla Govender). Tiga orang pegawai memperoleh ijazah Sarjana di bawah Skim Bantuan Penyelidikan FRIM (Nurul Farhanah Zakaria, Ahmad Fitri Zohari dan Yanti Abd Kadir). Tahniah diucapkan kepada semua dan saya harap pengetahuan dan pengalaman yang diraih di sepanjang pengajian menyediakan asas yang kukuh bagi meningkatkan peranan dan sumbangan mereka kepada institut.

Iltizam yang Diiktiraf

Seperti yang dinyatakan dalam Laporan Pengerusi, ramai penjawat awam FRIM mendapat pelbagai anugerah dan pengiktirafan atas usaha mereka baik di dalam mahupun di luar negara.

Saya ingin menyampaikan penghargaan saya kepada kumpulan projek Pengerian Suhu Tinggi (HTD) yang menerima anugerah Harta Intelek Negara 2014 dalam Kategori Paten serta menjadi finalis Anugerah Inovasi Antarabangsa 2014 Commonwealth Association for Public Administration and Management (CAPAM). Teknologi HTD menghapuskan penggunaan pengawet untuk merawat kayu gergaji dan mengurangkan masa pemprosesan kepada hampir 80% berbanding dengan kaedah konvensional. Ia merupakan penyelesaian yang ideal kepada masalah yang dihadapi oleh para pengusaha dan

Nurturing Innovation

While FRIM takes R&D to international level, the know-how and technology are being shared at home to strengthen the forest industry and to enhance forest protection and conservation. Innovation Day, an annual event in FRIM, continuously encourage the spirit of invention and innovation among both research as well as non-research staff. The event is intended to accord recognition to FRIM staff for their efforts in generating high quality and high value innovations besides to encourage sharing of innovative and creative ideas. This year alone, FRIM has filed for seven patents and registered a total of 26 invention disclosures. We have also witnessed the licensing of 12 technologies to local private companies in addition to 17 other research outputs that carry commercialisation potential.

In developing more competent researchers, FRIM constantly encourages the pursue of post-graduate studies among staff members. This year, five have obtained their PhD degree (Dr Norhayati Abdullah, Dr Mazura Pizar, Dr Sam Yen Yen and Dr V Jeyanny), and four have graduated with Masters degree (Nur Fairuz Mat Yassin, Mohd Jamil Abd Wahab, Nurul Hilal Ahmad Tarmidzi, Lim Chung Lu and Hema Thopla Govender) while another three obtained Masters under the FRIM Research Assistance Scheme (Nurul Farhanah Zakaria, Ahmad Fitri Zohari and Yanti Abd Kadir). Congratulations to all and I hope that the knowledge and experiences gained through studies will provide a strong foundation that will enhance their role and contribution to this institution.

Recognised Commitments

As mentioned earlier in the Chairman's Report, many researcher officers have gained recognition in their works at home and abroad.

I too would like to extend my appreciation to the High Temperature Drying (HTD) team for being granted the National Intellectual Property Award 2014 (NIPA)—Patent Category and for being a finalist of the Commonwealth Association for Public Administration and Management (CAPAM) 2014 International Innovations Awards. The HTD technology eliminates the use of preservatives when treating lumber and reduces the processing cycle time down to only 25% compared to the conventional method. It is thus an ideal solution to the concerns of the rubberwood furniture manufacturers and related wood-based industry as developed countries are imposing increasingly

industri berasaskan kayu kerana negara-negara maju mengenakan syarat-syarat yang ketat untuk produk mesra alam.

Kreativiti dalam penyelidikan turut mendapat pengiktirafan apabila Dr Mohd Khairun Anwar Uyup memenangi pingat emas BioInnovation Awards 2014. Tahniah kepada kumpulan penyelidik ini yang meneroka penggunaan papan buluh terawat yang didapati lebih tahan lama untuk kegunaan luaran, menjadi produk akhir yang lebih baik, mengurangkan masa dan kos pengeluaran sebanyak 15–20% dan memaksimumkan penggunaan batang buluh. Saya juga ingin mengucapkan setinggi-tinggi tahniah kepada dua kumpulan penyelidik yang diketuai oleh Dr Rushdan Ibrahim dan Dr Abdul Hamid Salleh; masing-masing merangkul satu pingat emas dan dua pingat perak di Ekspo Teknologi Malaysia ke-13 (MTE) 2014, dan Puan Tumirah Khadiran yang memenangi pingat emas di Pameran Reka Cipta dan Inovasi (i-ENVEX) ke-5. Saya harap pencapaian mereka dapat merangsang semangat lebih ramai penyelidik serta budaya inovatif dapat diterapkan dalam semua usaha R&D di FRIM.

Sesungguhnya saya sangat berbangga dengan pencapaian En. Khairuddin Kamarudin yang dipilih sebagai penerima Anugerah Buku Terbaik (Kategori Sains, Teknologi dan Perubatan) di Hari Anugerah Majlis Penerbitan Ilmiah Malaysia (MAPIM)-Kementerian Pendidikan Malaysia 2013 (MAPIM-KPM 2013).

Saya juga mengucapkan syabas kepada Dr Ismail Harun, Dr Nor Azah Mohamad Ali dan Dr Gan Kee Seng yang dianugerahkan pingat Ahli Mangku Negara (AMN) dan En. Mohd Afendi Hussin yang dianugerahkan Pingat Pangkuan Negara (PPN).

Pemindahan Teknologi

Sekiranya FRIM ingin memperkukuh kedudukannya sebagai pusat rujukan dalam penyelidikan perhutanan tropika, maklumat dan teknologi yang dijana daripada penyelidikan mestilah disebarluaskan serta dikongsi menerusi pelbagai cara agar dapat dimanfaatkan oleh orang awam daripada bengkel, simposium hinggalah kepada latihan yang dianjurkan.

Pada 2014, FRIM memainkan peranan penting dalam pemindahan teknologi menerusi pelbagai cara termasuklah beberapa siri bengkel, pameran dan lain-lain. Bengkel tentang pemprofilan dan pengekodjaluran DNA berjaya dianjurkan kepada 14 peserta dari agensi kerajaan, universiti dan syarikat swasta. Menerusi bengkel tersebut, peserta memperoleh pengetahuan secara teori tentang teknologi yang digunakan dalam pemprofilan dan

stringent requirements for environmentally-friendly products.

Creativity in research got rewarded when Dr Mohd Khairun Anwar Uyup won a gold medal at the BioInnovation Awards 2014. Congratulations to the research team that explored the use of treated plybamboo which is more durable for exterior applications, makes better end-products, cuts down production time and cost by 15–20% and maximises use of bamboo culms. I would also like to congratulate two different research teams led by Dr Rushdan Ibrahim and Dr Abdul Hamid Salleh who have bagged one gold and two silver medals respectively at the 13th Malaysia Technology Expo (MTE) 2014, and Mrs Tumirah Khadiran who won a gold medal at the 5th International Engineering Invention and Innovation Exhibition (i-ENVEX). I hope more researchers will be encouraged by these achievements and that the innovative culture will cemented into all R&D efforts in FRIM.

I am indeed proud of Mr Khairuddin Kamarudin who received the Best Book Award at the Malaysian Scholarly Publication Council (MAPIM)-Ministry of Education Malaysia 2013 (MAPIM-KPM 2013) Awards Ceremony (under the Science, Technology and Medicine Category).

I would also like to congratulate Dr Ismail Harun, Dr Nor Azah Mohamad Ali and Dr Gan Kee Seng as recipients of Ahli Mangku Negara (AMN) and Mr Mohd Afendi Hussin for being awarded the Pingat Pangkuan Negara (PPN).

Technology Transfer

If FRIM is to entrench as a centre of reference in tropical forestry research, information and technologies generated from research must be disseminated and shared through various means that benefits the public from workshops and symposiums to trainings.

In 2014, FRIM has assumed an instrumental role in technology transfer by various means which include a pipeline of workshops, exhibitions and others arranged throughout the year. A four-day DNA profiling and barcoding workshop was successfully convened for 14 participants from government institutions, universities and private companies. Through the workshop, participants gained a theoretical insight into the technologies used in DNA profiling and DNA barcoding besides hands-on experience in microsatellites genotyping, DNA sequencing

pengekodjaluran DNA. Di samping itu, mereka juga berpeluang mempelajari secara amali dalam genotip mikrosatelit, teknik penjujukan DNA dan analisis statistik profil dan kod jalur DNA. FRIM menganggap pendidikan alam sekitar (EE) sangat penting dalam meningkatkan kesedaran alam sekitar dan dengan itu menganjurkan satu bengkel dengan kerjasama FRIM-Malaysian Nature Society (MNS)-SHELL Nature Education Centre (NEC) bagi meningkatkan pembinaan keupayaan dalam kalangan pemudah cara yang mengendalikan program dan teknik-teknik pengajaran dan pembelajaran EE.

Dengan meningkatnya kebimbangan terhadap isu perubahan iklim, FRIM turut menawarkan kepakarannya dengan melaksanakan Latihan Teknikal Serantau tentang Penilaian Karbon pada Mac, dengan kerjasama U.S Agency for International Development-Supported Lowering Emissions from Asia's Forest (USAID-LEAF), International Tropical Timber Organization (ITTO), Jabatan Perhutanan Semenanjung Malaysia (JPSM) dan Jabatan Hutan Pahang. Usaha ini adalah untuk membantu Malaysia ke arah kebersediaan REDD dengan melatih para penyelidik dan pengurus hutan dalam penganggaran stok karbon hutan. Projek FRIM-ITTO REDDES menganjurkan bengkel konsultasi pemegang taruh yang bertajuk "Identifying and Addressing Drivers of Deforestation and Forest Degradation in Pahang State, Malaysia". Projek ini sedang menjalankan kajian perintis di Pahang tentang pengurangan pelepasan karbon ke atmosfera oleh sektor perhutanan. Dapatan daripada kajian ini diharap dapat membantu Malaysia dalam membuat keputusan yang lebih baik dalam Reducing Emissions from Deforestation and Forest Degradation in Developing Countries and Forest Conservation (REDD+).

FRIM turut menganjurkan Simposium Pemuliharaan Kebangsaan 2014 dari 11 hingga 14 Ogos yang bertema "Mengekalkan Khazanah Warisan Negara" di Kota Kinabalu dengan penyertaan seramai 65 peserta dari sektor kerajaan dan swasta. Objektif simposium adalah untuk mengumpul pakar-pakar dari FRIM dan pelbagai agensi kerajaan di Malaysia termasuklah institusi pengajian tinggi awam bagi berkongsi pengalaman dan pengetahuan tentang kaedah dan teknik pemuliharaan.

FRIM turut terlibat dalam sesi-sesi dialog dengan para pemegang taruh. Contohnya, Ceramah Teknologi Gaharu yang bertemakan "R, D&C ke arah Pengeluaran Gaharu secara Mampan" yang diadakan pada Disember tahun ini berjaya menarik 75 penyertaan. Ceramah ini bertujuan untuk menyoroti R, D & C FRIM tentang gaharu serta mengenal pasti jurang serta keperluan pihak industri bagi menyokong industri gaharu.

techniques and statistical analyses of DNA profiles and DNA barcodes. FRIM views environmental education (EE) as an important tool to enhance environmental awareness and has therefore organised a workshop in collaboration with FRIM-Malaysian Nature Society (MNS)-SHELL Nature education Centre (NEC) to strengthen capacity building among facilitators in managing programmes and impart techniques for teaching and learning EE.

With rising concerns over climate change issue, FRIM also rendered expertise by conducting the Regional Technical Training on Carbon Assessment in March, co-organised with U.S Agency for International Development-supported Lowering Emissions from Asia's Forest (USAID-LEAF), International Tropical Timber Organization (ITTO), Forestry Department Peninsular Malaysia (FDPM) and the Pahang Forestry Department (FD). The effort was to help Malaysia towards REDD-readiness by training researchers and forest managers in estimating forest carbon stocks in relation to climate change. Later this year, the FRIM-ITTO REDDES Project has conducted a stakeholders' consultation workshop on "Identifying and Addressing Drivers of Deforestation and Forest Degradation in Pahang State, Malaysia". The project is currently conducting pilot studies in Pahang on reducing emissions, particularly carbon, to the atmosphere from the forestry sector. Findings from these studies are expected to help Malaysia in making better informed decisions with regards to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries and Forest Conservation (REDD+).

From 11 to 14 August, FRIM organised the National Conservation Symposium 2014 themed "Sustaining the National Heritage Treasures" in Kota Kinabalu which was participated by over 65 participants from the government and private sector including the local universities and colleges. The aim of this symposium was to gather experts from FRIM and various other public agencies in Malaysia including public higher educational institutions to share knowledge and experiences on conservation methods and techniques.

FRIM has also engaged in dialogues with stakeholders to understand their concerns and to learn from them. For instance, the Agarwood Technology Talk themed "R,D&C for Sustainable Agarwood Production" held in December this year which attracted 75 participants. The talk aimed to highlight FRIM R, D&C in agarwood, and identify gaps and needs of the industry to further support the agarwood industry.

Perkhidmatan Perundingan Ikhtisas dan Ujian

Pada 2014, FRIM terus diberi kepercayaan untuk melaksanakan 62 khidmat perundingan ikhtisas yang bernilai RM3.2 juta, berbanding 55 khidmat perundingan bernilai RM2.3 juta pada 2013. Ini membuktikan bahawa kredibiliti dan kepakaran FRIM terus diiktiraf oleh para pemegang taruhnya baik dari sektor awam, swasta mahupun individu.

Antara perkhidmatan rundingan yang dilaksanakan adalah yang berkaitan dengan inventori keseluruhan dirian jati sebelum tebangan di Runggu, Tawau, Sabah, demonstrasi penyediaan sap, analisis dan pemisahan fiber batang kelapa sawit menggunakan kaedah R&D FRIM serta kajian inventori dan kesesuaian spesies pokok di Taman Persekutuan, Bukit Kiara, Kuala Lumpur. FRIM juga menawarkan khidmat kepakaran dalam penentuan nisbah gentian perekat dalam penghasilan pelet, penggunaan asid piroligneus daripada biojisim nanas sebagai bioawetan ke atas agen biodegradasi kayu serta penghutanan semula kawasan bekas lombong bijih timah.

Di samping khidmat perundingan, FRIM juga merupakan institusi yang berautoritatif dalam perkhidmatan ujian termasuk pengecaman kayu, nutrien tumbuhan serta ujian-ujian berkaitan pensijilan/akreditasi. Perkhidmatan ini berjaya menjana pendapatan melebihi RM900 ribu pada 2014. Pada tahun ini juga FRIM menerima hampir satu juta pelawat ke FRIM dan berjaya menjana pendapatan kira-kira RM1.5 juta daripada aktiviti ekopelancongan. Walau bagaimanapun, FRIM memutuskan untuk menghad kemasukan pengunjungnya kepada kira-kira 400 ribu orang sahaja pada 2015 demi mengekalkan ekosistem FRIM serta mengurangkan kerosakan kepada pelbagai kemudahan yang disediakan.

Pengurusan Kualiti

Saya menyanjung tinggi usaha yang tidak mengenal erti jemu seluruh warga FRIM dalam memastikan FRIM terus mengekalkan pensijilan MS ISO 9001:2008 menerusi Pemantauan Audit yang dijalankan pada 14–15 Oktober. Akreditasi diperoleh sejak 2007 bagi skop pengurusan R&D dan khidmat sokongan dalam pembangunan sektor perhutanan.

Makmal Entomologi Kayu dan Makmal Kimia Tanah berjaya memperoleh akreditasi MS ISO/IEC 17025. Makmal Kimia Tanah turut menerima Anugerah Perak Kecemerlangan Makmal Institut Kimia Malaysia (IKM) di majlis penyampaian anugerah IKM setelah berjaya meraih Anugerah Kecemerlangan Makmal IKM selama 10 tahun berturut-turut. FRIM turut

Consultancy and Testing Services

FRIM was entrusted to provide consultancy services for 62 projects amounting to RM3.2 million, an increase from RM2.3 million in 2013 with only 55 projects. This is evident that once again the credibility and expertise of FRIM are continuously recognized by stakeholders from both private and public sectors as well as from individuals.

Among the consultancies carried out include a complete inventory on teak stand before harvesting in Runggu, Tawau, Sabah, demonstration on sap preparation, analysis and separation of oil palm stem fibre using FRIM R&D and, a study on the inventory and tree species matching at Taman Persekutuan, Bukit Kiara, Kuala Lumpur. FRIM also offers expert services on determination of fibre and adhesive ratio in the production of pellet, utilisation of pyroligneous acid from pineapple biomass as biopreservation against wood biodegradation agent besides afforestation of ex-tin mine.

Other than consultancy services, FRIM is also an authoritative institution in testing services which include wood identification, plant nutrient and other tests regarding certification / accreditation. Testing services conducted in 2014 amounted to over RM900 000. This year, FRIM received more than one million visitors which generated about RM1.5 million from ecotourism activities. Nonetheless, FRIM has decided to reduce the number of visitors to about 400 000 in 2015 in view of ecosystem protection and to reduce damages on various infrastructure provided.

Quality Management

The relentless efforts of all in FRIM have enabled FRIM to retain the MS ISO 9001:2008 certification through Audit Monitoring conducted from 14–15 October. Since 2007, FRIM has obtained the MS ISO 9001:2008 certification for the management scope of research and development (R&D) and support services for the forestry sector development.

The Wood Entomology Lab and Soil Chemistry Lab were accredited with the MS ISO/IEC 17025 certification. The latter also received IKM Laboratory Excellence Silver Award at the Malaysian Institute of Chemistry's (IKM) awards presentation ceremony recently for attaining the IKM Laboratory Excellence Award for 10 consecutive years. FRIM has also

memperbaharu pensijilan Persekitaran Berkualiti/5S daripada Perbadanan Produktiviti Malaysia (MPC).

FRIM mewujudkan Khidmat Pensijilan Produk (FRIM PCS) pada 2013. Pada 2014, FRIM diakreditasi oleh Standard Malaysia sebagai sebuah Badan Pensijilan Produk ISO/IEC 17065. Ini merupakan salah satu sumbangan FRIM ke arah membantu industri berasaskan kayu dan lignoselulosa tempatan agar dapat memenuhi keperluan dan kehendak pengguna di pasaran. Setakat ini, empat syarikat tempatan mematuhi kriteria dan spesifikasi di bawah skim ini. Produk yang berjaya dipersijilkan ialah kerusi dan meja untuk sekolah rendah dan menengah.

Kesimpulan

Dengan pencapaian-pencapaian seperti yang dinyatakan, FRIM akan terus mengorak langkah ke arah mencapai kejayaan sepertimana yang dinyatakan dalam visi FRIM. Menjelang 2015, FRIM bakal menyambut ulang tahun penubuhannya yang ke-30; menyaksikan lebih banyak cabaran menanti di hadapan, FRIM bersedia ke arah memantapkan keberhasilan R, D & C memandangkan kita terikat dengan ekspektasi yang lebih tinggi daripada orang awam selaras dengan usaha kerajaan untuk “merakyatkan perkhidmatan.”

successfully renewed the Quality Environment (QE/5S) certification from the Malaysian Productivity Corporation (MPC).

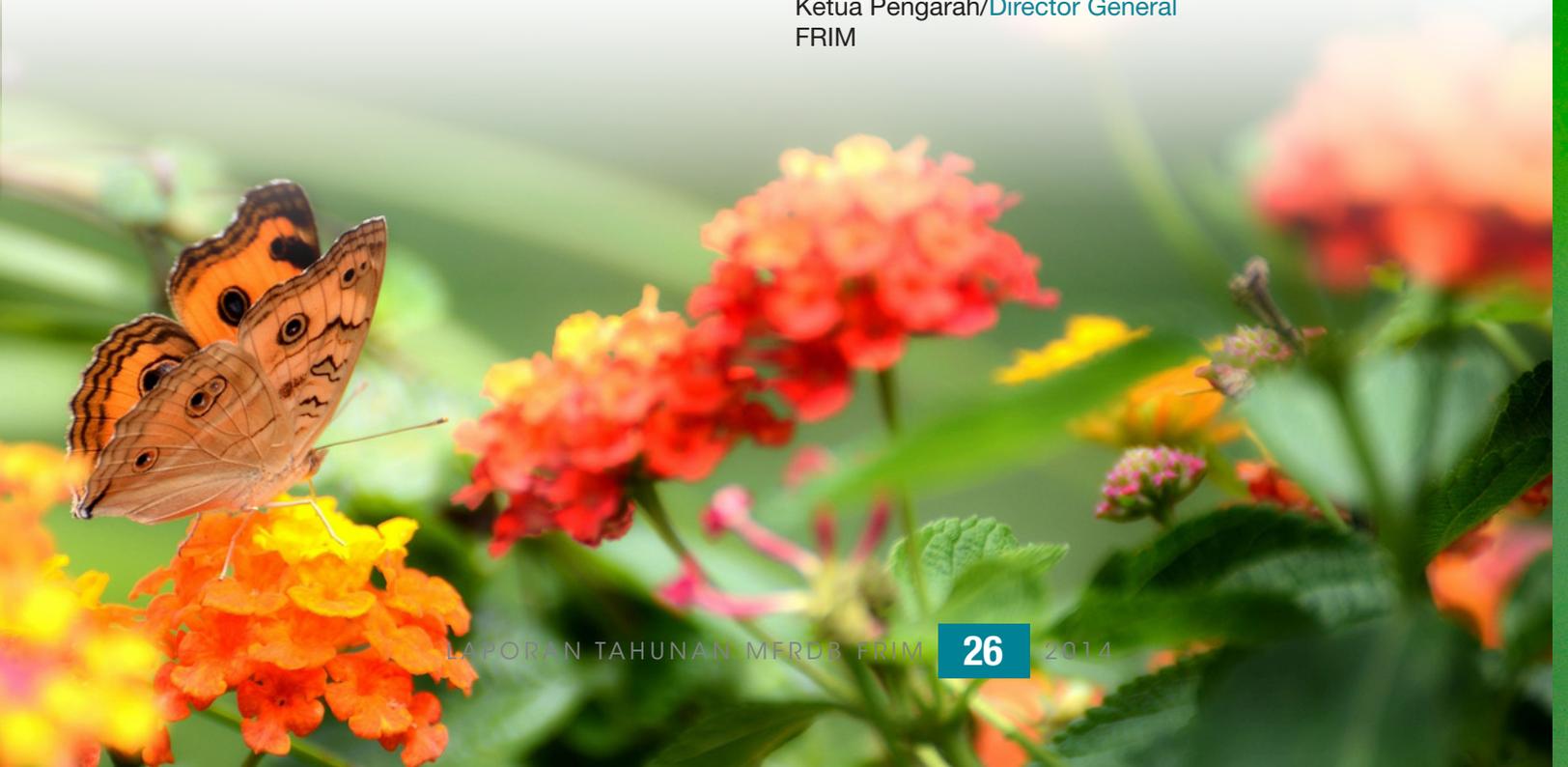
FRIM has established the FRIM Product Certification Service (FRIM PCS) in 2013. FRIM was subsequently accredited by Standard Malaysia as a Product Certification Body ISO/IEC 17065 in 2014. The product certification scheme aims to assist local downstream lignocellulosic- and wood-based manufacturing industry meet the standard requirements and needs of consumers in their products. To-date, four companies have shown compliance to the criteria and specifications under this scheme. The products certified were chairs and tables for primary and secondary schools.

Conclusive remark

With the aforementioned accomplishments, there are more reasons for FRIM to continue striving for more outstanding achievements and edging closer to our vision. As we usher in 2015, marking our 30th anniversary, and more challenging times ahead, FRIM is geared towards empowering its R,D&C as we brace for higher expectations from research outcomes by the public.



DATO' DR ABD. LATIF MOHMOD
DIMP, JSM, KMN, AMN
 Ketua Pengarah/Director General
 FRIM







PENGURUSAN TERTINGGI TOP MANAGEMENT

Duduk dari kanan ke kiri/**Sitting from right to left:**

Y.Bhg. Dato' Dr Hj Marzalina Hj Mansor, En/**Mr** Abdul Jabbar Hj Sabli, Dr Ismail Harun,
Dr Saw Leng Guan dan/**and** Dr Rahim Sudin

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

Dr Rasadah Mat Ali, Dr Khali Aziz Hamzah, Dr Ahmad Zuhaidi Yahya,
Dr Norini Haron, Dato' Dr Abd. Latif Mohmod, Dr Mohamed Nor Mohd. Yusoff,
En/**Mr** Mohd Zamshari Abd. Rahman, Dr Woon Weng Chuen dan/**and** Puan/**Mdm** Norhayati Nordin

Ketua Pengarah/Director General

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

Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)

Deputy Director General (Research and Development)

DR MOHAMED NOR MOHD. YUSOFF, KMN

Timbalan Ketua Pengarah (Operasi)
Deputy Director General (Operational)
DR NORINI HARON, AMN

Pengarah Bahagian Perhutanan dan Alam Sekitar
Director Forestry and Environment Division
DR ISMAIL HARUN

Pengarah Bahagian Keluaran Hutan
Director Forest Products Division
DR RAHIM SUDIN

Pengarah Bahagian Bioteknologi Perhutanan
Director Forestry Biotechnology Division
DR AHMAD ZUHAIIDI YAHYA

Pengarah Bahagian Biodiversiti Hutan
Director Forest Biodiversity Division
DR SAW LENG GUAN

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

Pengarah Bahagian Perancangan Penyelidikan
Director Research Planning Division
YBHG. DATO' DR MARZALINA MANSOR

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

Pengarah Bahagian Kewangan
Director Finance Division
TUAN HJ MOHD. ZAMSHARI ABD. RAHMAN

Pengarah Bahagian Sumber Manusia
Director Human Resource Division
PUAN/MDM HJH NORHARA HUSSEIN
(Sehingga Oktober/Until October)

Pengarah Bahagian Perkhidmatan Teknikal
Director Technical Services Division
DR KHALI AZIZ HAMZAH

Pengarah Bahagian Inovasi dan Komersialisasi
Director Innovation and Commercialization Division
DR WOON WENG CHUEN

Ketua Unit Komunikasi Korporat
Head Corporate Communications Unit
PUAN/MDM NORHAYATI NORDIN

CARTA ORGANISASI FRIM

FRIM ORGANISATION CHART

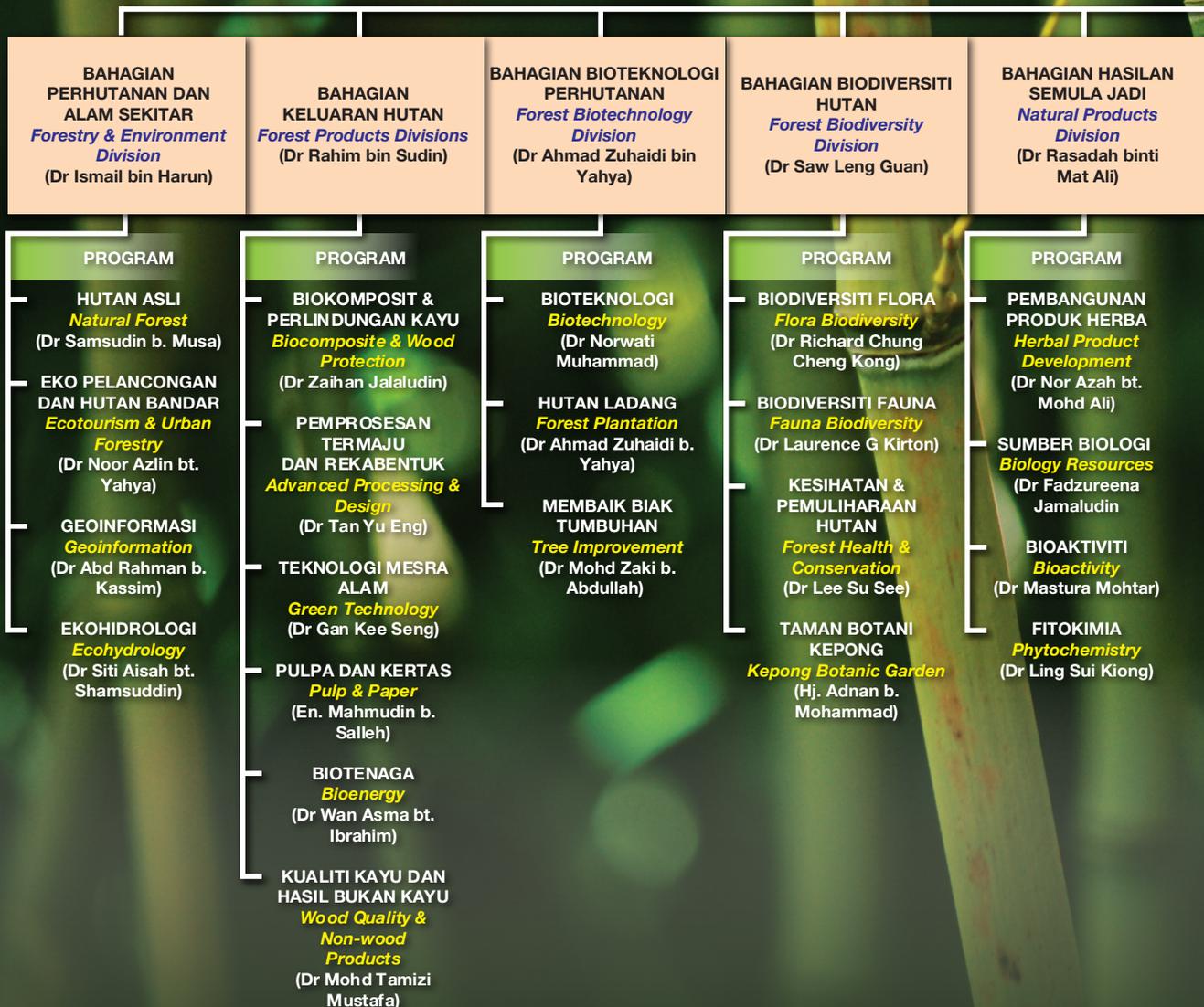
2014

JAWATANKUASA PENASIHAT
PENYELIDIKAN
Research Advisory Committee (RAC)

PANEL PENASIHAT TEKNIKAL
Technical Advisory Panel (TAP)

PENYELIDIKAN DAN PEMBANGUNAN
Research & Development

TIMBALAN KETUA PENGARAH (PENYELIDIKAN)
Deputy Director General (Research)
(DR MOHD NOR BIN MOHD YUSOFF)



KEMENTERIAN SUMBER ASLI DAN ALAM SEKITAR
Ministry of Natural Resources & Environment (NRE)

**LEMBAGA PENYELIDIKAN DAN PEMBANGUNAN
PERHUTANAN MALAYSIA**
*Malaysia Forestry Research & Development
Board (MFRDB)*

KETUA PENGARAH FRIM / *Director General FRIM*
(Y. BHG. DATO' DR ABD. LATIF BIN MOHMOD)

PEJABAT KETUA PENGARAH
Director General's Office

UNIT AUDIT DALAM
Internal Audit Unit
(Pn. Ilyani binti Mazlan)

UNIT UNDANG-UNDANG
Legal Affairs Unit
(Pn. Nor Azura binti Ahmad Murad)

UNIT KOMUNIKASI KORPORAT
Corporate Communication Unit
(Pn. Norhayati binti Nordin)

PENGURUSAN KUALITI
Quality Management
(Pn. Salamah binti Selamat)

UNIT INTEGRITI
Integrity Unit
(En. Mohd Asmawee bin Ismail)

**PERKHIDMATAN PERSIJILAN
PRODUK**
Product Certification Services

OPERASI DAN URUSAN KORPORAT
Operation & Corporate Affairs

TIMBALAN KETUA PENGARAH (OPERASI)
Deputy Director General (Operation)
(DR NOR'INI BINTI HARON)

**BAHAGIAN PERANCANGAN
PENYELIDIKAN**
*Research Planning
Division*
(Y. Bhg. Dato' Dr Marzalina
binti Mansor)

**BAHAGIAN
PENTADBIRAN**
Administration Division
(En. Abdul Jabbar bin
Hj. Sabli)

**BAHAGIAN INOVASI
DAN KOMERSIALISASI**
*Innovation &
Commercialisation
Division*
(Dr Woon Weng
Chuen)

BAHAGIAN KEWANGAN
Finance Division
(En. Mohd Zamshari
bin Abdul Rahman)

**BAHAGIAN SUMBER
MANUSIA**
*Human Resource
Division*
(KOSONG)

**BAHAGIAN
PERKHIDMATAN
TEKNIKAL**
*Technical Services
Division*
(Dr Khali Aziz bin
Hamzah)

CAWANGAN

**DASAR &
PERANCANGAN
PENYELIDIKAN**
*Policy & Research
Planning*
(Dr Nur Supardi b.
Md Noor)

PROGRAM

**EKONOMI & ANALISA
STRATEGIK**
*Economic & Strategic
Analysis*
(Dr Ismariah bt. Ahmad)

PERHUTANAN SOSIAL
Social Forestry
(Dr Lim Hin Fui)

CAWANGAN

PENTADBIRAN
Administration
(En. Zamri b.
Mohd Zangi)

**PEMBANGUNAN &
PENYELENGGARAAN**
*Development &
Maintenance*
(En. Noorsuhanis b.
Abdul Latif)

PEROLEHAN
Procurement
(Pn. Norli Raja Mohd)

CAWANGAN

**PENGURUSAN
HARTA INTELEK &
PELESENAN
TEKNOLOGI**
*Intellectual Property
Management &
Technology Licensing*

**PENGGOMERSIALAN
TEKNOLOGI**
*Technology
Commercialization*
(En. Nor Azman b.
Hussein)

**PENGURUSAN
PERUNDINGAN &
PERKHIDMATAN
IKHTISAS**
*Consultation
Management &
Professional Services*

**PUSAT TEKNOLOGI
HERBA**
*Herbal Technology
Center*
(En. Zamree b. Md Shah)

CAWANGAN

**KEWANGAN DAN
AKAUN**
Finance & Accounts
(Pn. Jumaaton bt.
Abu Bakar)

PENGURUSAN ASET
Asset Management
(Pn. Saizatul Maheeran
bt. Ramle)

CAWANGAN

PERJAWATAN
Establishment
(Mohd Asmawee b.
Ismail)

PERKHIDMATAN
Services
(Pn. Azuarni bt. Abd
Adzis)

LATIHAN
Training
(Pn. Liza bt. Ismail)

CAWANGAN

PERPUSTAKAAN
Library
(Pn. Mastura bt.
Buang)

**TEKNOLOGI
MAKLUMAT**
Information Technology
(En. Wan Zahiri b.
Wan Yaacob)

PENERBITAN
Publication
(Hj. Mohamad Zaki b.
Mohd Isa)



MAKLUMAT KORPORAT CORPORATE INFORMATION

LATAR BELAKANG

Institut Penyelidikan Perhutanan Malaysia (FRIM) ditubuhkan pada tahun 1929, dahulunya dikenali sebagai Institut Penyelidikan Perhutanan (IPP) di bawah Ibu Pejabat Jabatan Perhutanan Semenanjung Malaysia. Pada 1985 FRIM menjadi sebuah badan berkanun di bawah Akta 319 Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia dan diletakkan di bawah Kementerian Perusahaan Utama sebelum berpindah ke Kementerian Sumber Asli dan Alam Sekitar pada tahun 2004.

VISI

Menjadi peneraju dalam penyelidikan perhutanan tropika menjelang tahun 2020.

MISI

Menghasilkan inovasi dan penyelesaian permasalahan secara saintifik bagi memenuhi keperluan perhutanan masa kini dan akan datang.

OBJEKTIF

Objektif Umum FRIM adalah untuk:

- Menjana pengetahuan saintifik bagi pemahaman, pengurusan dan penggunaan sumber hutan

BACKGROUND

The Forest Research Institute Malaysia (FRIM) founded in 1929 as the Forest Research Institute (FRI) was a department under the Forestry Headquarters Peninsular Malaysia. It was not until 1985, the Institute became a statutory body under Act 319 governed by the Malaysian Forestry Research and Development Board (MFRDB) under the then Ministry of Primary Industries. Later in 2004, FRIM was administered by the Ministry of Natural Resources and Environment.

VISION

By 2020, FRIM will be a world leader in tropical forestry research.

MISSION

To deliver science-based innovations and solutions, meeting the forestry needs of today and tomorrow.

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,

- 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
- 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 commercialise 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.

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

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.

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 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.

FUNCTIONS

The main functions of FRIM are:

- planning and implementing research for the development of the forestry sector and conservation of forest resources,
- obtaining and disseminating research information to enhance forest management and the use of forest products,
- establishing joint research and joint forest development with other bodies within and outside Malaysia.

CORPORATE QUALITY POLICY

FRIM is committed to providing effective research and related supporting services to fulfil its Customers' needs. We ensure that those working with and for us shall be committed and adhered to the quality standards that have been identified. FRIM will carry out continual improvements to enhance the effectiveness of related systems.

DASAR KUALITI KORPORAT FRIM

FRIM komited menyediakan perkhidmatan penyelidikan dan perkhidmatan sokongan berkaitan dengan cekap dan berkesan bagi memenuhi keperluan pelanggannya. Kami akan memastikan semua yang bekerja dengan kami bersama-sama bertanggungjawab dan mematuhi standard kualiti yang telah ditetapkan. FRIM akan melaksanakan penambahbaikan berterusan bagi meningkatkan keberkesanan sistem berkaitan.

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 yang berikut:

- Memastikan 90% khidmat nasihat dan perundingan diberi kepada pelanggan dalam tempoh 14 hari daripada tarikh permohonan,
- Memastikan 30% artikel jurnal dihasilkan dalam jurnal berfaktor impak (Pelaporan dibuat setiap tiga (3) bulan sekali),
- Memproses pembayaran bil & invois dalam tempoh 14 hari dari tarikh penerimaan dokumen yang lengkap,
- Memastikan 95% keputusan perkhidmatan ujian diserahkan kepada pelanggan dalam tempoh yang dijanjikan,
- Memastikan 95% laporan pembekalan perkhidmatan diserahkan kepada pelanggan dalam tempoh yang dijanjikan,
- Memberi maklum balas berhubung aduan pelanggan dalam tempoh lima (5) hari bekerja,
- Memuat naik maklumat terkini di portal FRIM dalam tempoh dua (2) hari bekerja,
- Memberi maklum balas berhubung permohonan latihan industri/sangkut dalam tempoh tujuh (7) hari bekerja,
- Memberi maklum balas berhubung permohonan sewaan ruang/kawasan/peralatan dalam tempoh lima (5) hari bekerja dan
- Memastikan 80% projek penyelidikan dilaksanakan dalam tempoh yang ditetapkan oleh penaja (Pelaporan dibuat setiap 6 bulan sekali).

DASAR KUALITI OPERASI

Kami bertanggungjawab:

- menjalankan penyelidikan dan memberikan perkhidmatan yang berkualiti secara profesional bersesuaian dengan keperluan dan jangkaan pelanggan dalam bidang perhutanan tropika dan keluaran hutan,
- melaksanakan Sistem Pengurusan Kualiti (SPK) secara berkesan untuk skop

CLIENTS' CHARTER

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

- 90% provision of advisory and consulting services to the customer within 14 days from the application date,
- 30% publication of journal articles in impact factor journals (Reporting at every three (3) months),
- Process payment for bills and invoices within 14 days receipt of complete documents,
- 95% of test results submitted to the customer within the stipulated time,
- 95% submission of test report to the clients within the stipulated period,
- Provide feedback on customer complaints within five (5) working days,
- Uploading the latest information at FRIM portal within two (2) working days,
- Provide feedback on the application of industrial training / outboard within seven (7) working days,
- Provide feedback on application to rent space / area / equipment within five (5) working days and
- 80% of research projects are carried out within the time frame stipulated by sponsors (Reporting at 6 monthly intervals).

OPERATIONAL QUALITY POLICY

We are responsible for:

- conducting research and providing quality professional services appropriate to the customers' needs and expectations in the tropical forestry and forest product sectors,
- implementing Quality Management System (QMS) effectively within the scope of research, training, testing & calibration, selling, renting and consultancy services, in accordance to MS ISO 9001 requirements,
- monitoring the effectiveness in the implementation of the QMS through feedback received from customers,
- ensuring that the continual improvement on the current quality objectives through effective corrective and preventive actions based on the key performance indicator analysis which is done consistently,
- ensuring that all procedures and services provided to customers are reviewed to meet the standard requirements,
- ensuring that any failure towards achieving the identified standard is reviewed and evaluated to be used as a reference in the continual improvement process,

- perkhidmatan penyelidikan, latihan, ujian & tentukan, jualan, sewaan, perundingan dan khidmat nasihat yang memenuhi keperluan ISO 9001,
- memantau keberkesanan pelaksanaan SPK melalui maklum balas yang diterima daripada pelanggan,
 - memastikan peningkatan secara berterusan ke atas objektif kualiti yang sedia ada melalui tindakan pembetulan dan pencegahan berdasarkan hasil analisis petunjuk kualiti yang dilakukan secara konsisten dan menyeluruh,
 - memastikan semua prosedur dan perkhidmatan yang disediakan untuk pelanggan melalui proses penyemakan agar standard yang ditetapkan dapat dicapai,
 - memastikan sebarang kegagalan dalam mencapai standard yang ditetapkan akan disemak dan dinilai untuk digunakan sebagai rujukan dalam proses peningkatan berterusan,
 - memastikan dasar ini difahami oleh kakitangan FRIM melalui taklimat, mesyuarat dan pameran poster, dan
 - memastikan setiap kakitangan FRIM melaksanakan polisi dan prosedur dalam semua aspek perkhidmatan yang diberikan kepada pelanggan.

- ensuring that the quality policy is understood by FRIM's personnel through briefings, meetings and poster exhibitions,
- ensuring that all personnel implement the policies and procedures in all aspects services provided to the customers.

QUALITY SLOGAN

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

QUALITY ENVIRONMENT SLOGAN

- Quality environment as catalyst to excellence in productivity

FRIM STRATEGIC PLAN 2011–2020

- Strategy 1: Income Generation
- Strategy 2: R&D Strategies
- Strategy 3: Commercialisation of R&D Output
- Strategy 4: Ecotourism
- Strategy 5: ICT Application and Services
- Strategy 6: Human Resource Development
- Strategy 7: Technical Services
- Strategy 8: Communication and Promotion in R&D

SLOGAN KUALITI

Kualiti teras kecemerlangan, Inovasi kunci keunggulan

SLOGAN PERSEKITARAN BERKUALITI

- Persekitaran berkualiti pemangkin kecemerlangan produktiviti

PELAN STRATEGIK FRIM 2011–2020

- Strategi 1: Penjanaan Pendapatan
- Strategi 2: Strategi-strategi R&D
- Strategi 3: Komersialisasi Out Put R&D
- Strategi 4: Ekopelancongan
- Strategi 5: Aplikasi dan Perkhidmatan ICT
- Strategi 6: Pembangunan Sumber Manusia
- Strategi 7: Perkhidmatan Teknikal
- Strategi 8: Komunikasi dan Promosi R&D

STESEN-STESEN PENYELIDIKAN FRIM (SPF)

FRIM RESEARCH STATIONS



FRIM menawarkan pelbagai kemudahan untuk menjalankan penyelidikan termasuk sembilan buah stesen penyelidikan yang terletak di beberapa buah negeri yang mewakili pelbagai jenis hutan di Semenanjung Malaysia seperti yang berikut:

1. Stesen Penyelidikan FRIM (SPF) Pasoh

- Stesen penyelidikan FRIM yang pertama ditubuhkan pada 1970 di bawah Man and Biosphere Programme, Universiti Malaya.
- Dipindah hak milik kepada Institut Penyelidikan Perhutanan (FRI) pada 1978.
- Terletak di Hutan Simpan Penyelidikan Pasoh yang meliputi kawasan seluas 1,840 ha yang diwartakan untuk tujuan penyelidikan dan pendidikan yang diuruskan oleh FRIM.
- Mendapat perhatian daripada saintis dan ahli ekologi hutan tropika seluruh dunia, serta pendidik dan penggemar alam sekitar tempatan.
- Terdapat sebuah petak ekologi kekal seluas 50 ha, arboretum seluas 2 ha, denai alam berpandu sepanjang 2 km dan sistem menara titian kanopi setinggi 30 m diperbuat daripada aluminium dan aloi yang pertama seumpamanya di negara ini.
- Hutan Simpan Penyelidikan Pasoh merupakan hutan pamah tropika yang paling menyeluruh dikaji di rantau Asia.
- Antara projek penyelidikan yang aktif dijalankan di bawah penyelarasan SPF Pasoh ialah projek pemantauan fenologi, dinamik pokok hutan, stok karbon, kepelbagaian fauna dan pemantauan mikro iklim. Projek-projek tersebut dijalankan dengan kerjasama institusi/universiti antarabangsa termasuk daripada Jepun, Taiwan dan Amerika Syarikat.

Sila hubungi: Program Hutan Asli
Tel: +603-6279 7638/7177
E-mail: cdfletcher@frim.gov.my

FRIM offers a wide range of facilities for conducting research including nine (9) research stations in different states to represent various forest types in various parts of Peninsular Malaysia, namely:

1. FRIM Research Station Pasoh, Negeri Sembilan:

- FRIM's oldest research station, established in 1970 under the Man and Biosphere Programme, University of Malaya.
- Handed over to the Forest Research Institute (FRI) in 1978.
- Located in the Pasoh Research Forest Reserve (FR), covering a total area of 1,840 ha gazetted for research and educational purposes managed by FRIM.
- Receives worldwide attention from tropical forest ecologists and scientists, as well as local educators and naturalists.
- Comprises a 50-ha permanent ecology plot, a 2-ha arboretum, a 2-km nature trail and a 30-m three-tower-canopy walkway system made of aluminum alloy, the first of its kind in the country.
- The Pasoh Research FR is the best studied lowland tropical forest in Asia.
- Among the current research projects coordinated by SPF Pasoh are phonological observations, forest trees dynamics, carbon stock pools, fauna diversity and micro climate monitoring. These projects are in collaboration with international institutes/universities including from Japan, Taiwan and the United States of America.

Contact: Natural Forest Programme
Tel: +603-6279 7638/7177
E-mail: cdfletcher@frim.gov.my

2. Stesen Penyelidikan FRIM Mata Ayer, Perlis:

- Ditubuhkan pada 1974, stesen ini terletak di kawasan seluas 455 ha dalam Hutan Simpan Mata Ayer.
- Penyelidikan berkaitan bidang membaik biak spesies perhutanan—pokok dan herba merupakan keutamaan di stesen ini. Antaranya ialah penyelidikan tentang *Tectona grandis* (jati), *Endospermum malaccense* (sesenduk), *Macaranga tanarius* (mahang), *Tinospora crispa* (patawali), *Labisia pumila* (kacip fatimah), *Eurycoma longifolia* (tongkat ali) dan *Citrus microcarpa* (limau kasturi). Namun begitu, *T. grandis* masih menjadi teras utama dalam bidang penyelidikan di stesen ini. Pihak pengurusan melalui Jawatankuasa SPF telah menetapkan hala tuju bagi menjadikan stesen ini sebagai Pusat Rujukan Membaik Biak Jati.
- Seluas 300 ha telah ditanam dengan jati dari pelbagai provenans seperti Thailand, Indonesia, India, Papua New Guinea, Trinidad dan Sabah.
- Dilengkapi dengan kemudahan untuk aktiviti-aktiviti pendidikan ekopelancongan dan alam sekitar termasuk titian silara, kemudahan penginapan dan tapak perkhemahan.

Sila hubungi: Program Membaik Biak Tumbuhan
Tel: +603-6279 7098 / E-mail: zaky@frim.gov.my atau Mata Ayer Research Station.
Tel: +604-9456235 / E-mail: ramlyps@frim.gov.my

3. Stesen Penyelidikan FRIM Jengka:

- Ditubuhkan pada 1982, berkeluasan 0.9 ha dan berfungsi sebagai pusat rujukan penyelidikan dan destinasi bagi aktiviti ekopendidikan perhutanan terutama dalam bidang pengurusan hutan.
- Merupakan pusat petak-petak demonstrasi bagi penyelidikan.
- Menggunakan kawasan ini secara optimum terutamanya untuk kajian jangka masa panjang.
- Mewujudkan satu platform untuk FRIM dan pihak jabatan perhutanan untuk bekerjasama dalam usaha-usaha penyelidikan, pembangunan dan pengurusan hutan
- Terdapat pelbagai kemudahan seperti bilik penginapan, bilik mesyuarat, makmal, dapur, surau, internet dan sebagainya.
- Digunakan juga untuk menjalankan kursus/ latihan, penempatan sementara pokok tanaman dan sebagainya.

Sila hubungi: Program Hutan Asli
Tel: +603-6279 7182 / 7164
E-mail: sallehmt@frim.gov.my

2. FRIM Research Station Mata Ayer, Perlis:

- Established in 1974, this research station is located over an area of 455 ha in Mata Ayer Forest, Perlis.
- The main research area at the station is plant improvement of forest species including trees and herbs. Among the species involved are *Tectona grandis* (teak), *Endospermum malaccense*, *Macaranga tanarius*, *Tinospora crispa*, *Labisia pumila*, *Eurycoma longifolia* and *Citrus microcarpa* (Kaffir lime). However, teak is the main thrust area of research activities in this station. The Committee of the FRIM's Research Station (SPF) has set the vision for this station as a Reference Center for Teak Improvement Program.
- About 300 ha of the station have been planted with teak of various provenances such as Thailand, Indonesia, India, Papua New Guinea, Trinidad and Sabah.
- The station is equipped with facilities for ecotourism activities and environmental education including a canopy walkway, accommodation and campsites.

Contact: Plant Improvement Programme
Tel: +603-6279 7098 / E-mail: zaky@frim.gov.my or SPF Mata Ayer Research Station.
Tel: +604-9456235 / E-mail: ramlyps@frim.gov.my

3. FRIM Research Station Jengka, Pahang:

- Established in 1982, covers an area of 0.9 ha and serves as a referral center for research and destinations for eco-forestry education activities especially in the field of forest management.
- A centre of demonstration plots for researches.
- To optimise the use of this area for long-term studies.
- Establish a platform for FRIM and the forestry department to cooperate in research, development and forest management.
- Has various facilities such as guest houses, meeting rooms, laboratories, kitchens, prayer room, internet and others.
- In addition, the station is also used to run the course/ training, temporary placement for trees and others.

Contact: Natural Forest Programme
Tel: +603-6279 7182 / 7164
E-mail: sallehmt@frim.gov.my

4. Stesen Penyelidikan FRIM Segamat, Johor:

- Ditubuhkan pada 2003, stesen ini merangkumi kawasan seluas 292.2 ha.
- Berfungsi sebagai pusat rujukan untuk penyelidikan tentang perladangan spesies campuran, dengan tumpuan khas kepada karas.
- Sebanyak 93 ha telah ditanam dengan *Aquilaria malaccensis* (karas), *Dyera costulata* (jelutong), *Hopea odorata* (merawan), *Khaya ivorensis*, *Palaquium gutta* (nyatuh), *Shorea roxburghii* (meranti temak nipis) dan *Azadirachta excelsa* (sentang).

Sila hubungi: Program Membaik Biak Tumbuhan
Tel: +603-6279 7092
E-mail: mohdnoor@frim.gov.my

5. Stesen Penyelidikan FRIM Setiu, Terengganu:

- Terletak di kawasan seluas 53 ha yang dipajakkan kepada FRIM oleh Kerajaan Negeri pada 1996.
- Tumbuhan asal terdiri daripada *Syzygium* spp. (kelat), *Malaleuca cajuputi* (gelam), *Shorea metarialis* (balau pasir), *Rhodomyrtus tomentosa* (kemunting), *Melastoma malabathricum* (senduduk), *Baeckea frutescens* (cucur atap), *Casuarina equisetifolia* (ru pantai) dan beberapa spesies sekunder yang lain.
- Menjalankan aktiviti penyelidikan dan menyebarkan maklumat berkenaan penanaman pokok di atas tanah BRIS, mengenal pasti spesies pokok hutan ladang yang berpotensi ditanam di tanah BRIS, mempromosi penggunaan tanah BRIS dengan tanaman spesies pokok hutan yang bernilai komersial dan membangunkan teknik yang menjimatkan kos bagi penanaman pokok di tanah jenis bermasalah ini.
- Antara spesies yang telah ditanam ialah *Acacia hybrid* (Akasia hybrid), *Khaya ivorensis*, *Hopea odorata* (merawan siput jantan), *Eurycoma longifolia* (tongkat ali) dan *Jatropha curcas* (jarak).

Sila hubungi: Program Hutan Ladang
Tel: +603-6279 7091 / E-mail: rosdi@frim.gov.my

4. FRIM Research Station Segamat, Johor:

- Established in 2003 and covers a total of 292.2 ha.
- Serves as a referral centre for research on mixed species plantations with special focus on *Aquilaria malaccensis* (agarwood).
- Some 93 ha of the area have been planted with *Aquilaria malaccensis*, *Dyera costulata*, *Hopea odorata*, *Khaya ivorensis*, *Palaquium gutta*, *Shorea roxburghii* and *Azadirachta excelsa*.

Contact: Tree Improvement Programme
Tel: +603-6279 7092
E-mail: mohdnoor@frim.gov.my

5. FRIM Research Station Setiu, Terengganu:

- Situated in a 53-ha land, leased by the state government to FRIM in 1996.
- The original vegetation includes *Syzygium* spp., *Malaleuca cajuputi*, *Shorea metarialis*, *Rhodomyrtus tomentosa*, *Melastoma malabathricum*, *Baeckea frutescens*, *Casuarina equisetifolia* and a few other secondary species.
- Conducts research activities and disseminates information on tree planting on BRIS soil, identifies potential forest species that can be grown on BRIS soil, promotes the use of BRIS soil for planting commercial forest species and develops cost-effective tree planting techniques.
- Among the species planted are *Acacia hybrid*, *Khaya ivorensis*, *Hopea odorata*, *Eurycoma longifolia* and *Jatropha curcas*.

Contact: Forest Plantation Programme
Tel: +603-6279 7091 / E-mail: rosdi@frim.gov.my

6. Stesen Penyelidikan FRIM Maran, Pahang:

- Ditubuhkan pada 2000, stesen yang meliputi kawasan seluas 50 ha ini berfungsi sebagai pusat rujukan untuk penubuhan ladang herba.
- Kerja penanaman *Eurycoma longifolia* (tongkat ali), *Ortosiphon stamineus* (misai kucing) dan *Morinda citrifolia* (mengkudu) mula dilaksanakan pada 2000.
- Penanaman pada 2003 melibatkan *Labisia pumila* (kacip fatimah), *Mentha arvensis* (pudina), *Elephantopus scaber* (tutup bumi) dan *Curcuma domestica* (kunyit) di ladang kelapa sawit.
- Setakat ini, kawasan seluas 20 ha ditanam dengan pelbagai tumbuhan ubatan seperti *Tinospora crispera* (patawali), *Aquilaria malaccensis* (karas), *Parkia speciosa* (petai), *Hopea odorata* (merawan siput jantan), *Khaya senegalensis* (African mahogany), *Peperomia pellucida* (ketumpangan air), *Cinnamomum zeylanicum* (kayu manis), *Centella asiatica* (pegaga), *Citrus hystrix* (limau purut), *Citrus aurantifolia* (limau nipis), *Cymbopogon citradus* (serai makan), *Cymbopogon nardus* (serai wangi), *Vitex negundo* (legundi), *Neolamarckia cadamba* (kelampayan) dan *Garcinia atroviridis* (asam gelugur).

Sila hubungi: Program Sumber Biologi
Tel: +603-6279 7330 / E-mail: zamree@frim.gov.my

7. Stesen Penyelidikan FRIM Bidor, Perak:

- Kawasan tanah bekas lombong merangkumi 121.5 ha ini dipajakkan kepada FRIM oleh Kerajaan Negeri Perak pada 1996.
- Merupakan tapak kajian bagi projek-projek penyelidikan kebangsaan dan antarabangsa yang berkaitan dengan penghutan semula, biodiversiti, pengaruh hutan, fitopemulihan dan ekoketoksikan.
- Stesen ini akan dibangunkan selaras dengan blue print dari 2013 hingga 2020.
- Ia akan dibahagikan kepada Zon Rekreasi, Zon Pengetahuan serta Zon Pemuliharaan dan Penyelidikan.
- Konsepnya adalah untuk membangunkan stesen ini sebagai taman ekoantarabangsa yang mempunyai kepelbagaian biologi hutan hujan tanah pamah.

Sila hubungi: Program Hutan Ladang
Tel: +603-6279 7103/7096
E-mail: anglh@frim.gov.my

6. FRIM Research Station Maran, Pahang:

- Established in 2000, the station covers an area of 50 ha and acts as a referral centre for the establishment of a herbal plantation.
- Planting began with *Eurycoma longifolia*, *Ortosiphon stamineus* and *Morinda citrifolia* in open area.
- Subsequent planting in 2003 included *Labisia pumila*, *Mentha arvensis*, *Elephantopus scaber* and *Curcuma domestica* in oil palm plantations.
- Some 20 ha of the area have been planted with various plants such as *Tinospora crispera*, *Aquilaria malaccensis*, *Parkia speciosa*, *Hopea odorata*, *Khaya senegalensis* (African mahogany), *Peperomia pellucida*, *Cinnamomum zeylanicum*, *Centella asiatica*, *Citrus hystrix*, *Citrus aurantifolia*, *Cymbopogon citradus*, *Cymbopogon nardus*, *Vitex negundo*, *Neolamarckia cadamba* and *Garcinia atroviridis*.

Contact: Biological Resources Programme
Tel: +603-6279 7330 / E-mail: zamree@frim.gov.my

7. FRIM Research Station Bidor, Perak:

- Leased by the Perak State Government to FRIM in 1996, the station covers an area of 121.5 ha.
- A research site for national and international research projects on afforestation, biodiversity, forest influences, phytoremediation and ecotoxicity.
- The station will be developed according to a blue print from 2013 to 2020.
- It will be divided into Recreation Zone, Knowledge Zone and, Conservation and Research Zone.
- The concept is to transform the station into an international eco-park that habitats the biodiversity of lowland rainforests.

Contact: Forest Plantation Programme
Tel: +603-6279 7103/7096
E-mail: anglh@frim.gov.my

8. Stesen Penyelidikan FRIM Jeli, Kelantan:

- Ditubuhkan pada 2008 dengan kelulusan Kerajaan Negeri.
- Meliputi kawasan seluas 200 ha.
- Terletak di Mukim Belimbing, Daerah Batu Melintang, Jajahan Jeli.
- Tapak penyelidikan bagi pemuliharaan kepelbagaian biologi, pemuliharaan buluh semantan (*Gigantochloa scortechinii*), ujian provenan untuk *Eurycoma longifolia* (tongkat ali) dan ladang hutan termasuk *Aquilaria malaccensis* (karas), *Tectona grandis* (jati), *Macaranga tanarius* (mahang), *Eucalyptus deglupta* dan *Eucalyptus* hybrid.

Sila hubungi: Program Hutan Ladang

Tel: +603-6279 7192

E-mail: abdrazak@frim.gov.my; emlee@frim.gov.my

9. Stesen Penyelidikan FRIM Selandar, Melaka:

- Ditubuhkan pada 2009 atas kelulusan Kerajaan Negeri dan Jabatan Perhutanan.
- Kawasan meliputi seluas 30 ha dan terletak di Mukim Selandar, Daerah Jasin.
- Kawasan seluas 10 ha dibersihkan untuk uji tanam pelbagai klon, spesies berpotensi dan tumbuhan herba
- Antara spesies klon yang diuji tanam termasuklah *Aquilaria malaccensis* (karas), *Dyera costulata* (jelutong), *Endospermum malaccense* (sesenduk) dan *Eucalyptus deglupta*
- Spesies berpotensi termasuklah *Paraserianthes falcataria* (batai), *Eucalyptus* hybrid (*E. grandis* x *E. urophylla*), *Macaranga tanarius* (mahang) dan pelbagai spesies *Aquilaria*
- Merupakan tapak penyelidikan hutan ladang dan pemuliharaan ex-situ spesies *Shorea*.
- Tanaman spesies dalam penyediaan termasuklah *Santalum album* (cendana) dan *Labisia pumila* (kacip fatimah) yang dikeluarkan oleh Makmal Kultur Tisu FRIM.

Sila hubungi: Program Hutan Ladang

Tel: +603-6279 7093

E-mail: zuhaidi@frim.gov.my; dasrul@frim.gov.my

8. FRIM Research Station Jeli, Kelantan:

- Established in 2008 with the approval from state government.
- Covers an area of 200 ha.
- Located in Mukim Belimbing, Batu Melintang District, Jajahan Jeli, Kelantan.
- Research site for biodiversity conservation, conservation of natural bamboo stands (*Gigantochloa scortechinii*), provenance trial of *Eurycoma longifolia* and forest plantation including *Aquilaria malaccensis*, *Tectona grandis*, *Macaranga tanarius*, *Eucalyptus deglupta* and *Eucalyptus* hybrid.

Contact: Forest Plantation Programme

Tel: +603-6279 7192

E-mail: abdrazak@frim.gov.my; emlee@frim.gov.my

9. FRIM Research Station Selandar, Melaka:

- Established in 2009, with approval from the state government and state forestry department.
- Covers a total of 30 ha and located in Mukim Selandar, Jasin District.
- A 10-ha area has been cleared for trial planting of various clones and species as well as herbs
- Clones tested include agarwood (*Aquilaria malaccensis*), *Dyera costulata*, *Endospermum malaccense* and *Eucalyptus deglupta*.
- Potential species include *Paraserianthes falcataria*, *Eucalyptus* hybrid (*E. grandis* x *E. urophylla*), *Macaranga tanarius* and various *Aquilaria* species.
- A site for forest plantation research and ex-situ conservation of *Shorea* species.
- Species that are being prepared for planting include *Santalum album* and *Labisia pumila* which are produced by the Tissue Culture Lab in FRIM.

Contact: Forest Plantation Programme

Tel: +603-6279 7093

E-mail: zuhaidi@frim.gov.my; dasrul@frim.gov.my



PERKHIDMATAN TEKNIKAL TECHNICAL SERVICES

BIODIVERSITI HUTAN

PENGECAMAN SPESIMEN TUMBUHAN

Hubungi: RICHARD CHUNG CHENG KONG (DR)
Tel: 03-62797231 E-mail: richard@frim.gov.my

PENGECAMAN SAMPEL YANG DIJANGKITI PENYAKIT/SAMPEL YANG DISERANG SERANGGA PEROSAK

Hubungi: ONG SU PING
Tel: 03-62797717 Email: ongsuping@frim.gov.my

PENGECAMAN PENYAKIT POKOK DAN KULAT

Hubungi: MOHD. FARID AHMAD (DR)
Tel: 03-62797119 E-mail: mohd.farid@frim.gov.my

BIOTEKNOLOGI PERHUTANAN

SURVEI TANAH, PENENTUAN KESUBURAN TANAH DAN PENYEDIAAN PETA TANAH UNTUK PENUBUHAN LADANG HUTAN

Hubungi: JEYANNY VIJAYANATHAN (DR)
Tel: 03-62797136 E-mail: jeyanny@frim.gov.my

ANALISIS TANAH

Hubungi: WAN RASIDAH WAN A. KADIR (DR)
Tel: 03-62797301 E-mail: rashidah@frim.gov.my

FOREST BIODIVERSITY

IDENTIFICATION OF PLANT SPECIMEN

Contact: RICHARD CHUNG CHENG KONG (DR)
Tel: 03-62797231 E-mail: richard@frim.gov.my

IDENTIFICATION OF INFESTED SAMPLE/SAMPLE ATTACKED BY INSECT PEST

Contact: ONG SU PING
Tel: 03-62797717 Email: ongsuping@frim.gov.my

IDENTIFICATION OF TREE DISEASE AND FUNGUS

Contact: MOHD. FARID AHMAD (DR)
Tel: 03-62797119 E-mail: mohd.farid@frim.gov.my

FOREST BIOTECHNOLOGY

SOIL SURVEY, SOIL FERTILITY DETERMINATION AND SOIL MAP PREPARATION FOR FOREST PLANTATION ESTABLISHMENT

Contact: JEYANNY VIJAYANATHAN (DR)
Tel: 03-62797136 E-mail: jeyanny@frim.gov.my

SOIL ANALYSIS

Contact: WAN RASIDAH WAN A. KADIR (DR)
Tel: 03-62797301 E-mail: rashidah@frim.gov.my

ANALISIS NUTRIEN TUMBUHAN

Hubungi: WAN RASIDAH WAN A. KADIR (DR)
Tel: 03-62797301 E-mail: rashidah@frim.gov.my

JUALAN STOK TANAMAN

Hubungi: SITI SALWANA HASHIM (DR)
Tel: 03-62797124 E-mail: salwana@frim.gov.my

SUMBANGAN ANAK BENIH/TANAMAN KEPADA SEKOLAH, AGENSI KERAJAAN DLL.

Hubungi: SITI SALWANA HASHIM (DR)
Tel: 03-62797124 E-mail: salwana@frim.gov.my

KURSUS DAN LATIHAN

Hubungi: AHMAD FAUZI MOHD SHARIFF
Tel: 03-62797125 E-mail: afauzi@frim.gov.my

KHIDMAT NASIHAT TENTANG TEKNIK TAPAK SEMAIAN

Hubungi: AHMAD FAUZI MOHD SHARIFF
Tel: 03-62797125 E-mail: afauzi@frim.gov.my

KAJIAN KEMUNGKINAN PENUBUHAN HUTAN LADANG

Hubungi: AHMAD ZUHAI DI YAHYA (DR)
Tel: 03-62797093 E-mail: zuhaidi@frim.gov.my

PENYEDIAAN PROSEDUR OPERASI STANDARD UNTUK LADANG HUTAN

Hubungi: AHMAD ZUHAI DI YAHYA (DR)
Tel: 03-62797093 E-mail: zuhaidi@frim.gov.my

RANCANGAN KERJA UNTUK LADANG HUTAN SWASTA/NEGERI

Hubungi: AHMAD ZUHAI DI YAHYA (DR)
Tel: 03-62797093 E-mail: zuhaidi@frim.gov.my

KAJIAN PENGHIJAUAN TANAH BEKAS LOMBONG MARGINAL DAN BUKAN-TOKSIK DENGAN PELBAGAI SPESIES TUMBUHAN

Hubungi: ANG LAI HOE (DR)
Tel: 03-62797096 E-mail: anglh@frim.gov.my

KAJIAN PENGHIJAUAN & BIOREMEDIASI TANAH BEKAS LOMBONG MARGINAL DAN BUKAN-TOKSIK DENGAN PELBAGAI SPESIES TUMBUHAN

Hubungi: ANG LAI HOE (DR)
Tel: 03-62797096 E-mail: anglh@frim.gov.my

PENJUJUKAN DNA

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PENGENOTIPAN MIKROSATELIT

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PLANT NUTRIENT ANALYSIS

Contact: WAN RASIDAH WAN A. KADIR (DR)
Tel: 03-62797301 E-mail: rashidah@frim.gov.my

SALE OF PLANTING STOCK

Contact: SITI SALWANA HASHIM (DR)
Tel: 03-62797124 E-mail: salwana@frim.gov.my

CONTRIBUTION OF SEEDLINGS/PLANTS TO SCHOOLS, GOVERNMENT AGENCIES, ETC.

Contact: SITI SALWANA HASHIM (DR)
Tel: 03-62797124 E-mail: salwana@frim.gov.my

COURSES AND TRAINING

Contact: AHMAD FAUZI MOHD SHARIFF
Tel: 03-62797125 E-mail: afauzi@frim.gov.my

ADVISORY SERVICE ON NURSERY TECHNIQUE-

Contact: AHMAD FAUZI MOHD SHARIFF
Tel: 03-62797125 E-mail: afauzi@frim.gov.my

FEASIBILITY STUDY FOR THE ESTABLISHMENT OF FOREST PLANTATION

Contact: AHMAD ZUHAI DI YAHYA (DR)
Tel: 03-62797093 E-mail: zuhaidi@frim.gov.my

PREPARATION OF STANDARD OPERATION PROCEDURE (SOP) FOR FOREST PLANTATION

Contact: AHMAD ZUHAI DI YAHYA (DR)
Tel: 03-62797093 E-mail: zuhaidi@frim.gov.my

WORKING PLAN FOR PRIVATE/STATE FOREST PLANTATION

Contact: AHMAD ZUHAI DI YAHYA (DR)
Tel: 03-62797093 E-mail: zuhaidi@frim.gov.my

STUDY ON THE GREENING OF MARGINAL AND NON-TOXIC EX-MINING LANDS WITH MULTIPLE PLANT SPECIES

Contact: ANG LAI HOE (DR)
Tel: 03-62797096 E-mail: anglh@frim.gov.my

STUDY ON THE GREENING AND BIOREMEDIATION OF MARGINAL AND TOXIC EX-MINING LANDS WITH MULTIPLE PLANT SPECIES

Contact: ANG LAI HOE (DR)
Tel: 03-62797096 E-mail: anglh@frim.gov.my

DNA SEQUENCING

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

MICROSATELITE GENOTYPING

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PEMBANGUNAN PENANDA MIKRO SATELIT DAN SINGLE NUCLEOTIDE POLYMORPHISM [SNP]

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PENGEKSTRAKAN DNA & RNA TUMBUHAN

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PENILAIAN KUALITI DAN KUANTITI DNA & RNA UNTUK EKSPERIMEN NEXT GENERATION SEQUENCING [NGS]

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PENGENALPASTIAN & PENGESAHIHAN SPESIES TUMBUHAN & SERANGGA MELALUI PENDEKATAN DNA

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PENILAIAN GERMPLASMA MELALUI PENDEKATAN DNA

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

UJIAN DIAGNOSTIK UNTUK MENENTUKAN PENGHAPUSAN KOLONI ANAI-ANAI MELALUI PENDEKATAN DNA

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PENGESANAN BALAK & VERIFIKASI ASAL-USUL UNTUK CHENGAL, RAMIN MELAWIS, KEMPAS & MERANTI BUKIT)

Hubungi: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PENJUALAN BIJI BENIH POKOK HUTAN

Hubungi: NADIAH SALMI NADZRI
Tel: 03-62797135 E-mail: nadiyah@frim.gov.my

UJIAN KUALITI BIJI BENIH

Hubungi: NASHATUL ZAIMAH NOOR AZMAN
Tel: 03-62797130 E-mail: nashatul@frim.gov.my

MEMBANGUNKAN PROTOKOL KULTUR TISU BAGI SPESIES YANG DIMOHON

Hubungi: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

PENJUALAN ANAK POKOK KULTUR TISU

Hubungi: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

KHIDMAT NASIHAT TEKNIK KULTUR TISU

Hubungi: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

DEVELOPMENT OF MICROSATELITE AND SNP MARKERS

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PLANT DNA & RNA EXTRACTION

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

DNA & RNA QUALITY ASSESSMENT AND QUANTIFICATION FOR NGS EXPERIMENT

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

PLANT & INSECT SPECIES IDENTIFICATION & AUTHENTICATION THROUGH DNA APPROACH

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

GERMPLASM EVALUATION THROUGH DNA APPROACH

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

DIAGNOSTIC TEST FOR TERMITE COLONY ELIMINATION THROUGH DNA APPROACH

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

TIMBER TRACKING & VERIFICATION OF GEOGRAPHICAL ORIGIN OF CHENGAL, RAMIN MELAWIS, KEMPAS & MERANTI BUKIT THROUGH DNA APPROACH

Contact: LEE SOON LEONG (DR)
Tel: 03-62797145 E-mail: leesl@frim.gov.my

SALES OF FOREST TREE SEEDS

Contact: NADIAH SALMI NADZRI
Tel: 03-62797135 E-mail: nadiyah@frim.gov.my

SEED QUALITY TESTING

Contact: NASHATUL ZAIMAH NOOR AZMAN
Tel: 03-62797130 E-mail: nashatul@frim.gov.my

DEVELOP TISSUE CULTURE PROTOCOL FOR REQUESTED SPECIES

Contact: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

SALES OF TISSUE CULTURE PLANTLETS

Contact: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

ADVISORY SERVICE ON TISSUE CULTURE TECHNIQUE

Contact: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

LATIHAN BERKAITAN KULTUR TISU

Hubungi: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

KELUARAN HUTAN

ANALISIS AWETAN KAYU

Hubungi: SALAMAH SELAMAT
Tel: 03-62797295 E-mail: salmahs@frim.gov.my

KEMASIAPAN KAYU

Hubungi: MOHD KHAIRUN ANWAR UYUP (DR)
Tel: 03-62797390 E-mail: mkanwar@frim.gov.my

UJIAN PANCANG

Hubungi: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

UJIAN KETAHANAN TERHADAP KULAT PEROSAK KAYU

Hubungi: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

UJIAN KETAHANAN TERHADAP CACAT WARNA GUBAL

Hubungi: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

UJIAN KETAHANAN TERHADAP KULAPUK

Hubungi: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

PENGECAMAN KULAT PEROSAK KAYU & SEBAB KEROSAKAN

Hubungi: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

LAWATAN KE LAPANGAN & PENSAMPELAN

Hubungi: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

UJIAN KETAHANAN TERHADAP ANAI-ANAI

Hubungi: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

UJIAN KETAHANAN TERHADAP SERANGGA PENGOREK KAYU

Hubungi: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

PENGECAMAN SERANGGA / SERANGGA PENGOREK KAYU

Hubungi: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

TRAINING ON TISSUE CULTURE

Contact: NOR HASNIDA HASSAN (DR)
Tel: 03-62797353 E-mail: hasnida@frim.gov.my

FOREST PRODUCTS

ANALYSIS OF WOOD PRESERVATIVE

Contact: SALAMAH SELAMAT
Tel: 03-62797295 E-mail: salmahs@frim.gov.my

WOOD FINISHING

Contact: MOHD KHAIRUN ANWAR UYUP (DR)
Tel: 03-62797390 E-mail: mkanwar@frim.gov.my

GRAVEYARD/STAKE TEST

Contact: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

DURABILITY TEST AGAINST WOOD DECAY FUNGI

Contact: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

DURABILITY TEST AGAINST SAPSTAIN

Contact: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

DURABILITY TEST AGAINST MOLD

Contact: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

IDENTIFICATION OF WOOD-DECAY FUNGI & CAUSE OF DECAY

Contact: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

FIELD VISIT & SAMPLING

Contact: SALMIAH UJANG (DR)
Tel: 03-62797413 E-mail: salmiah@frim.gov.my

DURABILITY TEST AGAINST TERMITES

Contact: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

DURABILITY TEST AGAINST WOOD-BORER INSECTS

Contact: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

IDENTIFICATION OF INSECT/WOOD-BORER INSECT

Contact: ROSZAINI KADIR (DR)
Tel: 03-62797410
E-mail: rosaini@frim.gov.my

PENGECAMAN SERANGGA / SERANGAN ANAI-ANAI KE ATAS KAYU

Hubungi: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

LAWATAN KE LAPANGAN & PENSAMPELAN SERANGGA

Hubungi: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

UJIAN PINTU RINTANGAN API (RELAU 3 m X 3 m)

Hubungi: ZAIHAN JALALUDDIN (DR)
Tel: 03-62797398 E-mail: zaihan@frim.gov.my

UJIAN PINTU RINTANGAN API UNTUK DINDING TANPA MUATAN (RELAU 3 m X 3 m)

Hubungi: ZAIHAN JALALUDDIN (DR)
Tel: 03-62797398 E-mail: zaihan@frim.gov.my

UJIAN DAYA KETAHANAN API—PINTU RINTANGAN API, DINDING & KOMPONEN BANGUNAN (RELAU INDIKATIF 1.5m X 1.5m)

Hubungi: ZAIHAN JALALUDDIN (DR)
Tel: 03-62797398 E-mail: zaihan@frim.gov.my

ANALISIS KANDUNGAN KAYU

Hubungi: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

PEREKAT

Hubungi: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

UJIAN KOMPOSIT KAYU (BERDASARKAN EN, JAS, JIS, JANZ, MS ISO STANDARD)

Hubungi: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

KOMPOSIT KAYU: PAPAN SERPAI, PAPAN SERPAI KAYU-SIMEN & PAPAN GENTIAN KEPADATAN SEDERHANA

Hubungi: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

GLULAM

Hubungi: ONG CHEE BENG
Tel: 03-62797443 E-mail: ongcb@frim.gov.my

MENGGERGAJI KAYU BALAK/BATANG KELAPA SAWIT

Hubungi: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

IDENTIFICATION OF INSECT / TERMITES ATTACK ON WOOD

Contact: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

FIELD VISIT & SAMPLING OF INSECT ATTACK

Contact: ROSZAINI KADIR (DR)
Tel: 03-62797410 E-mail: rosaini@frim.gov.my

FIRE RESISTANCE TEST FOR DOORS (3 m X 3 m FURNACE)

Contact: ZAIHAN JALALUDDIN (DR)
Tel: 03-62797398 E-mail: zaihan@frim.gov.my

FIRE RESISTANCE TEST FOR NON-LOAD BEARING WALL (3 m X 3 m FURNACE)

Contact: ZAIHAN JALALUDDIN (DR)
Tel: 03-62797398 E-mail: zaihan@frim.gov.my

FIRE RESISTANCE TEST—FIRE RATED DOOR, WALL & BUILDING COMPONENTS (1.5m X 1.5m INDICATIVE FURNACE)

Contact: ZAIHAN JALALUDDIN (DR)
Tel: 03-62797398 E-mail: zaihan@frim.gov.my

ANALYSIS OF CONTENTS IN WOOD

Contact: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

ADHESIVE

Contact: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

WOOD COMPOSITE TEST (ACCORDING TO EN, JAS, JIS, JANZ, MS ISO STANDARD)

Contact: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

PARTICLEBOARD, WOOD - CEMENT PARTICLEBOARD & MEDIUM DENSITY FIBREBOARD (MDF)

Contact: HASHIM WAN SAMSI/RAFEADAH RUSLI (DR) Tel: 03-62797438/7287
E-mail: hashim@frim.gov.my/rafeadah@frim.gov.my

GLULAM

Contact: ONG CHEE BENG
Tel: 03-62797443 E-mail: ongcb@frim.gov.my

LOG/OIL PALM TRUNK SAWING

Contact: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

MEMBELAH KAYU BALAK (BALAK KECIL, BUNGKAH KAYU & KAYU GERGAJI)

Hubungi: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

MEMBELAH AKAR TONGKAT ALI

Hubungi: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

MENCELUP KAYU GERGAJI DI DALAM BORON

Hubungi: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

MENGASAH MATA GERGAJI

Hubungi: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

UJIAN STRUKTUR / MEKANIKAL BERDASARKAN BS, ASTM, JIS, JAS, EN, STANDARD ISO DLL.

Hubungi: MOHAMAD OMAR MOHAMAD KHAIDZIR (DR) Tel: 03-62797377
E-mail: omarkh@frim.gov.my

KERJA BERKAITAN BESI

Hubungi: MOHAMAD OMAR MOHAMAD KHAIDZIR (DR) Tel: 03-62797377 E-mail: omarkh@frim.gov.my

NASIHAT TEKNIKAL / PERUNDINGAN TENTANG PENILAIAN STRUKTUR KAYU

Hubungi: MOHAMAD OMAR MOHAMAD KHAIDZIR (DR) Tel: 0-362797377 E-mail: omarkh@frim.gov.my

UJIAN KERUSI / BANGKU / KERUSI PANJANG / SOFA

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

MEJA (SEMUA JENIS)

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

UNIT PENYIMPANAN / KABINET

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

PERABOT PEJABAT (KERUSI / MEJA / MEJA KERJA)

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

PERABOT SEKOLAH (KERUSI / MEJA)

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

KATIL & KATIL DUA TINGKAT

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

RIPPING OF LOGS (SMALL LOG, WOOD BLOCK & SAWN TIMBER)

Contact: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

RIPPING OF TONGKAT ALI ROOTS

Contact: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

DIPPING OF SAWN TIMBER IN BORON

Contact: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

SHARPENING OF SAW BLADES

Contact: KHAIRUL MASSEAT
Tel: 03-62797437 E-mail: khairulm@frim.gov.my

STRUCTURAL / MECHANICAL TEST ACCORDING TO BS, ASTM, JIS, JAS, EN, ISO STANDARDS, ETC.

Contact: MOHAMAD OMAR MOHAMAD KHAIDZIR (DR) Tel: 03-62797377 E-mail: omarkh@frim.gov.my

METAL WORK

Contact: MOHAMAD OMAR MOHAMAD KHAIDZIR (DR) Tel: 03-62797377 E-mail: omarkh@frim.gov.my

TECHNICAL ADVICE / CONSULTANCY ON ASSESSMENT OF TIMBER STRUCTURE

Contact: MOHAMAD OMAR MOHAMAD KHAIDZIR (DR) Tel: 0-362797377 E-mail: omarkh@frim.gov.my

CHAIR/STOOL / SETTEE / SOFA TESTING

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

TABLE (ALL TYPES)

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

STORAGE UNIT / CABINET

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

OFFICE FURNITURE (CHAIR / TABLE / WORKSTATION)

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

SCHOOL FURNITURE (CHAIR / TABLE)

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

BED & BUNK BED

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

PERABOT LUAR RUMAH (KERUSI / MEJA)

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

KETAHANAN KOMPONEN PERABOT

Hubungi: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

PENYEDIAAN SERPAI & PULPA KAYU

Hubungi: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

PELUNTURAN PULPA—ECF & TCF

Hubungi: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

PEMBUATAN KERTAS—KERTAS TANGAN

Hubungi: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

PEMBUATAN PINGGAN TERACU

Hubungi: RUSHDAN IBRAHIM (DR)
Tel: 03-62797314 E-mail: rushdan@frim.gov.my

PEMUKULAN MENGGUNAKAN PENGISAR PFI

Hubungi: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

ANALISIS KIMIA KAYU & PULPA

Hubungi: LATIFAH JASMANI
Tel: 03-62797308 E-mail: latifah@frim.gov.my

CIRI KERTAS (FIZIKAL, MEKANIKAL & OPTIKAL)

Hubungi: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

ANALISIS GENTIAN

Hubungi: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

PENCERAPAN MENGGUNAKAN SEM

Hubungi: LATIFAH JASMANI
Tel: 03-62797308 E-mail: latifah@frim.gov.my

MENCARIK BAHAN LIGNOSELULOSA KPD BENTUK GENTIAN

Hubungi: WAN ASMA IBRAHIM (DR)
Tel: 03-62797312 E-mail: asma@frim.gov.my

ARANG / BRIKET / KARBON AKTIF

Hubungi: PUAD ELHAM
Tel: 03-62797312 E-mail: puad@frim.gov.my

OUTDOOR FURNITURE (CHAIR / TABLE)

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

DURABILITY OF FURNITURE COMPONENT

Contact: KHAIRUL AWANG (DR)
Tel: 03-62797381 E-mail: akhairul@frim.gov.my

PREPARATION OF WOOD CHIPS AND PULPS

Contact: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

BLEACHING OF PULP—ECF & TCF

Contact: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

PAPER MAKING—HANDSHEET

Contact: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

MOULDED PLATE MAKING

Contact: RUSHDAN IBRAHIM (DR)
Tel: 03-62797314 E-mail: rushdan@frim.gov.my

BEATING USING PFI MILL

Contact: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

CHEMICAL ANALYSIS OF WOOD & PULP

Contact: LATIFAH JASMANI
Tel: 03-62797308 E-mail: latifah@frim.gov.my

PAPER PROPERTIES (PHYSICAL, MECHANICAL & OPTICAL)

Contact: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

FIBRE ANALYSIS

Contact: SHARMIZA ADNAN (DR)
Tel: 03-62797691 E-mail: sharmiza@frim.gov.my

SEM IMAGE ANALYSIS

Contact: LATIFAH JASMANI
Tel: 03-62797308 E-mail: latifah@frim.gov.my

SHREDDING OF LIGNOCELLULOSIC MATERIAL INTO FIBRE FORM

Contact: WAN ASMA IBRAHIM (DR)
Tel: 03-62797312 E-mail: asma@frim.gov.my

CHARCOAL / BRIQUETTE / ACTIVE CARBON

Contact: PUAD ELHAM
Tel: 03-62797312 E-mail: puad@frim.gov.my

PENGERINGAN KAYU – KANDUNGAN KELEMBAPAN KAYU, KETUMPATAN KAYU & KALIBRASI ALAT PENGUKURAN KANDUNGAN KELEMBAPAN

Hubungi: GAN KEE SENG (DR)
Tel: 03-62797395 E-mail: ganks@frim.gov.my

PEMBANGUNAN BAHAN BAHARU

Hubungi: HAMDAN HUSAIN (DR)
Tel: 03-62797468 E-mail: hamdan@frim.gov.my

ANATOMI KAYU

Hubungi: NORDAHLIA ABUDULLAH SIAM
Tel: 03-62797678 E-mail: nordahlia@frim.gov.my

HASIL BUKAN-KAYU

Hubungi: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

PENGGUNAAN ALAT-ALAT JENTERA (BAHAN MENTAH DISEDIAKAN OLEH PELANGGAN)

Hubungi: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

PENGUPASAN ROTAN

Hubungi: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

MENGHALUSKAN ROTAN

Hubungi: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

PEMBUATAN KAYU HIGO (50 BATANG)

Hubungi: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

PEMESINAN KAYU & PROTOTAIP PRODUK

Hubungi: ZAIRUL AMIN RABIDIN
Tel: 03-62797422 E-mail: zairulamin@frim.gov.my

PERHUTANAN & ALAM SEKITAR

PENILAIAN FLORA

Hubungi: ABD. RAHMAN KASSIM (DR)
Tel: 03-62797179 E-mail: rahmank@frim.gov.my

PENYEDIAAN PELAN PENGURUSAN HUTAN (SEMUA JENIS HUTAN)

Hubungi: ISMAIL HARUN (DR)
Tel: 03-62797173 E-mail: ismail@frim.gov.my

PENILAIAN KESAN ALAM SEKITAR

Hubungi: SAMSUDIN MUSA (DR) Tel: 03-62797180
E-mail: samsudinmusa@frim.gov.my

WOOD DRYING—WOOD MOISTURE CONTENT, WOOD DENSITY & MOISTURE METER CALIBRATION

Contact: GAN KEE SENG (DR)
Tel: 03-62797395 E-mail: ganks@frim.gov.my

NEW MATERIAL DEVELOPMENT

Contact: HAMDAN HUSAIN (DR)
Tel: 03-62797468 E-mail: hamdan@frim.gov.my

WOOD ANATOMY

Contact: NORDAHLIA ABUDULLAH SIAM
Tel: 03-62797678 E-mail: nordahlia@frim.gov.my

NON-WOOD PRODUCTS

Contact: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

USE OF MACHINERY (RAW MATERIAL PROVIDED BY CLIENT)

Contact: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

PEELING OF RATTAN

Contact: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

SANDING OF RATTAN

Contact: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

MAKING OF HIGO STICKS (50 STICKS)

Contact: MOHD. TAMIZI MUSTAFA (DR)
Tel: 03-62797432 E-mail: tamizi@frim.gov.my

WOOD MACHINING & PRODUCT PROTOTYPE

Contact: ZAIRUL AMIN RABIDIN
Tel: 03-62797422 E-mail: zairulamin@frim.gov.my

FORESTRY & ENVIRONMENT

FLORAL ASSESSMENT

Contact: ABD. RAHMAN KASSIM (DR)
Tel: 03-62797179
E-mail: rahmank@frim.gov.my

PREPARATION OF FOREST MANAGEMENT PLAN (ALL FORESTS TYPE)

Contact: ISMAIL HARUN (DR)
Tel: 03-62797173 E-mail: ismail@frim.gov.my

ENVIRONMENTAL IMPACT ASSESSMENT

Contact: SAMSUDIN MUSA (DR) Tel: 03-62797180
E-mail: samsudinmusa@frim.gov.my

PENGECAMAN SPESIES BULUH & PALMA

Hubungi: HJ ABD. RAZAK OTHMAN
Tel: 03-62797192 E-mail: abdrzak@frim.gov.my

PEMBANGUNAN DENAI ALAM

Hubungi: NOOR AZLIN YAHYA (DR)
Tel: 03-62797243 E-mail: azlin@frim.gov.my

CERAMAH / AKTIVITI PENDIDIKAN ALAM SEMULA JADI

Hubungi: NOOR AZLIN YAHYA (DR)
Tel: 03-62797243 E-mail: azlin@frim.gov.my

PEMERIKSAAN POKOK AMENITI (PEMERIKSAAN & PENILAIAN KESIHATAN BAGI POKOK BERBAHAYA OLEH ARBORIS BERTAULIAH)

Hubungi: ELIZABETH MP PHILIP (DR)
Tel: 03-62797249 E-mail: philip@frim.gov.my

PEMETAAN & INVENTORI POKOK DI BANDAR /AMENITI YG MELIBATKAN KUTIPAN DATA DI LAPANGAN & PEMINDAHAN KE SUMBER ELEKTRONIK

Hubungi: ELIZABETH MP PHILIP (DR)
Tel: 03-62797249 E-mail: philip@frim.gov.my

REKA BENTUK LANDSKAP & CADANGAN UNTUK LANDSKAP KEJUR

Hubungi: NOOR AZLIN YAHYA (DR)
Tel: 03-62797243 E-mail: azlin@frim.gov.my

PEMROSESAN IMEJ PENDERIAAN JAUH

Hubungi: HAMDAN OMAR (DR)
Tel: 03-62797200 E-mail: hamdan@frim.gov.my

PEMETAAN GIS

Hubungi: RODZIAH HASHIM
Tel: 03-62797202 E-mail: rodziah@frim.gov.my

PEMETAAN POKOK

Hubungi: RODZIAH HASHIM
Tel: 03-62797202 E-mail: rodziah@frim.gov.my

GPS

Hubungi: ABD AZHAN SHAH IDRIS
Tel: 03-62797204 E-mail: azhan@frim.gov.my

PENYEDIAAN PETA / IMEJ / POSTER DIGITAL (JPEG, BMP, TIFF)

Hubungi: HAMDAN OMAR (DR)
Tel: 03-62797200 E-mail: hamdan@frim.gov.my

PERCETAKAN & PENGIMBASAN (PETA, POSTER, IMEJ DLL.)

Hubungi: RASHIDAH HASHIM
Tel: 03-62797205 E-mail: shidah@frim.gov.my

IDENTIFICATION OF BAMBOO & PALM SPECIES

Contact: HJ ABD. RAZAK OTHMAN
Tel: 03-62797192 E-mail: abdrzak@frim.gov.my

NATURE WALK DEVELOPMENT

Contact: NOOR AZLIN YAHYA (DR)
Tel: 03-62797243 E-mail: azlin@frim.gov.my

NATURE EDUCATION TALK / ACTIVITIES

Contact: NOOR AZLIN YAHYA (DR)
Tel: 03-62797243 E-mail: azlin@frim.gov.my

INSPECTION OF AMENITY TREES (PLANT HEALTH EVALUATION AND INSPECTION OF HAZARDOUS TREES BY CERTIFIED ARBORIST)

Contact: ELIZABETH MP PHILIP (DR)
Tel: 03-62797249 E-mail: philip@frim.gov.my

URBAN/AMENITY TREE INVENTORY AND MAPPING—INVOLVED FIELD DATA COLLECTION AND TRANSFER TO ELECTRONIC SOURCES

Contact: ELIZABETH MP PHILIP (DR)
Tel: 03-62797249 E-mail: philip@frim.gov.my

LANDSCAPE DESIGN & PROPOSAL FOR SOFT LANDSCAPE)

Contact: NOOR AZLIN YAHYA (DR)
Tel: 03-62797243 E-mail: azlin@frim.gov.my

REMOTE SENSING IMAGE PROCESSING

Contact: HAMDAN OMAR (DR)
Tel: 03-62797200 E-mail: hamdan@frim.gov.my

GIS MAPPING

Contact: RODZIAH HASHIM
Tel: 03-62797202 E-mail: rodziah@frim.gov.my

TREE MAPPING

Contact: RODZIAH HASHIM
Tel: 03-62797202 E-mail: rodziah@frim.gov.my

DGPS

Contact: ABD AZHAN SHAH IDRIS
Tel: 03-62797204 E-mail: azhan@frim.gov.my

PREPARATION OF MAP / IMAGE / DIGITAL POSTER

(JPEG, BMP, TIFF)
Contact: HAMDAN OMAR (DR)
Tel: 03-62797200 E-mail: hamdan@frim.gov.my

PRINTING & SCANNING (MAP, POSTER, IMAGE, ETC.)

Contact Person: RASHIDAH HASHIM
Tel: 03-62797205 E-mail: shidah@frim.gov.my

LAMINASI KERTAS

Hubungi: RASHIDAH HASHIM
Tel: 03-62797205 E-mail: shidah@frim.gov.my

LATIHAN

Hubungi: ABD RAHMAN KASSIM (DR)
Tel: 03-62797179 E-mail: rahmank@frim.gov.my

SURVEI HUTAN

Hubungi: MOHD RIZUWAN MAMAT
Tel: 03-62797262 E-mail: rizuwan@frim.gov.my

EKOLOGI & SILVIKULTUR HUTAN TROPIKA

Hubungi: ABD. RAHMAN KASSIM (DR)
Tel: 03-62797179 E-mail: rahmank@frim.gov.my

HASILAN SEMULA JADI

PENGESANAN MIKROORGANISMA SPESIFIK

Hubungi: NOR AZAH MOHAMAD ALI (DR)
Tel: 03-62797344 E-mail: norazah@frim.gov.my

BIOASAI ANTIOKSIDAN

Hubungi: VIMALA P SUBRAMANIAM (DR)
Tel: 03-62797355 E-mail: vimala@frim.gov.my

BIOASAI ANTIRADANG

Hubungi: FADZUREENA JAMALUDIN (DR)
Tel: 03-62797607 E-mail: fadzureena@frim.gov.my

MAKMAL BAHAN MENTAH

Hubungi: ZAMREE MD SHAH
Tel: 03-62797696 E-mail: zamree@frim.gov.my

MAKMAL PENGEKSTRAKAN

Hubungi: PIN KAR YONG (DR)
Tel: 03-62797695 E-mail: pin@frim.gov.my

PENGILANGAN & MAKMAL PRODUK AKHIR

Hubungi: NOOR RASYILA MOHAMED NOOR
Tel: 03-62797695 E-mail: rasyila@frim.gov.my

UJIAN KANDUNGAN GLUKOSA & PROTEIN

Hubungi: GETHA R KRISNASAMY (DR)
Tel: 03-62797652 E-mail: getha@frim.gov.my

ANALISIS MASSA SEBATIAN TULEN MENGGUNAKAN TEKNIK LCMS (LIQUID CHROMATOGRAPHY - MASS SPECTROMETRY)

Hubungi: GETHA R KRISNASAMY (DR)
Tel: 03-62797652 E-mail: getha@frim.gov.my

UJIAN SITOTOKSISITI

Hubungi: NIK MUSAADAH MUSTAPHA (DR)
Tel: 03-62797345 E-mail: musaadah@frim.gov.my

PAPER LAMINATION

Contact: RASHIDAH HASHIM
Tel: 03-62797205 E-mail: shidah@frim.gov.my

TRAINING

Contact: ABD RAHMAN KASSIM (DR)
Tel: 03-62797179 E-mail: rahmank@frim.gov.my

FOREST SURVEY

Contact: MOHD RIZUWAN MAMAT
Tel: 03-62797262 E-mail: rizuwan@frim.gov.my

ECOLOGY & SILVICULTURE OF TROPICAL FOREST

Contact: ABD. RAHMAN KASSIM (DR)
Tel: 03-62797179 E-mail: rahmank@frim.gov.my

NATURAL PRODUCTS

DETECTION OF SPECIFIC MICROORGANISMS

Contact: NOR AZAH MOHAMAD ALI (DR)
Tel: 03-62797344 E-mail: norazah@frim.gov.my

ANTIOXIDANT BIOASSAY

Contact: VIMALA P SUBRAMANIAM (DR)
Tel: 03-62797355 E-mail: vimala@frim.gov.my

ANTI-INFLAMMATORY BIOASSAY

Contact: FADZUREENA JAMALUDIN (DR)
Tel: 03-62797607 E-mail: fadzureena@frim.gov.my

RAW MATERIAL LABORATORY

Contact: ZAMREE MD SHAH
Tel: 03-62797696 E-mail: zamree@frim.gov.my

EXTRACTION LABORATORY

Contact: PIN KAR YONG (DR)
Tel: 03-62797695 E-mail: pin@frim.gov.my

MILLING & FINISHED PRODUCT LABORATORY

Contact: NOOR RASYILA MOHAMED NOOR
Tel: 03-62797695 E-mail: rasyila@frim.gov.my

GLUCOSE & PROTEIN CONTENT TEST

Contact: GETHA R KRISNASAMY (DR)
Tel: 03-62797652 E-mail: getha@frim.gov.my

MASS ANALYSIS OF PURE COMPOUNDS USING LCMS (LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY) TECHNIQUE

Contact: GETHA R KRISNASAMY (DR)
Tel: 03-62797652 E-mail: getha@frim.gov.my

CYTOTOXICITY TEST

Contact: NIK MUSAADAH MUSTAPHA (DR)
Tel: 03-62797345 E-mail: musaadah@frim.gov.my

UJIAN KETOKSIKAN AKUT

Hubungi: ROHANA SAHDAN
Tel: 03-62797608 E-mail: rohana@frim.gov.my

**PENGECAMAN NAMA SAINTIFIK TUMBUHAN
UBATAN & BERAROMA**

Hubungi: TAN AI LEE
Tel: 03-62797671 E-mail: tanal@frim.gov.my

PENYEDIAAN SPESIMEN HERBARIUM

Hubungi: UMMU HANI BADRON
Tel: 03-62797602 E-mail: nurnida@frim.gov.my

**UJIAN PENYARINGAN FITOKIMIA (STEROID,
FLAVONOID, TANNIN, TRITERPENE, ALKALOID,
SAPONIN)**

Hubungi: ZUNOLIZA ABDULLAH (DR)
Tel: 03-62797339 E-mail: zunoliza@frim.gov.my

**ANALISIS HPLC (PEMPROFILAN, ANALISIS
KUALITATIF DAN KUANTITATIF)**

Hubungi: LING SUI KIONG (DR) / MOHD RADZI
AHMAD Tel: 03-62797356/7335
E-mail: lingsk@frim.gov.my / radzi@frim.gov.my

**PENYULINGAN & PENGEKSTRAKAN MINYAK
PATI (PENYULINGAN SKALA MAKMAL (1-
5KG), PENYULINGAN SKALA PILOT (20-
70KG), PENYULINGAN SKALA BESAR
(100KG), PENGEKSTRAKAN MENGGUNAKAN
SUPERCRITICAL FLUID EXTRACTION SYSTEM
(SFE)**

Hubungi: NOR AZAH MOHAMAD ALI (DR) /
MAILINA JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349
E-mail: norazah@frim.gov.my/mailina@frim.gov.my/
saidatul@frim.gov.my

PENENTUAN KANDUNGAN KELEMBAPAN

Hubungi: NOR AZAH MOHAMAD ALI (DR) / MAILINA
JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349
E-mail: norazah@frim.gov.my/mailina@frim.gov.my/
saidatul@frim.gov.my

**ANALISIS KIMIA FIZIKAL (GRAVITI SPESIFIK,
INDEX BIASAN)**

Hubungi: NOR AZAH MOHAMAD ALI (DR) / MAILINA
JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349 E-mail: norazah@frim.gov.
my/mailina@frim.gov.my/saidatul@frim.gov.my

**ANALISIS GC, ANALISIS GCMS, ANALISIS
HS-SPME-GCMS, ANALISIS KANDUNGAN
EKSTRAKTIF KAYU GAHARU**

Hubungi: NOR AZAH MOHAMAD ALI (DR) / MAILINA
JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349 E-mail: norazah@frim.gov.
my/mailina@frim.gov.my/saidatul@frim.gov.my

ACUTE TOXICOLOGY TEST

Contact: ROHANA SAHDAN
Tel: 03-62797608 E-mail: rohana@frim.gov.my

**IDENTIFICATION OF MEDICINAL AND AROMATIC
PLANTS TO SCIENTIFIC NAME**

Contact: TAN AI LEE
Tel: 03-62797671 E-mail: tanal@frim.gov.my

PREPARATION OF HERBARIUM SPECIMEN

Contact: UMMU HANI BADRON
Tel: 03-62797602 E-mail: nurnida@frim.gov.my

**PHYTOCHEMISTRY SCREENING TEST (STEROID,
FLAVONOID, TANNIN, TRITERPENE, ALKALOID,
SAPONIN)**

Contact: ZUNOLIZA ABDULLAH (DR)
Tel: 03-62797339 E-mail: zunoliza@frim.gov.my

**HPLC ANALYSIS (PROFILING, QUALITATIVE &
QUANTITATIVE ANALYSES)**

Contact: LING SUI KIONG (DR) / MOHD RADZI
AHMAD Tel: 03-62797356/7335
E-mail: lingsk@frim.gov.my/radzi@frim.gov.my

**DISTILLATION & EXTRACTION OF ESSENTIAL
OIL (LABORATORY SCALE (1-5 KG), PILOT SCALE
(20-70 KG), BIG SCALE (100 KG), EXTRACTION
USING SUPERCRITICAL FLUID EXTRACTION
SYSTEM (SFE)**

Contact: NOR AZAH MOHAMAD ALI (DR) / MAILINA
JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349 E-mail: norazah@frim.gov.
my/mailina@frim.gov.my/saidatul@frim.gov.my

MOISTURE CONTENT

Contact: NOR AZAH MOHAMAD ALI (DR) / MAILINA
JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349 E-mail: norazah@frim.gov.
my/mailina@frim.gov.my/saidatul@frim.gov.my

PHYSICAL CHEMISTRY ANALYSIS

Contact: NOR AZAH MOHAMAD ALI (DR) / MAILINA
JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349 E-mail: norazah@frim.gov.
my/mailina@frim.gov.my/saidatul@frim.gov.my

**GC ANALYSIS, GCMS ANALYSIS, HS-SPME-
GCMS ANALYSIS, GAHARU WOOD EXTRACTIVE
CONTENT ANALYSIS**

Contact: NOR AZAH MOHAMAD ALI (DR) / MAILINA
JAMIL / SAIDATUL HUSNI SAIDIN
Tel: 03-62797344/7349 E-mail: norazah@frim.gov.
my/mailina@frim.gov.my/saidatul@frim.gov.my

UJIAN PENCEMARAN MIKROORGANISMA – UJIAN BEBANAN MIKROORGANISMA (PENGIRAAN KOLONI MIKROORGANISMA AEROBIK (TAMC), PENGIRAAN KOLONI YIS DAN KULAT (TYMC))

Hubungi: ONG BOO KEAN / NORULAIMAN YUSOFF
Tel: 03 6279 7370 / 7358 E-mail: ongbk@frim.gov.my/norulaiman@frim.gov.my

UJIAN PENCEMARAN MIKROORGANISMA – PENGECAMAN MIKROORGANISMA SPESIFIK (*Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella* sp., BACTERIA NEGATIVE BILE TOLERANT GRAM)

Hubungi: ONG BOO KEAN / NORULAIMAN YUSOFF
Tel: 03 6279 7370 / 7358 E-mail: ongbk@frim.gov.my/norulaiman@frim.gov.my

UJIAN PENGESANAN ENDOTOKSIN BAKTERIA / (GEL CLOT LAL ASSAY)

Hubungi: ONG BOO KEAN
Tel: 03 6279 7370 E-mail: ongbk@frim.gov.my

PENGIRAAN JUMLAH PLAT MIKROORGANISMA

Hubungi: NOR AZAH MOHAMAD ALI (DR)
Tel: 03-62797344 E-mail: norazah@frim.gov.my

UJIAN KUALITI: UJIAN WARNA (H₂SO₄, HCl, NaOH, KOH, NH₄OH, FeCl₃), UJIAN KANDUNGAN ABU (ABU TOTAL, ABU TAK LARUT ASID) & UJIAN NILAI EKSTRAKTIF (LARUT AIR-KAEDAH PANAS/SEJUK, LARUT ETANOL-KAEDAH PANAS/SEJUK)

Hubungi: ZUNOLIZA ABDULLAH (DR)
Tel: 03 6279 7339 E-mail: zunoliza@frim.gov.my

ANALISIS SPEKTROSKOPI UV-VIS (KANDUNGAN FLAVONOID, GULA, PROANTOSIANIDIN & SAPONIN)

Hubungi: ABDUL RASHID LI
Tel: 03 6279 7337 E-mail: abdrashid@frim.gov.my

ANALISIS SPEKTROSKOPI IR (4000 – 450 cm⁻¹)

Hubungi: ZUNOLIZA ABDULLAH (DR)/SALBIAH MAN
Tel: 03-62797339/7361
E-mail: zunoliza@frim.gov.my/salbiah@frim.gov.my

ANALISIS SPEKTROSKOPI NMR (PROTON (1H), KARBON (13C), DEPT)

Hubungi: ADIANA MOHD ADIB/SALBIAH MAN
Tel: 03 6279 7366/7361 E-mail: adiana@frim.gov.my/salbiah@frim.gov.my

ANALISIS EURYCOMANONE (KAEDAH UPLC)

Hubungi: ABDUL RASHID LI / MOHD RADZI AHMAD
Tel: 03 6279 7337/7335 E-mail: abdrashid@frim.gov.my/radzi@frim.gov.my

MICROORGANISM POLLUTION TEST – MICROORGANISM LOADING TEST (AEROBIC MICROORGANISM COLONY, YEAST & FUNGUS COLONY)

Contact: ONG BOO KEAN / NORULAIMAN YUSOFF
Tel: 03 6279 7370/ 7358 E-mail: ongbk@frim.gov.my/norulaiman@frim.gov.my

MICROORGANISM POLLUTION TEST – SPECIFIC MICROORGANISM IDENTIFICATION (*Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella* sp., BACTERIA NEGATIVE BILE TOLERANT GRAM)

Contact: ONG BOO KEAN/ NORULAIMAN YUSOFF
Tel: 03 6279 7370 / 7358 E-mail: ongbk@frim.gov.my/norulaiman@frim.gov.my

(GEL CLOT LAL ASSAY)

Contact: ONG BOO KEAN
Tel: 03 6279 7370 E-mail: ongbk@frim.gov.my

TOTAL MICROORGANISM PLATE COUNT

Contact: NOR AZAH MOHAMAD ALI (DR)
Tel: 03-62797344 E-mail: norazah@frim.gov.my

QUALITY TEST: UJIAN WARNA (H₂SO₄, HCl, NaOH, KOH, NH₄OH, FeCl₃), UJIAN KANDUNGAN ABU (ABU TOTAL, ABU TAK LARUT ASID) & UJIAN NILAI EKSTRAKTIF (LARUT AIR-KAEDAH PANAS/SEJUK, LARUT ETANOL-KAEDAH PANAS/SEJUK)

Contact: ZUNOLIZA ABDULLAH (DR)
Tel: 03 6279 7339 E-mail: zunoliza@frim.gov.my

SPECTROSCOPY ANALYSIS UV-VIS (FLAVONOID, PROANTHOCYANIDIN & SAPONIN CONTENTS)

Contact: ABDUL RASHID LI
Tel: 03 6279 7337 E-mail: abdrashid@frim.gov.my

IR SPECTROSCOPY ANALYSIS (4000 – 450 cm⁻¹)

Contact: ZUNOLIZA ABDULLAH (DR)/SALBIAH MAN
Tel: 03-62797339/7361 E-mail: zunoliza@frim.gov.my/salbiah@frim.gov.my

NMR SPECTROSCOPY ANALYSIS (PROTON (1H), KARBON (13C), DEPT)

Contact: ADIANA MOHD ADIB/SALBIAH MAN
Tel: 03 6279 7366/7361 E-mail: adiana@frim.gov.my/salbiah@frim.gov.my

EURYCOMANONE ANALYSIS (UPLC METHOD)

Contact: ABDUL RASHID LI/MOHD RADZI AHMAD
Tel: 03 6279 7337/7335 E-mail: abdrashid@frim.gov.my/radzi@frim.gov.my

ANALISIS HPTLC (PEMPROFILAN/ANALISIS KUALITATIF; PENGESANAN DENGAN H₂SO₄)

Hubungi: ZUNOLIZA ABDULLAH (DR)
Tel: 03 6279 7339 E-mail: zunoliza@frim.gov.my

ANALISIS LC-MS (SEBATIAN/FRAKSI SEPARA TULEN) LC-MS: ION TRAP MS FULL SCAN, LC-MS ORBITRAP MS FULL SCAN, DIRECT INFUSION ION TRAP MS FULL SCAN, DIRECT INFUSION ORBITRAP MS FULL SCAN, MS_n & DATA ANALYSIS (MASS FRONTIER)

Hubungi: FAUZIAH ABDULLAH Tel: 03- 6279 7361
E-mail: fauziahabdullah@frim.gov.my

PENGEKSTRAKAN FITOKIMIA (PELARUT ORGANIK)(PENGEKSTRAKAN ORGANIK DAN PENGERINGAN & PENGISARAN SAMPEL)

Hubungi: MUHAMMAD HAFFIZ JAURI
Tel: 03-62797651 E-mail: haffiz@frim.gov.my

PENGEKSTRAKAN AKUES (PENGERINGAN DAN PENGISARAN SAMPEL)

Hubungi: MOHD HAFIDZ HADI ABDULLAH
Tel: 03-62797653 E-mail: hafidz@frim.gov.my

UJIAN HAD LOGAM BERAT (KADMIUM, PLUMBUM, MERKURI, ARSENIK)

Hubungi: NORHAYATI ABDULLAH (DR) / NURHAZWANI MOHD HIRMIZI
Tel: 03-62797357/7695
E-mail: nurhazwani@frim.gov.my

PENILAIAN POTENSI ANTIMIKROB/ ANTIMICROBIAL POTENTIAL EVALUATION [MINIMUM INHIBITORY CONCENTRATION (MIC) TEST, MINIMUM BACTERIOCIDAL CONCENTRATION (MBC) TEST]

Hubungi: MASTURA MOHTAR (DR)
Tel: 03 62797351 E-mail: mastura@frim.gov.my

PENILAIAN KEBERKESANAN PRODUK DISINFEKTAN/ANTISEPTIK

Hubungi: MAZURAH MOHAMED ISA
Tel: 03 62797602 E-mail: mazurah@frim.gov.my

PENYARINGAN AKTIVITI ANTIKANSER IN VITRO

Hubungi: NURHANAN MURNI YUNOS (DR) /SITI SYARIFAH MOHD MUTALIP Tel: 03 62797659/7657
E-mail: hanan@frim.gov.my/syarifah@frim.gov.my

UJIAN PENILAIAN AKTIVITI ANTIRADANG (ASAI LIPOKSIGENASE, ASAI XANTIN OKSIDA & ASAI HYALURONIDASE)

Hubungi: MAZURA MD PISAR (DR)/ SITI NUR AISYAH MOHD HASHIM
Tel: 03- 62797359/7608 E-mail: mazura@frim.gov.my/sitinuraisyah@frim.gov.my

HPTLC ANALYSIS (PROFILING /QUALITATIVE ANALYSIS; PENGESANAN WITH H₂SO₄)

Contact: ZUNOLIZA ABDULLAH (DR)
Tel: 03 6279 7339 E-mail: zunoliza@frim.gov.my

ANALISIS LC-MS (SEBATIAN/FRAKSI SEPARA TULEN) LC-MS: ION TRAP MS FULL SCAN, LC-MS ORBITRAP MS FULL SCAN, DIRECT INFUSION ION TRAP MS FULL SCAN, DIRECT INFUSION ORBITRAP MS FULL SCAN, MS_n & DATA ANALYSIS (MASS FRONTIER)

Contact: FAUZIAH ABDULLAH Tel: 03-6279 7361
E-mail: fauziahabdullah@frim.gov.my

PHYTOCHEMISTRY EXTRACTION (ORGANIC SOLVENT) (ORGANIC EXTRACTION AND SAMPLE DRYING & GRINDING)

Contact: MUHAMMAD HAFFIZ JAURI
Tel: 03-62797651 E-mail: haffiz@frim.gov.my

AQUEOUS EXTRACTION (SAMPLE DRYING & GRINDING)

Contact: MOHD HAFIDZ HADI ABDULLAH
Tel: 03-62797653 E-mail: hafidz@frim.gov.my

HEAVY METAL LIMIT TEST (CADMIUM, PLUMBUM, MERCURY, ARSENIC)

Contact: NORHAYATI ABDULLAH (DR)/NURHAZWANI MOHD HIRMIZI Tel: 03-62797357/7695
E-mail: nurhazwani@frim.gov.my

ANTIMICROBIAL POTENTIAL EVALUATION [MINIMUM INHIBITORY CONCENTRATION (MIC) TEST, MINIMUM BACTERIOCIDAL CONCENTRATION (MBC) TEST]

Contact: MASTURA MOHTAR (DR)
Tel: 03 62797351 E-mail: mastura@frim.gov.my

ANTISEPTIC PRODUCTS EFFECTIVENESS EVALUATION

Contact: MAZURAH MOHAMED ISA
Tel: 03 62797602 E-mail: mazurah@frim.gov.my

IN VITRO ANTI-CANCER ACTIVITY SCREENING

Contact: NURHANAN MURNI YUNOS (DR) /SITI SYARIFAH MOHD MUTALIP Tel: 03 62797659/7657
E-mail: hanan@frim.gov.my/syarifah@frim.gov.my

ANTI-INFLAMMATORY ACTIVITY EVALUATION TEST (LIPOXYGENASE, XANTHINE OKSIDA & HYALURONIDASE ASSAYS)

Contact: MAZURA MD PISAR (DR)/ SITI NUR AISYAH MOHD HASHIM
Tel: 03- 62797359/7608 E-mail: mazura@frim.gov.my/sitinuraisyah@frim.gov.my

UJIAN SITOTOKSISITI KE ATAS SEL NORMAL [VERO (SEL GINJAL), WRL-68 (SEL HEPAR), 3T3 (FIBROBLAST), PENGEKSTRAKAN]

Hubungi: ROHANA SAHDAN
Tel: 03- 62797608 E-mail: rohana@frim.gov.my

UJIAN ANTIOKSIDAN/ANTI-OXIDANT TEST [1, 2-DIPHENYL-2-PICRYL-HYDRAZYL (DPPH) FREE RADICAL SCAVENGING ASSAY & XANTHINE

Hubungi: VIMALA SUBRAMANIAM (DR)
Tel: 03 62797355 E-mail: vimala@frim.gov.my

UJIAN ANTIOKSIDAN [ASAI PERENCATAN TIROSINASE (PEMUTIHAN KULIT), JUMLAH KANDUNGAN FENOLIK (TPC/GAE)

Hubungi: SHALINI MARKANDAN
Tel: 03-62797612 E-mail: shalini@frim.gov.my

UJIAN ANTIOKSIDAN [OXYGEN RADICAL ABSORBENCE CAPACITY (ORAC), MEDIAN INHIBITION CONCENTRATION (IC50) FOR DPPH FREE RADICAL SCAVENGING ASSAY & EXTRACTION (JIKA DIPERLUKAN)

Hubungi: JULIZA MOHAMED
Tel: 03-62797612 E-mail: juliza@frim.gov.my

Untuk maklumat lanjut, sila hubungi pegawai yang berkenaan.

CYTOTOXICITY TEST ON NORMAL CELL [VERO (KIDNEY CELL), WRL-68 (HEPAR CELL), 3T3 (FIBROBLAST), EXTRACTION]

Contact: ROHANA SAHDAN Tel: 03-62797608
E-mail: rohana@frim.gov.my

ANTI-OXIDANT TEST [1, 2-DIPHENYL-2-PICRYL-HYDRAZYL(DPPH)FREE RADICAL SCAVENGING ASSAY & XANTHINE/XANTHINE OXIDASE SUPEROXIDE SCAVENGING ASSAY (XOD)]

Contact: VIMALA SUBRAMANIAM (DR)
Tel: 03 62797355 E-mail: vimala@frim.gov.my

ANTI-OXIDANTTEST[TYROSINASE INHIBITORY ASSAY (SKIN WHITENING), TOTAL PHENOLIC CONTENT (TPC/GAE)

Contact: SHALINI MARKANDAN Tel: 03-62797612
E-mail: shalini@frim.gov.my

ANTI-OXIDANT TEST [OXYGEN RADICAL ABSORBENCE CAPACITY (ORAC), MEDIAN INHIBITION CONCENTRATION (IC50) FOR DPPH FREE RADICAL SCAVENGING ASSAY & EXTRACTION (IF REQUIRED)

Contact: JULIZA MOHAMED
Tel: 03-62797612 E-mail: juliza@frim.gov.my

For further information please contact the officer in charge.



SOROTAN AKTIVITI HIGHLIGHTS OF ACTIVITIES

20 Januari

Prof Dato' Dr Mohd Hamdan Adnan, Dekan Sekolah Sains Sosial, Universiti Malaysia Sabah, menyampaikan ceramah yang bertajuk, "Ledakan Media Sosial, Cabaran dan Impak terhadap Strategi Perhubungan Awam dan Penyebaran Maklumat" di FRIM, Kepong. Ceramah ini adalah untuk meningkatkan kesedaran dalam kalangan penjawat awam FRIM mengenai kepentingan media sosial dan dihadiri oleh 62 orang peserta.

20 January

Prof Dato' Mohd Hamdan Adnan, Dean of Social Science School, University Malaysia Sabah (UMS) has delivered a talk on "Social Media Explosion, Challenges and Impacts on Public Relations and Information Dissemination Strategies" at FRIM. The talk, with the aim of enhancing awareness among FRIM staff on the importance of social media, was attended by 62 participants.



29 Januari

Kerja-kerja pembinaan pagar konkrit dan pagar antipanjat di sempadan kampus FRIM seluas 544 ha telah bermula pada 2013. Syarikat yang dipilih mula melaksanakan kerja pembinaan di sepanjang kawasan perumahan Taman Ehsan, kawasan tanah perkuburan Islam Taman Ehsan, Taman Botani Kepong FRIM dan kawasan Bukit Hari serta sempadan Taman Aman Puri. Pengurusan FRIM telah mengadakan beberapa perjumpaan dengan wakil-wakil penduduk Selayang Utama dan pengusaha kilang. Seseengah pokok di sepanjang kawasan sempadan kampus FRIM ditebang untuk kerja-kerja pembinaan dan bagi tujuan ini, inventori pokok telah dibuat untuk mengenal pasti pokok-pokok yang terlibat serta memastikan tiada spesies terancam yang akan terjejas.

29 January

Work on the construction of concrete fence and anti-climb fence around FRIM 544-ha campus has started in 2013. The construction company has begun work in areas along the border of Taman Ehsan, Taman Ehsan muslim cemetery, FRIM Kepong Botanic Garden, Bukit Hari and Taman Aman Puri. The FRIM Management had conducted a series of meetings with representatives of Selayang Utama residents as well as three factory operators to discuss the project. Some trees along the campus border was removed for the construction of a combination of brick and anti-climb fences, and for this purpose, a tree inventory has been undertaken to ensure no species of importance would be affected. FRIM has done her best to minimise the impact of this project on our forest and take care to ensure safety in the tree removal process.

13 Februari

FRIM menganjurkan gotong-royong menanam 400 batang pokok di sekeliling bangunan kompleks panda Zoo Negara yang melibatkan 140 orang kakitangannya. Ini termasuklah lima spesies buluh yang sesuai dimakan oleh panda dan pokok iaitu kapur, pelawan putih, kelat paya, kayu manis, kelat hitam dan bafia; serta beberapa jenis tanaman hiasan. Ini merupakan salah satu program tanggungjawab sosial korporat (CSR) FRIM sebagai sumbangannya kepada Projek Panda Gergasi.

13 February

FRIM organised a tree planting gotong-royong involving 140 of its staff to help Zoo Negara with landscaping the areas surrounding the panda complex. The group managed to plant 400 trees including five species of bamboo found suitable for the giant panda's consumption and other trees such as pelawan putih, kelat paya, kayu manis, kelat hitam and bafia; as well as some ornamental plants. The activity was undertaken as part of the Institute's corporate social responsibility (CSR) programme in contribution to the Giant Panda Project.



1 Mac

FRIM mengadakan Majlis Penghargaan Media di Dataran FRIM untuk memberi penghargaan kepada pihak media yang telah memberi sokongan kepada FRIM sepanjang 2013. Ia juga bertujuan untuk memberi pengiktirafan kepada sumbangan media terhadap usaha meningkatkan kesedaran masyarakat tentang kepentingan penyelidikan dan pembangunan (R&D) perhutanan dalam pemuliharaan hutan dan penjagaan alam sekitar. Pemberita yang hadir ialah Laupa Junus dan Ashriq Fahmy Ahmad dari Utusan Malaysia, Wan Khairul Shahara Wan Ghazali dan Ahmad Fuad Yahya (Bernama), Mohd Letfee Ahmad (Radio 24), Isabelle Lai (The Star), Tho Siok Yen (China Press), Fouziah Amir (Sinar Harian) dan Zakiah Koya (fz.com).

22 Mac

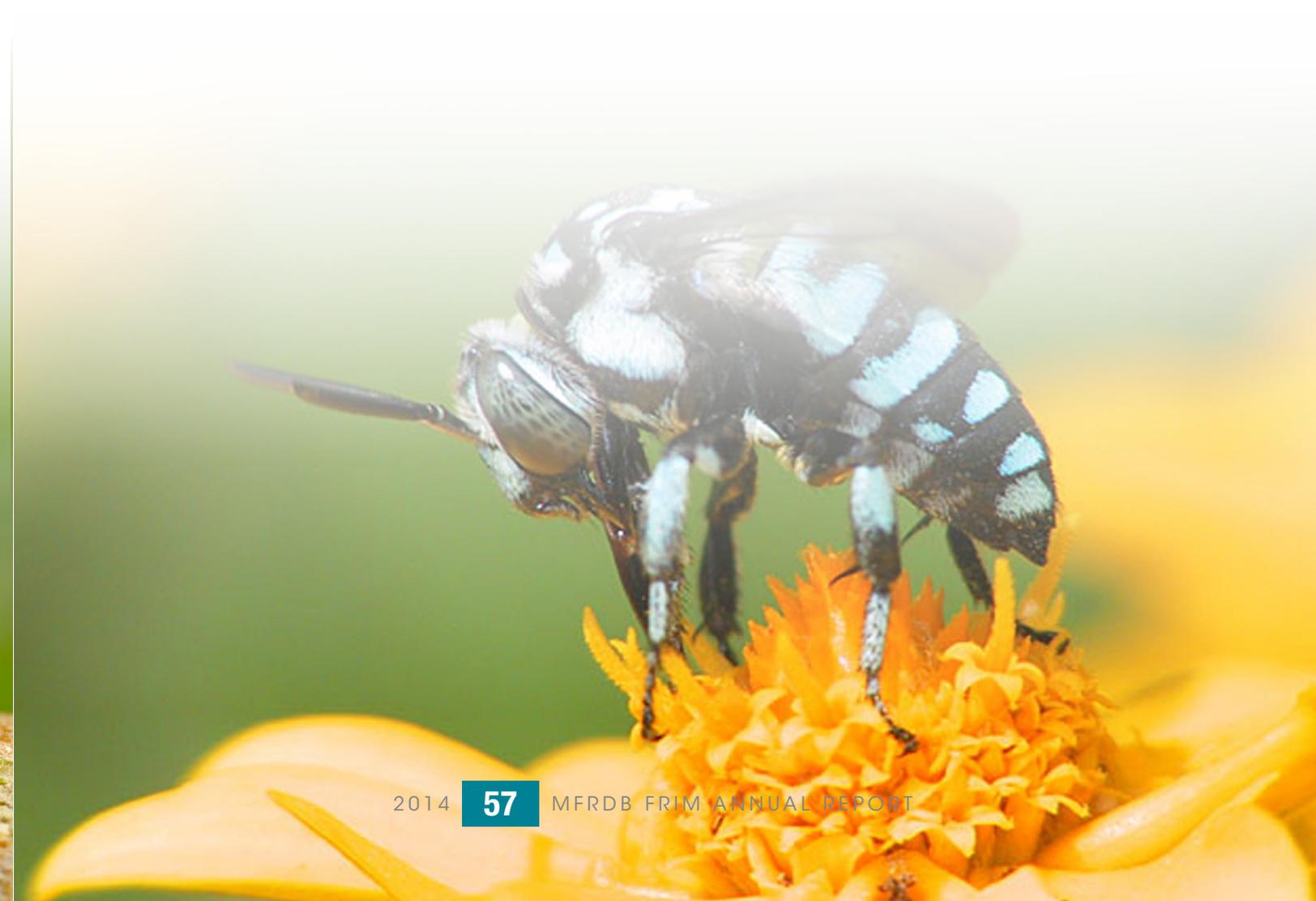
Pemenang-pemenang Pertandingan Menulis Surat Alam Sekitar anjuran FRIM menerima hadiah masing-masing pada Majlis Perasmian Sambutan Hari Hutan Antarabangsa 2014 Peringkat FRIM di Taman Botani Kepong. Hadiah disampaikan oleh Timbalan Menteri NRE, Dato' Sri Dr James Dawos Mamit.

1 March

FRIM has organised its Media Appreciation Ceremony at Dataran FRIM as a show of gratitude to journalists who have been supportive to the Institute throughout 2013. The event was also held to give recognition to the media's contribution in the efforts of enhancing public awareness on the importance of research and development (R&D) in forestry for the forest, biodiversity and environment conservation. Among the media members present were Laupa Junus and Ashriq Fahmy Ahmad of Utusan Malaysia, Wan Khairul Shahara Wan Ghazali and Ahmad Fuad Yahya from Bernama, Mohd Letfee Ahmad of Radio 24, Isabelle Lai of The Star, Tho Siok Yen of China Press, Fouziah Amir of Sinar Harian and Zakiah Koya of fz.com.

22 March

Winners of the FRIM Environment Letter Writing Competition held in 2013 have received their prizes during the FRIM International Day of Forests 2014 celebration at the Kepong Botanic Garden. The NRE Deputy Minister, Dato' Sri Dr James Dawos Mamit presented the prizes.



25 Mac

FRIM turut memeriahkan sambutan Hari Hutan Antarabangsa Perpustakaan Negara Malaysia dengan menyertai sesi bercerita dan menanam pokok. Penglibatan FRIM dalam menayakan sambutan bertema “Sayangi Hutan Kita” ini adalah sebahagian daripada program CSR-nya bagi mempererat kerjasama dengan pelbagai pihak untuk meningkatkan kesedaran orang ramai tentang kepentingan hutan.

19 Jun

FRIM menyampaikan hadiah kepada pemenang-pemenang Pertandingan Melukis Alam Sekitar yang bertemakan “FRIM: Warisan Kebangsaan” sempena Majlis Hari Anugerah FRIM. Pertandingan anjuran FRIM dan Balai Seni Visual Negara ini berjaya mendapat 164 penyertaan. Hadiah pertama bagi Kategori A berjumlah RM3000 dimenangi oleh Fauzi Ab Rahim, hadiah kedua (RM2000) diterima oleh Emran Mohd Tamil dan tempat ketiga (RM1000) oleh Lim Tai Meng. Kategori B pula dijuarai Lee Qing Yang, 16 yang menerima RM2000; tempat kedua (RM1000) Wan Nurlatifah Wan Ahmad Barhanuddin, ketiga (RM500) Chee Hui Xin, keempat (RM250), Lim Jing dan kelima (RM200), Tan Jiangsheng. Pertandingan yang julung-julung kalinya diadakan oleh FRIM ini bertujuan memupuk minat dan kesedaran dalam kalangan generasi muda tentang kepentingan usaha penjagaan dan pemuliharaan hutan sebagai warisan negara.

25 March

FRIM joined the celebration of the National Library of Malaysia’s International Day of Forests in Kuala Lumpur by contributing to the storytelling and tree planting activities. Its participation in the PNM IDF celebration, themed “Love Our Forests”, formed part of the FRIM CSR programme, aimed at working with various interested parties to enhance public awareness of the importance of forests.

19 June

FRIM has announced and presented prizes to all the winners of the Environment Drawing Competition themed, “FRIM: National Heritage” at the FRIM Awards Ceremony. The submissions to the competition, co-organised by FRIM and the National Visual Arts Gallery yielded a total of 164 entries. Fauzi Ab Rahim emerged as the top winner for Category A, taking home RM3,000 cash prize; while the second place (RM2,000) went to Emran Mohd Tamil and third (RM1,000), Lim Tai Meng. For Category B, the top winner was Lee Qing Yang who received RM2,000; while the second prize (RM1,000) went to Wan Nurlatifah Barhanuddin Wan Ahmad, third (RM500), Chee Hui Xin, fourth (RM250), Lim Jing, and fifth (RM200), Tan Jiangsheng. The competition, organised for the first time by FRIM, aimed to inculcate interest and awareness among the younger generations on the importance of conserving forests, the country’s precious heritage through painting.




 Lukisan oleh Fauzi Ab. Rahim,
 Pemenang Pertama Kategori A
 The Category A top prize winning
 artwork of Fauzi Ab. Rahim

28 Ogos

FRIM melaksanakan operasi bersepadu bersama-sama pihak Polis Diraja Malaysia (PDRM), Majlis Perbandaran Selayang (MPS) dan Tenaga Nasional Berhad (TNB) untuk mengosongkan tanah FRIM yang diceroboh oleh Kilang Hai Kee Hung Sdn Bhd sejak tahun 2005. Operasi Perobohan Bangunan Tambahan Syarikat Hai Kee Hung ini dilaksanakan setelah beberapa notis dan amaran serta perbincangan untuk mengosongkan tanah hak milik FRIM di Lot 64704 oleh pihak FRIM dan juga MPS kepada pihak pemilik kilang tidak diendah oleh mereka. FRIM terpaksa mengambil tindakan untuk melindungi kawasan FRIM yang diwartakan sebagai Tapak Warisan Kebangsaan. Sehubungan dengan itu, FRIM dengan kerjasama MPS dan PDRM menjalankan operasi bersepadu yang melibatkan 76 anggota yang terdiri daripada penjawat Awam FRIM, MPS, PDRM, TNB dan pihak setelah mendapat kebenaran oleh Yang DiPertua Majlis Perbandaran Selayang.

28 August

FRIM has executed an integrated operation involving 76 members jointly with the police (PDRM), the Selayang Municipal Council (MPS) and Tenaga Nasional Berhad (TNB) to evict a factory, Kilang Hai Kee Hung Sdn Bhd, that has encroached into the land of FRIM since 2005. The operation was carried out after several notices and warnings issued as well as negotiations by FRIM and MPS to vacate the land owned by FRIM in Lot 64704 were ignored by the factory. FRIM had to carry out the operation, after obtaining consent by the the President, Selayang Municipal Council, in order to protect her land from intrusion which has been declared as a National Heritage.



13 September

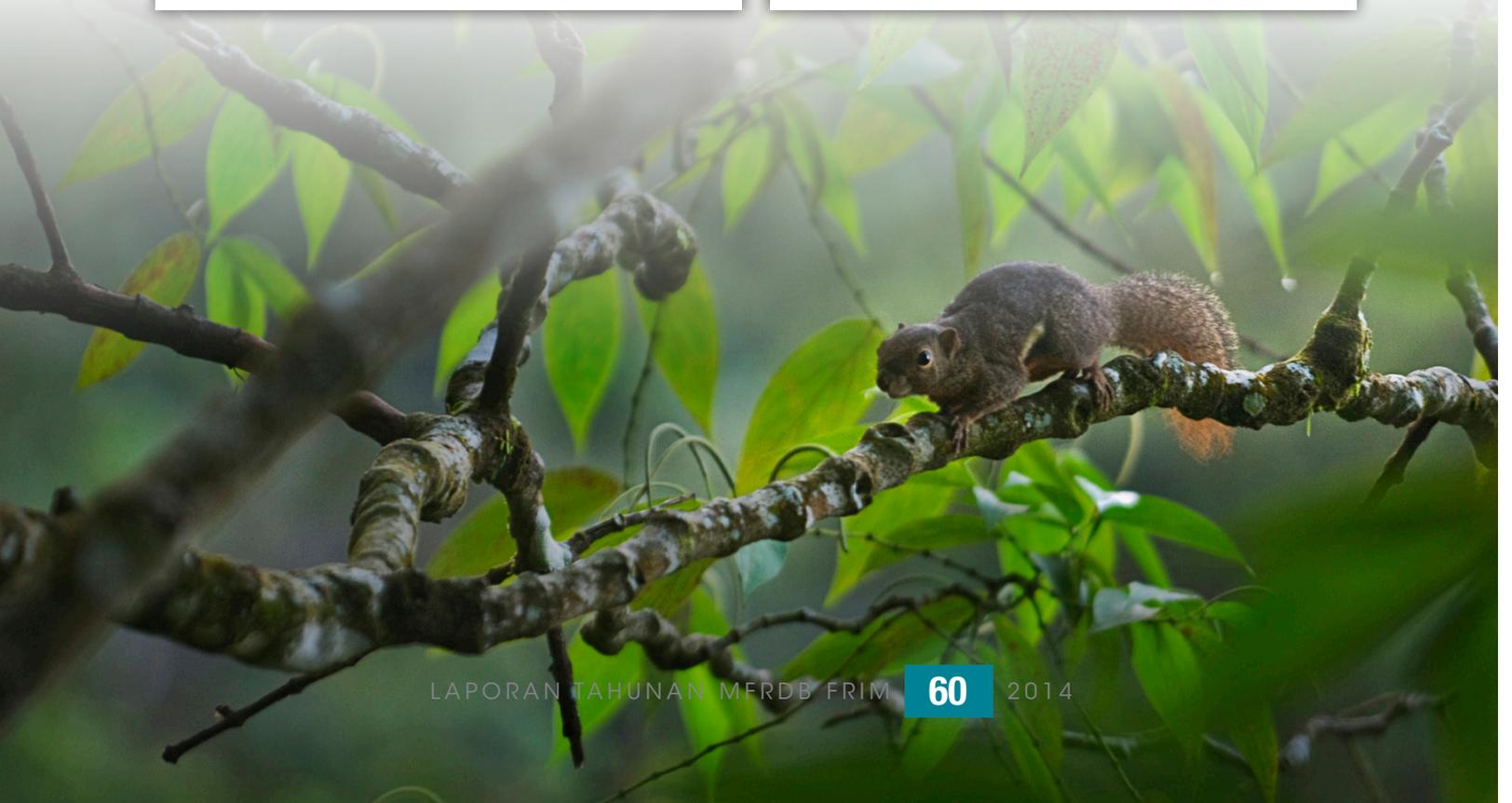
Lebih seribu orang sukarelawan yang terdiri daripada peminat dan pencinta alam dari Malaysia dan Jepun mengambil bahagian dalam program “Forest Tree Biodiversity Planting” anjuran AEON Co (M) Bhd di SPF Bidor, Perak. Majlis Perasmian Program “Forest Tree Biodiversity Planting” ini disempurnakan oleh DYMM Sultan Perak, Sultan Nazrin Muizzuddin Shah, yang turut menanam pokok merawan bunga (*Hopea pubescens*) sebagai kenang-kenangan.

Kumpulan sukarelawan ini termasuk pelajar universiti, kanak-kanak sekolah, wakil-wakil pihak berkuasa tempatan, pekerja-pekerja AEON, rakan-rakan perniagaan dan para pelanggan AEON menanam sebanyak 8,000 batang pokok daripada 30 spesies hutan. Inisiatif ini diterajui AEON untuk mewujudkan “Hutan Persahabatan Malaysia-Jepun” di SPF Bidor bagi menyumbang kepada usaha berterusan FRIM dalam memulih dan menghidupkan semula kawasan bekas lombong bijih timah di situ.

13 September

Over one thousand volunteers comprising nature enthusiasts and environmentalists from Malaysia and Japan took part in a ‘Forest Tree Diversity Planting’ programme, organised by AEON Co. (M) Bhd. at the FRIM research station in Bidor, Perak, last Sunday. The Forest Tree Diversity Planting Ceremony was officiated by His Royal Highness Sultan Nazrin Muizzuddin Shah, who also planted merawan bunga (*Hopea pubescens*) to commemorate the occasion.

The volunteers, including university students, school children, representatives from the local authority, AEON staff, business partners, and customers, planted a total of 8,000 trees consisting of 30 forest tree species. AEON spearheaded the initiative to create the Malaysia-Japan Friendship Forest at SPF Bidor to contribute to FRIM’s continuous efforts in rehabilitating and re-greening the ex-tin mine area.



26 September

Menteri NRE, Datuk Seri G Palanivel mengadakan lawatan kerja ke SPF Mata Ayer, Perlis untuk Program Pengembangan dan Kesedaran Alam Sekitar. Program ini diadakan bertujuan untuk memberi pendedahan dan kesedaran alam sekitar kepada komuniti di sekitar SPF Mata Ayer di samping melaksanakan aktiviti luar kelas yang dapat memupuk minat pelajar dalam bidang sains dan penghargaan terhadap alam sekitar. Palanivel turut menanam sebatang pokok jati (*Tectona grandis*) di kawasan Kem Temak Nipis sebagai tanda kenangan. Seramai 35 orang pelajar dari Sekolah Kebangsaan Titi Tinggi, Padang Besar dan Sekolah Jenis Kebangsaan (Tamil), Kangar, menyertai aktiviti CSR FRIM ini.



26 September

The Minister of NRE, Datuk Seri G Palanivel has conducted his first working visit to FRIM research station (SPF) in Mata Ayer, Perlis for an Outreach and Environmental Awareness Programme. The programme was aimed at inculcating environmental awareness among the neighbouring community members of SPF Mata Ayer while developing interest and appreciation towards science and nature through outdoor activities among school children. Palanivel also planted a teak tree (*Tectona grandis*) at the Temak Nipis Campsite to commemorate the visit. A total of 35 students from Sekolah Kebangsaan Titi Tinggi, Padang Besar and Sekolah Jenis Kebangsaan (Tamil), Kangar participated in this CSR programme.

30 September

Ketua Pengarah FRIM melancarkan Projek “Rain Water Harvesting System” (RWHS) yang dibangunkan di bangunan Auditorium (Blok E1). Sistem penuaian air hujan ini diadakan sebagai langkah penjimatan penggunaan air bersih di FRIM selaras dengan saranan kempen berjimat cermat kerajaan dalam penggunaan air. Ujian pengesahan keselamatan air yang dijalankan oleh Cawangan Hidrologi FRIM mendapati air yang dihasilkan RWHS selamat untuk digunakan. Penggunaan RWHS ini dapat mengurangkan penggunaan air dari bekalan SYABAS yang dianggarkan sebanyak 15–20 meter padu sebulan di bangunan Auditorium FRIM.

30 September

FRIM Director General has launched a “Rain Water Harvesting System” (RWHS) Project which was successfully developed and installed at the Auditorium building (Block E1). The RWHS was initiated as a water conservation measure in line with the government’s campaign to reduce water consumption and improve water reuse. Water safety tests conducted by the FRIM Hydrology Branch found that the water processed by RWHS to be safe for use. The use of RWHS will reduce the use of water supplied by SYABAS, estimated at 15–20 cubic meters per month, for the Auditorium building.



SOROTAN BERITA TENTANG FRIM DI MEDIA CETAK

HIGHLIGHT OF NEWS ABOUT FRIM IN PRINTED MEDIA

Tarikh/Date	Tajuk/Title	Akhbar/Newspaper
2 Januari/January	Main structure of panda exhibition hall completed	China Press
6 Januari/January	FRIM scientists honoured by academy	The Star
8 Januari/January	Malaysia bakal eksport perabot kayu mesra alam terkemuka	Utusan Malaysia
8 Januari/January	New drying system breakthrough in chemical-free technology	Malaysian Reserve
9 Februari/February	Conserve rest of Gunung Kanthan	Sunday Star
18 Februari/February	Establishment of DNA database for trees	Sin Chew Daily
19 Februari/February	FRIM to organise expo on herbs	The Star
21 Februari/February	Institut Penyelidikan Perhutanan Malaysia (FRIM)	Midi
24 Februari/February	FRIM anjur pameran herba	Utusan Malaysia
26 Februari/February	Recycling waste cooking oil to diesel	China Press
27 Februari/February	Cafe goes green	The Star
2 Mac/March	Abdul Latiff: Not allowed to be destroyed	Sin Chew Daily
2 Mac/March	FRIM comes under threat	The Star
6 Mac/March	MNS fully behind FRIM against plan	The Star
7 Mac/March	No highway splitting FRIM	The Star
8 Mac/March	Minister: No highway splitting FRIM	Nanyang Siang Pau
12 Mac/March	Khazanah Warisan Alam Semula Jadi - Koleksi produk & artifak FRIM	Sinar Harian
12 Mac/March	99 Spesies Buah di FRIM	Sinar Harian
12 Mac/March	Frim Warisan Kebangsaan	Sinar Harian
19 Mac/March	DBKL-FRIM MOA towards biodiversity	New Sabah Times English (KK)
20 Mac/March	More green projects for FRIM	New Straits Times
20 Mac/March	Kerjasama DBKL, FRIM urus hutan	Utusan Malaysia
23 Mac/March	DBKL, FRIM jalin kerjasama urus taman, hutan bandar	Sinar Harian
25 Mac/March	400 trees for Kepong Botanic Garden	New Straits Times
30 Mac/March	Leave FRIM alone	New Sunday Times
30 Mac/March	FRIM, WWF-Malaysia pulihara biodiversiti hutan	Sinar Harian
10 April	No highway to build around FRIM area	China Press
13 April	FRIM holds basic planting course on agarwood	The Sunday Post (Kuching)
16 April	Put FRIM on your canvas	The Star
4 Mei/May	Nature sparks creativity at FRIM	Sunday Star
12 Mei/May	FRIM anjur Pameran Herba Malaysia	Utusan Malaysia
29 Mei/May	Preserve all of Gunung Kanthan	The Star

Tarikh/Date	Tajuk/Title	Akhbar/Newspaper
29 Mei/May	Penulis buku ilmiah dihargai	Berita Harian
30 Mei/May	FRIM researcher gets Best Book award	Malay Mail
31 Mei/May	Finding our national treasure in Orang Asli communities	The Heat
2 Jun/June	FRIM officer receives book award	The Star
4 Jun/June	PHM 2014 tonjolkan potensi herba	Sinar Harian
10 Jun/June	Potensi pasaran herba tempatan	Harian Metro
16 Jun/June	Perladangan hutan FRIM-UTM	Utusan Malaysia
25 Jun/June	FRIM calls for conservation of urban green space	Malay Mail
16 Ogos/August	Generasi masa depan akan hargai Dasar Geran Komunal	Harian Ekspres (KK)
18 Ogos/August	Pulihara hutan palma	Utusan Malaysia
25 Ogos/August	Projek Linkages rapatkan hubungan dua generasi	Utusan Malaysia
22 September	Meneroka industri hiliran buluh	Utusan Malaysia
13 Oktober/October	FRIM menang anugerah harta intelek	Utusan Malaysia
14 Oktober/October	International recognition for our forest scientist	The Star
16 Oktober/October	FRIM, RMP among finalists for CAPAM International Innovation Awards	Borneo Post (Kuching)
25 Oktober/October	FRIM sedia bantu DBKL kenal pasti tempat berisiko	Sinar Harian
4 November	Agarwood's value is also its curse	New Straits Times
6 November	The soil will know if the tree almost fall down	Sin Chew Daily
3 Disember/December	Penulisan Tok Din menjadi	Sinar Harian
8 Disember/December	Penyelidik FRIM menang anugerah antarabangsa	Utusan Malaysia
16 Disember/December	Dr Abd Latif felo ASM baru	Harian Metro
18 Disember/December	HTD-treated lumber	Nanyang Siang Pau



ANUGERAH DAN PENGIKTIRAFAN AWARD AND RECOGNITION

NAMA ANUGERAH AWARD	KETERANGAN REMARK	TARIKH/TEMPAT DATE/VENUE
1. Anugerah Reka Cipta & Inovasi di Ekspo Teknologi Malaysia ke-13 <i>Invention and Innovation Awards at the 13th Malaysia Technology Expo (MTE)</i> Penganjur/Organiser: Malaysian Association Research Scientists (MARS) & PROTEMP Exhibitions Sdn Bhd,	Emas/Gold Tajuk/Title: Mathematical Models for Alkaline Pulp & Paper Properties of Oil Palm Empty Fruit Bunch Fibre—Dr Rushdan Ibrahim (Ketua/Head) Perak/Silver Tajuk/Title: RoVBAM Plyboard for Panel Furniture and Interior Products Tajuk/Title: The Production of Moulded Rotary Veneer Bamboo (RoVBAM) Chair Pereka/Inventor: Dr Abdul Hamid Saleh (Ketua/Head)	21 Februari February Pusat Dagangan Dunia Putra, Kuala Lumpur Putra World Trade Centre, Kuala Lumpur
2. 5th International Engineering Invention and Innovation Exhibition (i-ENVEX) Penganjur/Organiser: Universiti Malaysia Perlis (UniMAP) & Kementerian Pendidikan/Ministry of Education	Pingat Emas/Gold Medal: Kategori Bangunan, Pembinaan & Bahan (Kelas D)/Category of Building, Construction and Material (Class D) Tajuk/Title: Nanocapsule Organic Phase Change Material as Advanced Thermal Energy Storage for Energy Saving, Intelligent Building Application Pereka/Inventor: Tumirah Khadiran	13 April Pauh Putra, Perlis
3. Presiden Persatuan Sains Tanah Malaysia (MSSS) President of the Malaysian Society of Soil Science (MSSS)	Dr Wan Rasidah Kadir	8 April Perlis
4. Ekspo Teknologi Antarabangsa (ITEX) 2014/International Technology Expo (ITEX) 2014	5 pingat emas/5 gold medals: <ul style="list-style-type: none"> • Dr Rushdan Ibrahim: Kidney Tray for Hospital—An Environmental Friendly Antimicrobial Kenaf Core Pulp Moulding • Dr Abdul Hamid Saleh: Hybrid Bamboo Veneer Flooring • Siti Humeirah: Biofunctional Active Ingredient from <i>Aquilaria</i> species • Dr Fadzureena Jamaludin: Anti-Gout Herbal Remedies from Standardised Extract (SEBF) of <i>Baeckia frutescens</i> • Dr Abdul Hamid Saleh: ROVBAM Technology 	9 Mei/May Pusat Konvensyen Kuala Lumpur (KLCC) Kuala Lumpur Convention Centre
5. Ahli Majlis Persatuan Saintis Malaysia (MSA)/MSA Council members 2014/2016	Naib Presiden/Vice President: Dr Saw Leng Guan Timbalan Setiausaha Agung/Assistant Secretary General: Dr Gan Kee Seng Ahli Majlis/Council Members: Dato' Dr Abd. Latif Mohmod & Dato' Dr Marzalina Mansor Juruaudit/Auditor: Dr Rahim Sudin	17 Mei/May FRIM

NAMA ANUGERAH AWARD	KETERANGAN REMARK	TARIKH/TEMPAT DATE/VENUE
6. Anugerah Buku Terbaik bagi Kategori Sains, Teknologi dan Perubatan di Majlis Penyampaian Anugerah Majlis Penerbitan Ilmiah Malaysia–Kementerian Pendidikan Malaysia 2013 (MAPIM-KPM 2013) The Best Book Award under the Science, Technology and Medicine Category at the Malaysian Scholarly Publication Council (MAPIM)–Ministry of Education Malaysia 2013 (MAPIM-KPM 2013) Awards Ceremony	Khairuddin Kamarudin—trofi dan RM15,000 bagi buku yang berjudul Hutan Hujan Tropika Semenanjung Malaysia terbitan Dewan Bahasa dan Pustaka Khairuddin Kamarudin—trophy and RM15,000 for his book entitled, Hutan Hujan Tropika Semenanjung Malaysia published by Dewan Bahasa dan Pustaka	19 Mei/May Universiti Putra Malaysia (UPM)
7. Sijil Kecemerlangan TripAdvisor 2014 / TripAdvisor 2014 Certificate of Excellence	FRIM	27 Jun/June
8. Anugerah Harta Intelek Negara 2014 (AHIN 2014), Majlis AHIN anjuran bersama Kementerian Perdagangan Dalam Negeri dan Perbadanan Harta Intelek Malaysia (MyIPO) sempena Hari Harta Intelek Negara	Tempat Pertama Kategori Paten bagi ciptaan sistem pengeringan kayu suhu tinggi (high temperature drying atau HTD) yang mesra alam.	2 Oktober October
9. Pemenang Anugerah Penyelidikan Kedoktoran Cemerlang IUFRO sempena Kongres Sedunia Kesatuan Antarabangsa Pertubuhan Penyelidikan Perhutanan (IUFRO) yang ke-24 was entitled “Discovery of Genic Microsatellite Markers from Transcriptome Sequences of <i>Eurycoma longifolia</i> Root“.	Dr Sik Huei Shing—sistem pengeringan suhu tinggi (HTD) untuk merawat kayu getah secara mesra alam High Temperature Drying (HTD) system - a chemical-free wood treatment technology	10 Oktober October Salt Lake City, Amerika Syarikat Salt Lake City, United States of America
10. Anugerah Penyelidikan Kedoktoran Terbaik IUFRO sempena Kongres Sedunia Kesatuan Antarabangsa Pertubuhan Penyelidikan Perhutanan (IUFRO) yang ke-24 Anugerah poster terbaik IUFRO di Kongres Sedunia IUFRO ke-24, IUFRO Outstanding Doctoral Research Award in conjunction with the XXIV International Union of Forestry Research Organisations (IUFRO) World Congress best poster award	Dr Lee Chai Ting— Bahagian 2: Fisiologi dan Genetik/Division 2: Physiology and Genetics: Poster bertajuk/ The poster entitled “Discovery of Genic Microsatellite Markers from Transcriptome Sequences of <i>Eurycoma longifolia</i> Root“.	10 Oktober October Salt Lake City, Amerika Syarikat Salt Lake City, United States of America

NAMA ANUGERAH AWARD	KETERANGAN REMARK	TARIKH/TEMPAT DATE/VENUE
11. FRIM mengekalkan pensijilan MS ISO 9001:2008 dari Intertek International Sdn Bhd. FRIM retains its MS ISO 9001:2008 certification by Intertek Sdn Bhd.	FRIM	14–15 Oktober October
12. FRIM memperbaharu pensijilan Persekitaran Berkualiti (QE/5S) yang dilaksanakan oleh Perbadanan Produktiviti Malaysia. FRIM has successfully renewed the Quality Environment (QE/5S) certification, after being audited by the Malaysian Productivity Corporation (MPC).	FRIM	17 Oktober October
13. Sijil pengiktirafan sebagai finalis Anugerah Inovasi Antarabangsa Persatuan Komanwel bagi Pentadbiran Awam dan Pengurusan (CAPAM) 2014. A certificate of appreciation as one of the finalists for the Commonwealth Association for Public Administration and Management (CAPAM) 2014 International Innovations Awards.	FRIM dan Polis DiRaja Malaysia (PDRM) merupakan dua pasukan dari Malaysia yang berjaya ke pusingan akhir anugerah inovasi antarabangsa yang diadakan sempena Persidangan dwitahunan CAPAM. FRIM dicalonkan menerusi pembangunan teknologi rawatan kayu iaitu teknologi pengeringan kayu suhu tinggi (HTD) di bawah kategori Inovasi dalam Perkhidmatan dan Program Kerajaan. FRIM and the Royal Malaysian Police (RMP) were the only teams from Malaysia to make it to the final stage of the CAPAM Awards, held in conjunction with CAPAM 2014 Biennial Conference. FRIM was nominated for its lumber treatment technology (HTD) under the Innovations in Government Services and Programmes category.	21 Oktober October Putrajaya
14. Anugerah Pensijilan Akreditasi MS ISO/IEC 17025 (untuk penentuan potasium dalam tisu tumbuhan dan bahan-bahan berasaskan tumbuhan) daripada Jabatan Standard Malaysia. MS ISO/IEC 17025 Certificate of Accreditation (for determination of potassium in plant tissue and plant based material) from the Department of Standards Malaysia.	Makmal Kimia Tanah Soil Chemistry Laboratory	17 November
15. BioInnovation Awards 2014 sempena Biotechnology Asia yang dianjurkan bersama oleh Persatuan Saintis Penyelidikan Malaysia (MARS) dan PROTEMP Exhibitions Sdn Bhd.	Pingat Emas/ Gold Medal —Dr Mohd Khairun Anwar Uyup (ketua/ head), Dr Hamdan Husain, Prof Dr Paridah Md Tahir, Siti Rafidah Mahmud, Mat Yaacob Che Wan & Mohd Faizul Mohd Shukari. Tajuk projek/ project title : Exterior Grade Plybamboo	19–21 November November Pusat Konvensyen Kuala Lumpur (KLCC) Kuala Lumpur Convention Centre

NAMA ANUGERAH AWARD	KETERANGAN REMARK	TARIKH/TEMPAT DATE/VENUE
BioInnovation Awards 2014 held in conjunction with Biotechnology Asia, co-organised by the Malaysian Association of Research Science (MARS) and PROTEMP Exhibitions Sdn Bhd.	Pingat Emas/ Gold Medal —Dr Mohd Khairun Anwar Uyup (ketua/head), Dr Hamdan Husain, Prof Dr Paridah Md Tahir, Siti Rafidah Mahmud, Mat Yaacob Che Wan & Mohd Faizul Mohd Shukari. Tajuk projek/ project title : Exterior Grade Plybamboo	19–21 November November Pusat Konvensyen Kuala Lumpur (KLCC) Kuala Lumpur Convention Centre
16. Anugerah Perak Kecemerlangan Makmal Institut Kimia Malaysia (IKM) di Majlis Penyampaian Anugerah IKM sempena Majlis Makan Malam IKM 2014. IKM Laboratory Excellence Silver Award at the Malaysian Institute of Chemistry's (IKM) award presentation ceremony for the award presentation ceremony, held in Kuala Lumpur in conjunction with the IKM Annual Dinner 2014.	Makmal Kimia Tanah (MKT) mengekalkan Anugerah Kecemerlangan Makmal IKM selama 10 tahun berturut-turut mulai 2005. Soil Chemistry Laboratory attaining the IKM Laboratory Excellence Award for 10 consecutive years since 2005.	5 Disember December Kuala Lumpur
17. Anugerah Emas Kecemerlangan Makmal Institut Kimia Malaysia (IKM) di Majlis Penyampaian Anugerah IKM sempena Majlis Makan Malam IKM 2014. IKM Laboratory Excellence Gold Award at the Malaysian Institute of Chemistry's (IKM) award presentation ceremony for the award presentation ceremony, held in Kuala Lumpur in conjunction with the IKM Annual Dinner 2014.	Makmal Analisis Awetan Kayu 15 tahun berturut-turut memenangi Anugerah Kecemerlangan Makmal IKM pada tahun 2010 serta Anugerah Perak pada 2005 Wood Preservative Analytical Laboratory was accorded the Gold Award in 2010 (for receiving the excellence award for 15 consecutive years) and the Silver Award in 2005	5 Disember December Kuala Lumpur
18. Anugerah Emas Kecemerlangan Makmal Institut Kimia Malaysia (IKM) di Majlis Penyampaian Anugerah IKM sempena Majlis Makan Malam IKM 2014 IKM Laboratory Excellence Gold Award at the Malaysian Institute of Chemistry's (IKM) award presentation ceremony for the award presentation ceremony, held in Kuala Lumpur in conjunction with the IKM Annual Dinner 2014.	Makmal Ujian Komposit Kayu FRIM Menerima Anugerah Perak pada 2013 Wood Composite Testing Laboratory received the Silver Award in 2013	5 Disember December Kuala Lumpur

NAMA ANUGERAH AWARD	KETERANGAN REMARK	TARIKH/TEMPAT DATE/VENUE
19. Felo ASM di Majlis Penganugerahan Felo 2014 kepada ahli-ahli sains yang terpilih dan Pengumuman Anugerah Saintis Penyelidikan Terbaik Malaysia 2014. ASM fellow at the 2014 Conferment of Fellowships to Scientists by ASM and the Announcement of the 2014 Top Research Scientists Malaysia (TRSM).	Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod dipilih di bawah disiplin Sains Pertanian, Biologi dan Sains Alam Sekitar. Saintis FRIM yang kelima menerima pengiktirafan ini. FRIM Director General, Dato' Dr Abd Latif Mohmod elected under the Biological Agriculture and Environmental Sciences discipline	8 Disember December

20–22 February

20–22 February



FRIM meraih satu pingat emas dan dua pingat perak Anugerah Rekacipta dan Inovasi 2014 sempena Ekspo Teknologi Malaysia (MTE) ke-13 di Pusat Dagangan Dunia Putra, Kuala Lumpur. Majlis perasmian disempurnakan oleh Timbalan Menteri Sains, Teknologi dan Inovasi, Datuk Dr Abu Bakar Mohamad Diah. Kumpulan penyelidik FRIM yang memenangi Pingat Emas Anugerah Rekacipta dan Inovasi ini diketuai oleh Dr Rushdan Ibrahim. Mereka telah mempamerkan inovasi yang dihasilkan melalui projek yang bertajuk, “*Mathematical Models for Alkaline Pulp and Paper Properties of Oil Palm Empty Fruit Bunch Fibre*”.

FRIM took home one gold and two silver medals for the Invention and Innovation Awards at the 13th Malaysia Technology Expo (MTE) 2014. The expo, held at the Putra World Trade Centre in Kuala Lumpur, was officiated by the Deputy Minister of Science, Technology and Innovation (MOSTI), Datuk Dr Abu Bakar Mohamad Diah, who also presented the Invention and Innovation Awards. The research team, led by Dr Rushdan Ibrahim won the gold medal for the innovation on “*Mathematical Models for Alkaline Pulp and Paper Properties of Oil Palm Empty Fruit Bunch Fibre*”.

Pingat perak pula merupakan hasil penyelidikan yang diketuai oleh Dr Abdul Hamid Saleh iaitu, “*The Production of Moulded Rotary Veneer Bamboo (RoVBAM) Chair*” dan “*RoVBAM Plyboard for Panel Furniture and Interior Products*” berbanding dengan venir kayu lain.

The other innovations which won the silver were “*RoVBAM Plyboard for Panel Furniture and Interior Products*” and “*The Production of Moulded Rotary Veneer Bamboo (RoVBAM) Chair*” developed by a team of researchers led by Dr Abdul Hamid Salleh.

8 April

Dr Wan Rasidah Kadir, Ketua Cawangan Pengurusan Tanah FRIM dilantik sebagai Presiden wanita pertama Persatuan Sains Tanah Malaysia (MSSS). Wan Rasidah menjadi ahli MSSS sejak tahun 1986 dan dilantik sebagai ahli jawatankuasa pengurusan persatuan tersebut sejak 2011. Beliau merupakan Pengerusi Persidangan Sains Tanah Malaysia 2014. Beliau juga pernah menjadi pengerusi jawatankuasa saintifik dan teknikal persidangan pada 2012 dan 2013.

13 April

Penyelidik FRIM, Tumirah Khadiran, memenangi pingat emas bagi Kategori Bangunan, Pembinaan dan Bahan (Kelas D) dalam Pameran Reka Cipta dan Inovasi Kejuruteraan Antarabangsa (i-ENVEX) yang kelima anjuran Universiti Malaysia Perlis (UniMAP) dan Kementerian Pelajaran di Pauh Putra, Perlis. Ini merupakan hasil penyelidikan dan projek PhD-nya yang bertajuk, "Nanocapsule Organic Phase Change Material as Advanced Thermal Energy Storage for Energy Saving, Intelligent Building Application" bersama-sama Prof Dr Mohd Zobir Hussein, Prof Dr Zulkarnain Zainal dan Dr Rafeadah Rusli.

9 Mei

FRIM merangkul pingat emas untuk kesemua inovasi yang dipertandingkan di Ekspo Teknologi Antarabangsa (ITEX) 2014 di Pusat Persidangan Kuala Lumpur (KLCC). Ketua projek serta produk yang bertanding adalah seperti yang berikut:

- Dr Rushdan Ibrahim: Kidney Tray for Hospital— An Environmental Friendly Antimicrobial Kenaf Core Pulp Moulding
- Dr Abdul Hamid Saleh: Hybrid Bamboo Veneer Flooring
- Siti Humeirah: Biofunctional Active Ingredient from *Aquilaria* species
- Dr Fadzureena Jamaludin: Anti-Gout Herbal Remedies from Standardised Extract (SEBF) of *Baeckia frutescens*
- Dr Abdul Hamid Saleh: ROVBAM Technology

17 Mei

Beberapa orang saintis FRIM dilantik sebagai Ahli Majlis Persatuan Saintis Malaysia (MSA) 2014/2016.

Mereka terdiri daripada:

- Naib Presiden: Dr Saw Leng Guan
- Timbalan Setiausaha Agung: Dr Gan Kee Seng
- Ahli Majlis: Dato' Dr Abd. Latif Mohmod, Dato' Dr Marzalina Mansor
- Juruaudit: Dr Rahim Sudin

8 April

FRIM Soil Management Branch Head, Dr Wan Rasidah Kadir has been appointed as the first female President of the Malaysian Society of Soil Science (MSSS). Wan Rasidah has been a member of MSSS since 1986 and elected a member of the society's management committee since 2011. She served as the Chairman for the Soil Science Conference of Malaysia 2014. Prior to this, she had also served in the conference's scientific and technical sub-committee in 2012 and 2013.

13 April

FRIM researcher, Tumirah Khadiran won a gold medal under the Category of Building, Construction and Material (Class D) at the 5th International Engineering Invention and Innovation Exhibition (i-ENVEX), organised by Universiti Malaysia Perlis (UniMAP) and the Education Ministry, in Pauh Putra, Perlis. She won the medal for her invention and PhD project on "Nanocapsule Organic Phase Change Material as Advanced Thermal Energy Storage for Energy Saving, Intelligent Building Application" with her co-inventors, Prof Dr Mohd Zobir Hussein, Prof Dr Zulkarnain Zainal and Dr Rafeadah Rusli.

9 May

FRIM bagged five gold medals for all innovations submitted during the International Technology Expo (ITEX) 2014 held at the Kuala Lumpur Convention Centre (KLCC). The project leaders involved were as mentioned above:

- Dr Rushdan Ibrahim: Kidney Tray for Hospital— An Environmental Friendly Antimicrobial Kenaf Core Pulp Moulding
- Dr Abdul Hamid Saleh: Hybrid Bamboo Veneer Flooring
- Siti Humeirah: Biofunctional Active Ingredient from *Aquilaria* species
- Dr Fadzureena Jamaludin: Anti-Gout Herbal Remedies from Standardised Extract (SEBF) of *Baeckia frutescens*
- Dr Abdul Hamid Saleh: ROVBAM Technology

17 Mei

A few FRIM scientists were elected as MSA Council members 2014/2016.

They were as mentioned above:

- Vice President: Dr Saw Leng Guan
- Assistant Secretary General: Dr Gan Kee Seng
- Council Members: Dato' Dr Abd. Latif Mohmod, Dato' Dr Marzalina Mansor
- Auditor: Dr Rahim Sudin

19 Mei

Penolong Pegawai Penyelidik FRIM, Khairuddin Kamarudin, menerima Anugerah Buku Terbaik bagi Kategori Sains, Teknologi dan Perubatan di Majlis Penyampaian Anugerah Majlis Penerbitan Ilmiah Malaysia–Kementerian Pendidikan Malaysia 2013 (MAPIM-KPM 2013) di Universiti Putra Malaysia (UPM). Anugerah disampaikan oleh Timbalan Menteri Pendidikan II, P Kamalanathan.

19 May

FRIM Assistant Research Officer, Khairuddin Kamarudin, received the Best Book Award under the Science, Technology and Medicine Category at the Malaysian Scholarly Publication Council (MAPIM)–Ministry of Education Malaysia 2013 (MAPIM-KPM 2013) Awards Ceremony at the Universiti Putra Malaysia (UPM). Khairuddin received the award from the Deputy Minister of Education II, P Kamalanathan.



Khairuddin menerima trofi dan RM15,000 bagi bukunya yang berjudul *Hutan Hujan Tropika Semenanjung Malaysia* terbitan Dewan Bahasa dan Pustaka. Buku ini memaparkan tentang kepentingan hutan dalam kehidupan kita; serta pemeliharaan hutan berkesan yang dapat menyumbang kepada kesejahteraan dalam kehidupan manusia. Khairuddin was presented with the trophy and RM15,000 for his book entitled, *Hutan Hujan Tropika Semenanjung Malaysia*. His award-winning book, published by Dewan Bahasa dan Pustaka, was about the importance of forests to our lives and the contribution of effective forest conservation to the people’s prosperity and well-being

27 Jun

FRIM menerima Sijil Kecemerlangan TripAdvisor 2014 yang menandakan bahawa FRIM mendapat maklum balas cemerlang secara tekal daripada pelancong yang menggunakan khidmat TripAdvisor. FRIM juga disenaraikan sebagai salah satu daripada “Tujuh Keajaiban Ekopelancongan di Malaysia” dalam artikel yang diterbitkan oleh The Star Online pada 5 Jun.

27 June

FRIM is pleased to be awarded the TripAdvisor 2014 Certificate of Excellence, signifying that it has consistently received outstanding feedback from TripAdvisor travellers. FRIM was also listed as one of “Seven Wonders of Eco-tourism in Malaysia” in an article published by The Star Online on 5 June 2014.



2 Oktober

FRIM meraih tempat pertama Anugerah Harta Intelek Negara 2014 (AHIN 2014) untuk Kategori Paten bagi ciptaan sistem pengeringan kayu suhu tinggi (high temperature drying atau HTD) yang mesra alam. Majlis AHIN, anjuran bersama Kementerian Perdagangan Dalam Negeri dan Perbadanan Harta Intelek Malaysia (MyIPO) sempena Hari Harta Intelek Negara ini disempurnakan oleh Menteri Datuk Seri Hasan Malek. Teknologi HTD (rawatan kayu getah menggunakan pengeringan suhu tinggi) ini dapat menyelesaikan masalah yang dihadapi oleh industri kayu-kayan tempatan berkaitan halangan serta syarat-syarat perdagangan semakin ketat yang ditetapkan oleh negara-negara maju dalam memastikan penggunaan produk-produk lebih mesra alam.



10 Oktober

Pegawai penyelidik FRIM, Dr Sik Huei Shing yang berjaya membangunkan sistem pengeringan suhu tinggi (HTD) untuk merawat kayu getah secara mesra alam, dipilih sebagai pemenang Anugerah Penyelidikan Kedoktoran Cemerlang IUFRO sempena Kongres Sedunia Kesatuan Antarabangsa Pertubuhan Penyelidikan Perhutanan (IUFRO) yang ke-24 di Salt Lake City, Amerika Syarikat. Seorang lagi pegawai penyelidik FRIM iaitu Dr Lee Chai Ting menerima anugerah poster terbaik IUFRO di Kongres Sedunia IUFRO ke-24 ini di bawah "Bahagian 2: Fisiologi dan Genetik" untuk poster yang bertajuk "Discovery of Genic Microsatellite Markers from Transcriptome Sequences of *Eurycoma longifolia* Root".

2 October

FRIM has clinched the top prize of the National Intellectual Property Award 2014 (NIPA 2014) for the Patent Category for its outstanding and environmentally-friendly high temperature drying (high temperature drying timber or HTD) system. The NIPA official ceremony, co-organised by the Domestic Trade, Corporation and Consumers Ministry and the Intellectual Property Corporation of Malaysia (MyIPO) and held in conjunction with the celebration of National Intellectual Property Day, was graced by Minister Datuk Seri Hasan Malek. The HTD technology offers an ideal solution to the concerns of the rubberwood furniture manufacturers and timber trade industry over increasingly stringent requirements for environmentally-friendly products imposed by developed countries.



10 October

FRIM researcher, Dr Sik Huei Shing, who is one of the two key researchers who had successfully developed the High Temperature Drying (HTD) system, a chemical-free wood treatment technology, has been picked to receive the IUFRO Outstanding Doctoral Research Award in conjunction with the XXIV International Union of Forest Research Organisations (IUFRO) World Congress in Salt Lake City, United States of America. Another FRIM researcher, Dr Lee Chai Ting, clinched the best poster award for Division 2: Physiology and Genetics at the IUFRO World Congress. The poster was on "Discovery of Genic Microsatellite Markers from Transcriptome Sequences of *Eurycoma longifolia* Root".



21 Oktober

FRIM menerima sijil pengiktirafan sebagai finalis Anugerah Inovasi Antarabangsa Persatuan Komanwel bagi Pentadbiran Awam dan Pengurusan (CAPAM) 2014. FRIM dan Polis DiRaja Malaysia (PDRM) merupakan dua pasukan dari Malaysia yang berjaya ke pusingan akhir anugerah inovasi antarabangsa yang diadakan sempena Persidangan dwitahunan CAPAM di Putrajaya. FRIM dicalonkan menerusi pembangunan teknologi rawatan kayu iaitu teknologi pengeringan kayu suhu tinggi (HTD) di bawah kategori Inovasi dalam Perkhidmatan dan Program Kerajaan; manakala PDRM bagi sistem pemantauan bandar raya selamat (SPBS/SCMS) untuk kategori Penggunaan Inovatif Teknologi dalam Perkhidmatan Awam yang berjaya dimenangkinya.

5 Disember

Makmal Kimia Tanah (MKT) FRIM menerima Anugerah Perak Kecemerlangan Makmal Institut Kimia Malaysia (IKM) di Majlis Penyampaian Anugerah IKM kerana berjaya mengekalkan Anugerah Kecemerlangan Makmal IKM selama 10 tahun berturut-turut mulai 2005. Majlis penyampaian anugerah yang diadakan di Kuala Lumpur sempena Majlis Makan Malam IKM 2014 dirasmikan oleh Timbalan Menteri Sains, Teknologi dan Inovasi, Datuk Dr Abu Bakar Mohamad Diah.

Turut menerima Anugerah Kecemerlangan Makmal IKM ialah Makmal Analisis Awetan Kayu dan Makmal Ujian Komposit Kayu FRIM. Makmal Analisis Awetan Kayu menerima Anugerah Emas iaitu pengiktirafan 15 tahun berturut-turut memenangi Anugerah Kecemerlangan Makmal IKM pada tahun 2010 serta Anugerah Perak pada 2005; sementara Makmal Ujian Komposit Kayu pula menerima Anugerah Perak pada 2013.

21 October

FRIM received a certificate of appreciation as one of the finalists for the Commonwealth Association for Public Administration and Management (CAPAM) 2014 International Innovations Awards. FRIM and the Royal Malaysian Police (RMP) were the only teams from Malaysia to make it to the final stage of the CAPAM International Innovation Awards, held in conjunction with CAPAM 2014 Biennial Conference in Putrajaya. FRIM was selected for the development of Lumber Treatment Technology while the RMP for the Safe City Monitoring System (SCMS/SPBS). The RMP took home the Innovative Use of Technology in the Public Service Award for its Safe City Monitoring. FRIM's submission was under the Innovations in Government Services and Programmes category.

5 December

FRIM Soil Chemistry Laboratory has received IKM Laboratory Excellence Silver Award at the Malaysian Institute of Chemistry's (IKM) awards presentation ceremony recently for attaining the IKM Laboratory Excellence Award for 10 consecutive years since 2005. The awards presentation ceremony, held in Kuala Lumpur in conjunction with the IKM Annual Dinner 2014, was officiated by the Deputy Minister of Science, Technology and Innovation, Datuk Dr Abu Bakar Mohamad Diah.

Other FRIM laboratories also receiving the IKM Laboratory Excellence Award this year were the Wood Preservative Analytical Laboratory and Wood Composite Testing Laboratory. The Wood Preservative Analytical Laboratory was accorded the Gold Award in 2010 (for receiving the excellence award for the 15th consecutive year) and the Silver Award in 2005; whilst the Wood Composite Testing Laboratory received the Silver Award in 2013.

Makmal-makmal yang menerima pengiktirafan tersebut telah mencapai kecemerlangan dalam amalan kerja analisis dan menyediakan perkhidmatan ujian yang berkualiti berpandukan undang-undang tempatan dari segi kesihatan, keselamatan dan alam sekitar. Antara lain, MKT juga menerima anugerah Pensijilan Akreditasi MS ISO/IEC 17025 “for determination of potassium in plant tissue and plant based material” (untuk penentuan potasium dalam tisu tumbuhan dan bahan-bahan berasaskan tumbuhan) daripada Jabatan Standard Malaysia pada 17 November 2014.

8 Disember

Ketua Pengarah FRIM, Dato’ Dr Abd Latif Mohmod yang merupakan salah seorang penerima Anugerah Saintis Penyelidikan Terbaik Malaysia (TRSM) Akademi Sains Malaysia (ASM) tahun lalu, dilantik sebagai Felo ASM yang baharu. Beliau menerima pengiktirafan ini di Majlis Penganugerahan Felo 2014 kepada ahli-ahli sains yang terpilih dan Pengumuman Anugerah Saintis Penyelidikan Terbaik Malaysia 2014 yang dirasmikan oleh Perdana Menteri Datuk Seri Najib Tun Razak. Abd Latif dipilih atas kepakaran beliau dalam produk, ciri-ciri, pemprosesan dan penggunaan produk hutan bukan kayu (buluh, rotan, palma dan lain-lain) di bawah disiplin Sains Pertanian Biologi dan Sains Alam Sekitar.

Abd Latif merupakan saintis FRIM yang kelima menerima pengiktirafan sebagai Felo kepada akademi yang berprestij ini. Beliau juga adalah saintis FRIM pertama yang menerima Anugerah TRSM sebagai pengiktirafan sumbangan dan usaha beliau yang konsisten dalam menggerakkan penyelidikan perhutanan.

Apart from that, the FRIM Soil Chemistry Laboratory also received the MS ISO/IEC 17025 Certificate of Accreditation “for determination of potassium in plant tissue and plant based material” from the Department of Standards Malaysia on 17 November 2014.

8 December

FRIM Director General Dato’ Dr Abd Latif Mohmod, who was one of the recipients of the Top Research Scientists Malaysia (TRSM) Award from the Academy of Sciences Malaysia (ASM) last year, has been elected as a fellow to the prestigious academy. He received the certificate at the 2014 Conferment of Fellowships to Scientists by ASM and the Announcement of the 2014 Top Research Scientists Malaysia (TRSM), officiated by Prime Minister (PM) Datuk Seri Najib Tun Razak.

Abd Latif was elected for his expertise in Non-Wood Forest Products (bamboo, rattan, palms, etc.), Properties, Processing and Utilisation, under the Biological Agriculture and Environmental Sciences Discipline. Abd Latif is the fifth FRIM scientist to be appointed as a fellow to the prestigious academy. He is the first FRIM scientist to be accorded the ASM TRSM Award, in recognition of his many years of consistent efforts and contribution in undertaking and mobilising research in the field of forestry.



PENCAPAIAN/TAHUN ACHIEVEMENT/YEAR	2013	2014
4. PERKHIDMATAN/SERVICES <ul style="list-style-type: none"> • *Ujian berkaitan persijilan/akreditasi/certification/accreditation related test • Perundingan/Consultancy • Menyediakan latihan industri kepada pelajar IPTA/IPTS dalam bidang perhutanan Provide industrial training to students of public/private higher learning institution in the field of forestry • Menganjurkan bengkel/dialog/pemindahan teknologi/program latihan kepada orang awam/industri dalam bidang-bidang kepakaran FRIM Organising workshop/dialogue/technology transfer/training programme to the public/industries in areas of FRIM experties 	- 59 213 71	2350 62 238 80
5. PENDAPATAN/INCOME (RM juta/million) <ul style="list-style-type: none"> • Ujian/Testing • Perundingan ikhtisas/Professional consultancy • Ekopelancongan/Eco-tourism • Penjualan bahan/Sales of material • Perkhidmatan bukan teknikal (seminar, latihan dll) Non-technical services (seminar, training, etc.) • Royalti dan yuran pelesenan/Royalty and licensing fee 	1.9 2.4 1.5 0.47 0.8 3,139	1.1 3.2 1.7 0.34 0.9 73, 500
6. PELAWAT/VISITORS <ul style="list-style-type: none"> • Rasmi/Official • Tidak Rasmi (pengunjung dan pas riadah)/Unofficial (visitor and leisure pass holder) 	707,297	13, 924 1, 022, 318
7. PENGIKTIRAFAN/RECOGNITION <ul style="list-style-type: none"> • Makmal yang mendapat pengiktirafan antarabangsa/Internationally recognised laboratories (ISO/IEC 17025/CARB/ift/FIRA accreditations) • CUMBS yang mendapat pengiktirafan kebangsaan/Nationally recognised CUMBS (GMP/SOM/HALAL/BioNexus/IKM) 	14 13	17 12
8. SUMBANGAN KEPAKARAN DI PERINGKAT KEBANGSAAN DAN ANTARABANGSA/EXPERTIES CONTRIBUTION AT THE NATIONAL AND INTERNATIONAL LEVELS <ul style="list-style-type: none"> • Penghasilan kertas kerja melibatkan polisi negara Production of working paper related to the national policy • Penglibatan dalam rundingan termasuk input teknikal di forum antarabangsa yang berkaitan dengan perhutanan dan alam sekitar yang memberi impak kepada negara/Involvement in negotiation and provision of technical input at international forum related to forestry and environment which is of impact to the country • Sumbangan dan keanggotaan dalam organisasi kebangsaan/antarabangsa yang berkaitan dengan perhutanan dan alam sekitar Contribution and membership in national/international organisation in FRIM areas of experties • Penjawat awam yang terlibat dalam membangunkan standard Malaysia dan antarabangsa berkaitan dengan bidang perhutanan dan keluaran hutan Staff involved in developing Malaysian and international standards on forestry and forest product fields 	14 20 80 17	5 16 83 18

PENCAPAIAN/TAHUN ACHIEVEMENT/YEAR	2013	2014
9. KECEKAPAN/EFFICIENCY	(%)	(%)
<ul style="list-style-type: none"> Mencapai sasaran 95% penjawat awam yang mengikuti sekurang-kurangnya tujuh hari latihan dalam setahun <i>Achieve 95% of civil servants attending at least seven days of training yearly</i> Memberi maklum balas aduan pelanggan 100% tidak melebihi lima hari bekerja/<i>Give 100% feedback to customer complaints in less than five working days</i> Indeks kesejahteraan pelawat/<i>Visitors' well-being index</i> 	99	89
	100	100
	76	81.40%
10. IMPAK FRIM KEPADA INDUSTRI/ FRIM IMPACT TO INDUSTRIES		
<ul style="list-style-type: none"> Kilang/industri/ladang yang ditubuhkan hasil inisiatif FRIM <i>Mill/industry/plantation established by FRIM initiative</i> Kilang/Industri/Ladang yang dibantu oleh FRIM <i>Mill/industry/plantation assisted by FRIM</i> Usahawan yang dilatih oleh FRIM/<i>Entrepreneur trained by FRIM</i> Orang awam dan peserta industri yang mendapat manfaat daripada pemindahan teknologi melalui pelaksanaan latihan/bengkel dalam bidang perhutanan/<i>Public and participant from industry benefited from technology transfer through training/workshop in the field of forestry</i> Industri yang mendapat manfaat daripada pemindahan teknologi melalui pelaksanaan latihan/bengkel dalam bidang perhutanan/<i>Industry benefited from technology transfer through training/workshop in forestry</i> Organisasi/syarikat/kilang/individu yang mendapat faedah daripada perkhidmatan ujian/<i>Organisation/company/mill/individual benefited from testing service</i> Organisasi/individu mendapat faedah daripada perkhidmatan perundingan ikhtisas/<i>organisation/individual benefited from consultancy</i> Organisasi/individu mendapat faedah daripada pembekalan bahan/<i>Organisation/individual benefited from supply of material</i> Organisasi yang mendapat faedah daripada aktiviti ekopelancongan <i>Organisation benefited from eco-tourism activities</i> Organisasi/individu yang mendapat faedah daripada kemudahan di FRIM/<i>Organisation/individual benefited from FRIM facilities</i> Organisasi yang terlibat CSR di FRIM/<i>Organisation participated in FRIM CSR programme</i> Sampel ujian/<i>Testing sample</i> Penglibatan FRIM dalam aktiviti CSR di organisasi luar/<i>FRIM participation in CSR activity with other organisation</i> *Kesedaran orang awam terhadap alam sekitar/<i>Public awareness on nature</i> 	0	2
	0	25
	19	20
	309	-
	32	1641
	253	100
	45	139
	-	46
	296	760
	98	391
	33	93/33, 390 orang
	7,638	7,638
	1	18
	-	2996

Nota/Note:

* – Objektif Kualiti yang baru diperkenalkan pada 2014/*New Quality Objectives introduced in 2014*



SOROTAN PENYELIDIKAN DAN PEMBANGUNAN HIGHLIGHT OF RESEARCH AND DEVELOPMENT



BAHAGIAN PERHUTANAN DAN ALAM SEKITAR

Pengurusan Hutan Mampan bagi Pengawalan Perubahan Iklim di Bawah Skim REDD+

Malaysia mempunyai tanggungjawab untuk mengurangkan kesan perubahan iklim melalui pengurangan pelepasan daripada gas rumah hijau. Antara sektor penting yang dipertimbangkan ialah perhutanan, selaras dengan mekanisme REDD+ yang dibangunkan di bawah United Nations Framework Convention on Climate Change (UNFCCC) yang mana Malaysia juga merupakan ahlinya. Malaysia sedang dalam proses memuktamadkan strategi REDD Kebangsaan yang memerlukan banyak data asas mengenai pembasmian hutan dan kemerosotan kualiti hutan di negara ini. Bagi meningkatkan keupayaan untuk melaksanakan REDD+ berkenaan, FRIM dengan sokongan kewangan dari Pertubuhan Kayu-Kayan Tropika Antarabangsa (ITTO) sedang melaksanakan satu projek di bawah Program Tematik Mengurangkan Pembasmian Hutan dan Kemerosotan Kualiti Hutan dan Meningkatkan Perkhidmatan Alam Sekitar di Hutan Tropika (REDDES). Projek ini dijangka dapat memberi maklumat asas yang kritikal bagi menyokong pelaksanaan strategi REDD Kebangsaan.

Projek tiga tahun (mulai 2013) bertajuk “Reducing Forest Degradation and Emissions through Sustainable Forest Management (SFM) in Peninsular Malaysia” secara amnya bertujuan untuk menggunakan SFM sebagai satu kaedah bagi menangani perubahan iklim. Memandangkan kadar pembasmian hutan adalah stabil di negara kita,

FORESTRY AND ENVIRONMENT DIVISION

Utilising Sustainable Forest Management (SFM) Practices in Peninsular Malaysia under the REDD+ Mechanism in Mitigating the Climate Change

Malaysia has responsibilities to mitigate the impacts of climate change through the reduction of emissions from green house gases. An important sector that is currently being considered is the forestry sector. This is consistent with the REDD+ (reducing emissions from deforestation and forest degradation of tropical forests in developing countries) mechanism which is developed under the United Nations Framework Convention on Climate Change (UNFCCC); which Malaysia is also a party. Malaysia is in the process of finalising a National REDD strategy which requires a lot of baseline data on the status of deforestation and degradation in this country. To enhance our capacity in getting ready to implement REDD+ projects effectively, FRIM, with the support from the International Timber Trade Organization (ITTO) is implementing a project under Thematic Programme on Reducing Deforestation and Forest Degradation and Enhancing Environmental Services in Tropical Forests (REDDES). Consequently, this project is expected to provide some critical baseline data to support the implementation of the National REDD strategy.

The three-year project (started since February 2013) entitled Reducing Forest Degradation and Emissions through Sustainable Forest Management (SFM) in Peninsular Malaysia. In general the project is aim to utilise SFM as a mitigation tool in combating climate

pengurangan pelepasan gas rumah hijau (terutamanya karbon dioksida) yang akan terlibat dalam mekanisme REDD+ berkemungkinan akan disumbangkan oleh pengurangan kepada kemerosotan kualiti atau penambahan stok karbon di Semenanjung Malaysia. Projek ini dijangka akan meningkatkan pengetahuan mengenai peningkatan kualiti hutan/peningkatan stok karbon dan peningkatan dalam perkhidmatan ekosistem (PES).

Selain FRIM sebagai agensi pelaksana, jabatan/agensi utama lain yang terlibat ialah NRE dan Jabatan Perhutanan Semenanjung Malaysia (JPSM) serta Jabatan Perhutanan Negeri Pahang (JPN Pahang). Pahang dipilih sebagai tapak projek berikutan sumbangan besar sektor perhutanan kepada ekonomi dan pembangunan sosial negeri. Pahang juga mempunyai kawasan hutan terbesar di Semenanjung Malaysia dan terdiri daripada semua jenis hutan utama. Di samping itu, terdapat komuniti yang bergantung pada hutan, khususnya Orang asli, yang mungkin terlibat secara langsung dengan pelaksanaan REDD+. Projek ini sedang berjalan dengan baik dengan mendapat input-input teknikal daripada pakar-pakar antarabangsa yang berkaitan.

Pelaksanaan projek itu dijangka membolehkan integrasi kepada perubahan iklim yang lebih baik ke dalam pengurusan hutan. Projek ini akan menilai amalan pengurusan hutan semasa berdasarkan SFM dari segi jumlah pelepasan serta penyimpanan karbon. Di samping itu, penambahbaikan preskripsi silvikultur dan pengurusan akan diperkenalkan untuk mengurangkan lagi pelepasan dan meningkatkan jumlah stok karbon. Projek ini juga akan menilai insentif manfaat bukan karbon dari sektor perhutanan seperti kawasan tadahan air dan kualiti kehidupan yang lebih baik oleh masyarakat yang bergantung pada kawasan hutan di bawah sistem PES.

Mekanisme REDD + merupakan urusan peringkat kebangsaan, maka pelaporan juga perlu di peringkat kebangsaan. Walau bagaimanapun, pengiraan tersebut adalah berdasarkan pengiraan peringkat negeri atau peringkat subkebangsaan, di samping itu kesediaan kerajaan negeri untuk mengambil bahagian dalam mekanisme berkenaan juga bersifat suka rela. Output projek dijangka mudah diterima pakai di negeri-negeri lain di Semenanjung Malaysia kerana mempunyai sistem pengurusan hutan yang sama. Projek ini menyediakan peluang untuk meningkatkan nilai hutan dan menggalakkan SFM di Malaysia sebagai amalan terbaik pengurusan hutan tropika. Akhirnya, projek ini akan melengkapkan projek-projek lain yang berkaitan dengan REDD+ yang dijalankan di Malaysia dan usaha-usaha semasa oleh kerajaan Malaysia untuk membangun dan melaksanakan strategi REDD Kebangsaan. Oleh itu, Malaysia boleh

change. As deforestation rate is stable in our country, the emissions to be accounted for REDD+ mechanism probably from the reduction of forest degradation or enhancement of carbon stock in Peninsular Malaysia. The project is expected to improve knowledge on reduction of forest degradation/ enhancement of carbon stock and enhance of payments for ecosystem services (PES).

Besides FRIM as executing agency, other major players involved in this project are the NRE, Forestry Department of Peninsular Malaysia (FDPM) and Pahang State Forestry Department (Pahang FD). Pahang is selected as project site due to significant contribution on forestry sector to its economy and social development. Pahang has largest forest areas in Peninsular Malaysia and comprises all major forest types. In addition, there are forest dependent communities, in particular the Orang asli that could be directly affected by the implementation of REDD+. The project is progressing well with technical inputs from international experts.

The implementation of the project is expected to integrate better towards climate change in the current forest management practices. The project will assess the current management practices based on SFM in terms of its total emissions as well as carbon storage. In addition, improved silvicultural and management prescriptions will be introduced to further reduce emissions and enhance the total carbon stock. The project will also evaluate incentives for non-carbon benefits from the forestry sector such as watershed and improved livelihood of forest dependent community under PES system.

The REDD+ mechanism is based at the national level and therefore the reporting should be at the national level. Nevertheless, national level accounting is based on sub-national (state level) assessments and willingness of state governments to partake in the mechanism which is voluntary in nature. The project outputs can be easily adopted in other states in Peninsular Malaysia as they have the same forest management system. This project will provide opportunities to enhance the value of the forests and promote SFM in Malaysia as the best management practices of tropical forests. Ultimately, this project will also complement other REDD+ related projects conducted in Malaysia and the current efforts by the government of Malaysia to develop and implement of REDD strategy. Hence, Malaysia can gain valuable experience in conducting REDD+ at the sub-national level (state of Pahang) which will ultimately supports Malaysia's commitment under UNFCCC.

mendapat pengalaman berharga dalam menjalankan projek REDD+ di peringkat subkebangsaan (negeri Pahang) yang seterusnya akan menyokong komitmen Malaysia di bawah kerangka UNFCCC.

Output terkini bagi projek ini ialah trend pembasmian hutan di negeri Pahang antara tahun 2000 hingga 2010. Setiap tahun, kadar pembasmian hutan di Pahang adalah kira-kira 0.5 peratus. Akan tetapi, keluasan hutan simpan kekal di dalam negeri menunjukkan peningkatan pada setiap tahun selari dengan usaha JPN Pahang mengekal dan menambah kawasan hutan berkenaan. Projek ini mengenal pasti antara sebab pembasmian hutan berlaku ialah perladangan kelapa sawit, tanaman pertanian dan pembangunan bandar. Namun, projek ini mendapati, pembasmian hutan ini berlaku hanya melibatkan tanah berhutannya di kawasan hutan kerajaan negeri sahaja.

The current output of the project is the trend of deforestation in Pahang between year of 2000 and 2010. The annual deforestation rate in Pahang is about 0.5 percent. Nonetheless, permanent reserved forest (PRF) is increasing by years, in line with effort by the Pahang FD to sustain and increase the PRF areas. This project has identified main drivers of the deforestation; oil palm plantation, agriculture crops and urban development, however, it is occurring only in the stateland forest.



Hutan paya laut, paya gambut dan hutan bukit ialah jenis hutan utama di Malaysia yang diuruskan untuk kedua-dua tujuan pengeluaran dan pemeliharaan. Mereka menyimpan sejumlah besar karbon dan oleh itu mempunyai potensi yang besar untuk pengurusan dan pemuliharaan yang lebih baik di bawah mekanisme REDD+. Kawasan tadahan air juga merupakan salah satu perkhidmatan ekosistem (ES) utama yang dimainkan oleh hutan.

The mangroves, peat swamp and hill forests are the major tropical forests in Malaysia that are being managed for both production and conservation purposes. They store large amount of carbon and therefore has enormous potential for improved management and conservation under the REDD+ mechanism. Watershed is also one of the important ecosystem services (ES) play by the forests.



KAJIAN IMPAK FIZIKAL PEJALAN KAKI DAN BASIKAL LASAK DI DENAI ALAM FRIM

Aktiviti rekreasi berasaskan sumber semula jadi semakin popular pada hari ini dan menjadi tarikan pelancong. Walau bagaimanapun, keadaan semula jadi dan tidak tercemar ialah ciri-ciri penting yang dapat memikat hati pelancong terutamanya peminat ekopelancongan. Oleh itu, untuk memastikan industri pelancongan yang lestari, ciri-ciri ini perlu dikekalkan.

Salah satu daya tarikan utama pengunjung ke FRIM ialah persekitaran semula jadi dan kesesuaian persekitaran sebagai pusat ekopelancongan. Bagi menambah baik pengurusan kawasan ekopelancongan dan meningkatkan imej pelancongan di FRIM, pengurusan yang berkesan dalam sektor ini adalah amat perlu. Di bawah peruntukan dana RMke-10, sebanyak RM90,600 diperuntukkan pada 2014 untuk projek kajian yang berjudul "Pengurusan Ekopelancongan dan Pendidikan Alam Sekitar". Salah satu daripada tiga komponen projek ini ialah kajian impak ke atas denai pejalan kaki dan laluan basikal lasak yang dijalankan di FRIM.

Kajian ini bertujuan untuk menilai impak daripada aktiviti rekreasi yang berkenaan dengan daya tampung fizikal terhadap denai-denai alam dan denai laluan basikal lasak di FRIM. Kajian-kajian terdahulu terutamanya di luar negara mendapati aktiviti rekreasi boleh meninggalkan impak negatif terhadap ekologi. Kehadiran pelawat yang berlebihan bukan sahaja memberi kesan kepada kepuasan pengalaman, malahan boleh merosakkan persekitaran semula jadi. Melalui komponen ini, impak terhadap kepadatan tanah yang memberi kesan kepada tumbesaran tumbuh-tumbuhan dijalankan. Komponen ini menjurus ke arah penghasilan garis panduan pengurusan berasaskan daya tampung fizikal.

Kajian dijalankan di tiga denai utama yang sering dikunjungi pengguna. Tiga rekod data diambil iaitu data kepadatan tanah, menggunakan ujian ketumpatan pukal, data kelebaran denai dan data bilangan pengguna, menggunakan "eco-sensor" yang dipasang di laluan masuk denai-denai yang berkenaan. Kajian ini melibatkan denai pejalan kaki ke titian silara yang digunakan pada masa ini dan denai lama yang ditutup untuk melihat pemulihan secara semula jadi. Ia juga melibatkan denai laluan basikal lasak iaitu Bidara Trail.

Kajian mendapati bahawa denai titian silara lama yang dibina pada 1992 dan ditutup pada 2013 mempunyai purata kepadatan tanah sehingga 1.62 g/cm³. Sehingga Oktober 2014, tahap kepadatan tanah di denai ini menurun sehingga 1.57 g/cm³ setelah ditutup selama sepuluh bulan. Bagi denai titian silara

A STUDY ON PHYSICAL IMPACTS OF HIKERS AND MOUNTAIN BIKERS ON FRIM'S NATURE TRAILS

Nature based recreational activities are gaining popularity especially in the urbanising population. Nature based recreational services can also be tourism attractions. However, pristine and clean areas are important conditions that attract tourists. To ensure sustainable tourism especially in ecotourism practices, these conditions need to be maintained.

One of the main attractions in FRIM is the natural environment that is suitable for ecotourism activities. To improve the management of attractions sites, effective management is crucial. Under the funding from 10th Malaysian Plan, RM90,600 was allocated for a study in 2014 under the title of Ecotourism Management and Environmental Education. One of the three components of the project is the study on physical impacts of hikers and mountain bikers on FRIM's nature trails.

The objective of this study is to evaluate impacts of recreational activities that can be related to physical carrying capacity. Many international studies have shown that recreational activities left negative impacts on the ecology. Excessive visitors not only affect the recreational satisfaction but also degraded the environment. Through this project component, impacts of recreational activities on soil compaction through their effects on vegetation growth are assessed. This component will lead towards management suggestions for recreational activities in FRIM.

The study was conducted at three popularly used natural trails. Three types of data were recorded i.e., soil compaction through bulk density test, trail width and number of users that go through the "eco-sensors" which were installed at the trail's entrance. This study was carried out at the trail which is the access way to the canopy walk and another one is at an abandoned trail in order to understand the recuperational conditions. The Bidara Trail which is a mountain bike trail also used in this study.

The study found that the trail that was developed in 1992 and closed at end of 2013 have a soil compaction of 1.62 g/cm³. Up to October 2014, soil compaction was reduced to 1.57 g/cm³ that is 10 months after the trail was closed. Meanwhile, the currently used trail indicated increase in bulk density from 1.54 g/cm³ to 1.64 g/cm³ within 10 months of opening.

It was also found that the width of the new trail increased to 141.1 cm compared with initial value of 92 cm when the trail was first opened. A total number

yang baharu, terdapat peningkatan purata kepadatan tanah iaitu dari 1.54 g/cm³ kepada 1.64 g/cm³ dalam tempoh sepuluh bulan denai tersebut dibuka.

Kajian juga mendapati bahawa purata kelebaran denai titian silara baharu meningkat kepada 141.1cm berbanding purata kelebaran asal semasa pembukaannya iaitu 92 cm. Bilangan pengguna yang melalui denai tersebut ialah sebanyak 306 336 orang (Januari hingga Oktober 2014).

Bagi laluan basikal lasak "Bidara Trail", didapati purata kepadatan tanah meningkat daripada 1.18 g/cm³ kepada 1.26 g/cm³ dan purata kelebaran denai juga turut meningkat kepada 156 cm berbanding 100 cm pada awal pembukaannya pada 30 Jun 2014 dengan jumlah pengguna yang melaluinya sebanyak 1192 orang daripada Julai hingga Oktober.

Satu kajian simulasi untuk membezakan impak penggunaan basikal lasak berbanding impak pejalan kaki turut dijalankan melalui kaedah bilangan ulang alik yang berbeza. Kajian ini mendapati bahawa impak penggunaan basikal jauh lebih besar berbanding impak pejalan kaki. Jumlah ulang alik sebanyak 500 kali menghasilkan 14% kepadatan tanah penggunaan basikal berbanding 9% untuk pejalan kaki. Untuk kedua-dua aktiviti, hasil kajian menunjukkan terdapat perbezaan ketara kepada ciri kimia tanah (nitrogen, fosforus dan karbon organik berkurang) manakala tidak ada perbezaan yang ketara untuk ciri fizikal (kandungan pasir kasar, pasir halus dan lumpur), apabila ulangan basikal dan pejalan kaki bertambah.

Rumusan bagi kajian berkaitan kemampatan tanah, impak pejalan kaki adalah jauh lebih rendah berbanding impak basikal lasak. Manakala kajian di denai titian kanopi pula mendapati bahawa kesemua denai sama ada yang masih dibuka atau telah ditutup menunjukkan kepadatan tanah melebihi 1.47 g/m³ yang dirujuk sebagai tahap yang mana tumbuh-tumbuhan tidak boleh tumbuh. Untuk denai yang telah ditutup dalam tempoh 10 bulan, kepadatan tanah didapati dalam proses penurunan sebanyak 3.18%. Oleh itu sistem menutup denai secara berkala boleh dijadikan amalan yang efektif.

Kelebaran denai meningkat sebanyak 53.37% terutama untuk basikal lasak sepanjang tempoh 10 bulan pembukaan denai titian silara baru. Jelas didapati bahawa kelebaran denai yang mampat ini memberi impak yang tinggi kepada tumbuh-tumbuhan renek.

Daripada kajian ini disahkan bahawa hubungan kepadatan tanah berkadar terus dengan peningkatan bilangan pengguna. Penutupan denai atau pembukaan secara bergilir-gilir dapat mengurangkan

of 306,336 people was recorded using the trail since January to October 2014.

For Bidara biking trail it was found that the average bulk density increase from 1.18 g/cm³ to 1.26 g/cm³ while, the average of trail width increase from 100 cm to 156 cm. The opening of the trail is on 30 June 2014 and the number of users were 1192 from July to October.

A simulation impact study was also conducted to differentiate between the effects of mountain biking activities and hiking activities through the repeated walking and bicycling on controlled plots. It was found that bulk density is correlated with the number of repetition. The impacts from mountain biking was found higher than hiking. Repeated biking exercises of 500 times yielded 14% more soil compaction compared to 9% from hiking exercises. For both activities, there were significant differences in terms of chemical properties (reduced nitrogen, available phosphorus and organic carbon) but there were no significant changes in physical characteristics (coarse sand, fine sand and silt) when exercises were increased.

The study concluded that the impact of hiking activities is much less than to that of mountain biking. Meanwhile, the study on active and closed canopy trails showed that soil compaction were more than 1.47 g/m³ that is the reference point at which the plant growth is affected. It was also shown that the trail that was closed for regeneration, soil bulk density decreased by 3.18%. This suggests that rotational closing of trails can be an effective management alternative.

The trail width especially for biking activities was found to increase by 53.37% within 10 months of its opening. It is clear that the increased in trail width gives impact to the small vegetation.

The findings of this study confirmed the relation of soil compaction is directly proportional to the number of users. Seasonal trails of closing and opening is a practical method to minimise the impacts of soil compaction to avoid effects on plant growth.

Other than the study on soil compaction, qualitative surveys and observations in public access areas beside the nature trails were also conducted, to evaluate crowding and its impacts on FRIM's environment. It was found that:

1. Excessive visitors especially on weekends creates uncomfortable conditions for users.
2. Conflicts of interest between renters for day events and walk-in visitors due to shared areas for use.

tahap kepadatan tanah serta impak terhadap tumbuh-tumbuhan baru. Basikal lasak pula didapati memberikan impak yang jauh lebih tinggi daripada pejalan kaki.

Selain kajian kemampatan tanah, kajian melalui soal selidik dan pemerhatian juga dilakukan di kawasan-kawasan terbuka selain denai-denai alam untuk menentukan kesesakan pelawat serta impak terhadap persekitaran FRIM. Pemerhatian mendapati:

1. Kesesakan terutama pada hujung minggu sehingga menimbulkan ketidakselesaan pengunjung terutama di kawasan perkemahan Sungai Kroh.
2. Konflik penggunaan ruang antara pengguna yang menyewa kawasan (hari keluarga dan sebagainya) dan pengguna harian disebabkan saiz ruang yang terhad.
3. Pelawat yang terlalu ramai sukar dikawal menyebabkan pelawat keluar dari kawasan yang dihadkan tanpa kebenaran seperti memasuki denai alam, kawasan penyelidikan, termasuk hutan FRIM dan kawasan pejabat.
4. Bunyi bising yang keterlaluan; sistem audio bunyi dan aktiviti daripada penyewa kawasan yang boleh kedengaran sehingga ke dalam hutan dan di titian kanopi, mengganggu ketenteraman pengguna lain.
5. Parkir yang terhad sehingga pengunjung meletakkan kenderaan di kawasan yang tidak dibenarkan (kawasan berumput, di bawah pokok serta persekitaran bangunan yang tidak dibenarkan).
6. Kerosakan pada tanah dan persekitaran semula jadi FRIM disebabkan bilangan kereta yang berlebihan serta aktiviti pengunjung yang terlalu pelbagai.

Kajian ini masih diteruskan sehingga 2015. Walau bagaimanapun, beberapa saranan awal boleh dicadangkan. Untuk mencapai matlamat ekopelancongan yang berimpak rendah, dicadangkan pihak pengurusan mengambil langkah-langkah yang berikut:

1. Menutup denai yang digunakan secara intensif secara bergilir setiap lima tahun untuk mengurangkan kemampatan tanah dan membenarkan pertumbuhan tumbuh-tumbuhan baru.
2. Melupus atau mengehadkan aktiviti basikal lasak.
3. Hanya menggalakkan aktiviti yang dikenal pasti berimpak rendah di denai alam dan tidak membenarkan aktiviti jogging seperti laluan ke titian kanopi.
4. Mengurangkan jumlah bilangan pelawat secara am, termasuk yang melalui pas tahunan, penyewa harian (hari keluarga dan sebagainya) di padang, Sg. Kroh dan Rumah Terengganu.

3. Difficulty to control excessive visitors, accessing forest, research plots and office areas without permission
4. Excessive noise through audio system and events activities that could be heard all the way in the forest and the canopy walkway.
5. Insufficient parking space; visitors park on grass, under trees and near office buildings.
6. Degradation to soil and the natural environments of FRIM due to excessive numbers of cars and various visitors activities.

The study is continued until 2015. However, to achieve low impact tourism objective, a few early recommendations can be forwarded as below:

1. To close intensively used nature trails or rotate after five years of use to minimise soil compaction and to allow regeneration of vegetation.
2. To stop or limit the use of mountain bikes.
3. To promote low impact activities such as trekking on nature trail and to disallow jogging activities especially on canopy walkway trail.
4. To reduce the total number of visitors in FRIM, by reducing the annual pass, rentals (family days and other events) at the field, Sg. Kroh and Terengganu House.



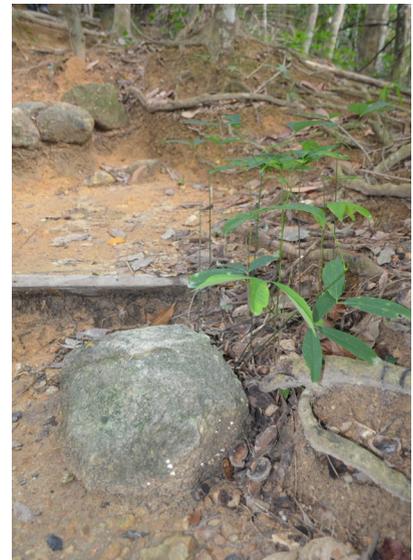
Eco-Sensor untuk merekod bilangan pengguna denai
Eco-Sensor to record the number of trail users



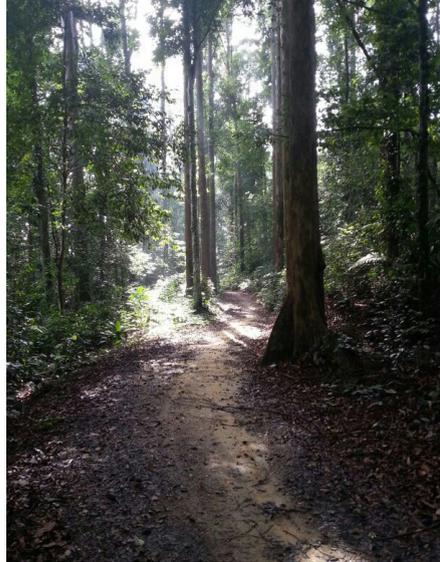
Pengambilan sampel tanah untuk menentukan kepadatan tanah
Soil sampling to determine soil compaction



Kelebaran denai meningkat dari 92 cm kepada 141.1 cm dalam tempoh 10 bulan
pembukaan denai titian silara baru
Trail width increased from 92cm to 141.1cm within 10 months opening of the new
canopy walkway trail establishment



Kelihatan anak pokok mula tumbuh di denai yang ditutup pada
Disember 2013, selepas 10 bulan ditutup untuk penggunaan
New vegetation growth was observed on the trail after 10 months
of closing for users, the trail was closed in December 2013



Kelebaran denai laluan basikal lasak meningkat dari 100 cm kepada 156 cm sepanjang tempoh empat bulan pembukaan
 Biking trail width increase from 100 cm to 156 cm within four months of opening



Kajian impak simulasi basikal lasak yang dijalankan secara ulang alik
 Impacts simulation study of mountain bike conducted through repeated exercises

PEMBINAAN JAMBATAN HUTAN MUDAH ALIH (JHMA)

Pengusahasilan hutan terutamanya yang dijalankan jauh di dalam hutan menyebabkan jalan hutan sangat penting untuk mengangkut kayu balak keluar. Jambatan dan kalbat adalah sebahagian daripada elemen jalan hutan digunakan untuk menyeberangi sungai dan sokongan jentera berat dalam menjalankan aktiviti pengusahasilan. Oleh itu, atas sebab praktikal dan keberkesanan kos, jambatan hutan biasanya dibina daripada kayu balak, sementara kalbat dibina menggunakan kayu balak berlubang yang terdapat di dalam kawasan tersebut.

DEVELOPMENT OF FOREST MOBILE BRIDGE (FMB)

The timber harvesting which is mainly being conducted deep in the forest whereby roads are crucial to transport the harvested logs. Log bridges and culvert as part of the forest roads serve as stringer for river crossing and support heavy machineries in forest logging activities. As such, for practicality and cost-efficiency reasons, forest road bridges are generally constructed from solid logs, while culvert is constructed from hollow logs found within the area.

Walaupun penting untuk perhubungan jalan hutan, pembinaan jambatan dan kalbat biasanya adalah untuk kegunaan sementara dengan jangka hayat kurang daripada lima tahun. Apabila aktiviti pengusahasilan selesai, jambatan dan kalbat sementara ini dibiarkan tanpa diselenggara dan sering runtuh disebabkan oleh aliran sungai yang laju, hakisan dan enapan yang tinggi. Masalah ini sering dihadapi oleh pihak Jabatan Perhutanan ketika mengendalikan aktiviti selepas pengusahasilan. Masalah ini juga dihadapi oleh para penyelidik untuk menjalankan penyelidikan di hutan.

Banyak kajian menunjukkan hubungan untuk lintasan sungai menyumbang kepada hakisan dan pendedapan sungai. Jambatan dan kalbat runtuh akibat hujan lebat, pendedapan dan hakisan tebing sungai. Sebagai alternatif, jambatan mudah alih boleh dijadikan pilihan berbanding jambatan balak. Beberapa kajian menunjukkan bahawa pemasangan jambatan mudah alih akan mengurangkan pendedapan.

Satu reka bentuk alternatif yang menggunakan konsep mudah alih sedang dibina di bawah projek pembangunan oleh FRIM untuk mengurangkan kesan alam sekitar seperti gangguan tanah, pencemaran sungai, hakisan dan pendedapan. Jambatan mudah alih tidak memerlukan bantuan jentera berat untuk pemasangan dan pembukaannya. Ia boleh dibuka selepas melintasi sungai dan boleh dipasang semula apabila melintasi sungai yang seterusnya. Dengan itu, ia dapat mengurangkan kos pembinaan dan penyelenggaraan sesebuah jambatan hutan. Pada peringkat reka bentuk, isu-isu seperti fungsian, faktor keselamatan beban, kekuatan lenturan tekanan dan pengagihan beban perlu diselesaikan. Analisis elemen terperinci (FEA) adalah diperlukan bagi membina prototaip jambatan mudah alih ini.

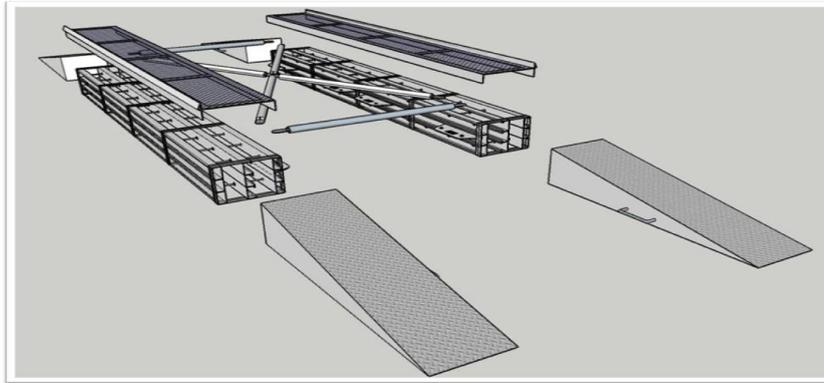
Prototaip pertama jambatan hutan mudah alih ini berjaya dihasilkan dan prototaip kedua yang lebih menekankan tambahan ciri keselamatan dan lebih ringan dijangka siap pada pertengahan 2015. Jambatan mudah alih ini direka bentuk supaya boleh dibawa dengan menggunakan kenderaan pacuan empat roda. Jambatan ini dijangka dapat menyelesaikan masalah perhubungan ke dalam kawasan hutan. Penghasilan jambatan ini lebih menjimatkan berbanding dengan jambatan lain yang dibina secara kekal kerana kadar kerosakan lebih tinggi apabila terdedah kepada cuaca dan musim. Secara tidak langsung, aplikasi jambatan ini akan menyokong ke arah pengurusan hutan secara berkekalan.

Although crucial to connect forest roads, log bridges and culvert are usually temporary constructions with a life span of less than five years. When forest logging activities are completed, these temporary bridges and culvert are left unmaintained and often collapsed due to high velocity of stream flow, erosion and high sedimentation. These problems are often faced by the Forestry Department when conducting post-harvesting activities. The problem also faced by the researchers when conducting research in the forest.

Many studies have shown that stream crossings contribute to stream bank erosion and sedimentation. Bridges and culvert were collapsed due to heavy rain, sedimentation and stream bank erosion. As an alternative, the portable bridge is preferred over the log bridge. Several studies have shown that proper installation of the portable bridge reduced sedimentation.

An alternative design using a mobile concept is being constructed under development project by Forestry and Environment Division of FRIM to reduce environmental impacts such as soil disturbances, stream pollution, erosion and sedimentation. The mobile bridge does not require heavy machineries for installation and its removal. It can be removed after stream crossing and re-installed at the next crossing site. Thus, reduces construction and maintenance costs of the log bridges. At its design stage, issues such as functionality, loading safety factor, bending strength, stress and load distribution are being resolved. Finite Element Analysis (FEA) is also required for establishing the prototype of the Forest Mobile Bridge.

The first prototype mobile forest bridge has successfully produced and the second prototype with more emphasis on the additional security features and lighter in weight is expected to be completed middle of year 2015. The bridge is designed to be fitted in 4 wheel drive vehicle. The production of the FMB will save cost compared with other permanently built bridges that the higher rate of damage when expose to the weather and season. Indirectly, the application of FMB will support towards the sustainable forest management.



Lukisan isometrik model prototaip kedua
Isometric drawing of second model prototype



FMB menjalani ujian beban
FMB's loading test run

PEMETAAN LITUPAN DAN PERUBAHAN HUTAN DI SEMENANJUNG MALAYSIA

FRIM dan Japan Aerospace Exploration Agency (JAXA) menjalankan penyelidikan usaha sama di bawah Inisiatif ALOS Kyoto and Carbon (K&C). FRIM dipilih sebagai agensi pelaksana bagi menjalankan satu kajian yang bertajuk “Pemetaan dan Pemantauan Perubahan Biojisim dan Stok Karbon Atas Tanah bagi Kawasan Hutan di Semenanjung Malaysia Menggunakan Jalur-L ALOS PALSAR dan JERS-1”. JAXA akan menyediakan kesemua data satelit yang terdiri daripada Japan Earth Resources Satellite (JERS-1) dan Phased array type L-band SAR (PALSAR) yang terdapat pada satelit Advanced Land Observation Satellite (ALOS), yang mana kedua-duanya dalam bentuk radar bukaan sintetik—synthetic aperture radar (SAR). Inisiatif K&C merupakan projek usaha sama antarabangsa yang diterajui oleh Pusat Kajian Pencerapan Bumi (EORC), JAXA.

Inisiatif K&C ALOS dilancar bertujuan untuk menyokong keperluan data dan maklumat yang sering diutarakan oleh Konvensyen, Sains Kitaran Karbon dan Pemuliharaan (CCCs) alam sekitar.

MAPPING OF FOREST COVER AND CHANGES IN PENINSULAR MALAYSIA

FRIM and Japan Aerospace Exploration Agency (JAXA) have conducted a collaborative research under the ALOS Kyoto & Carbon (K&C) Initiative. FRIM has been appointed as the implementing agency to carry out a study entitled “Aboveground Biomass and Carbon Stock Mapping and Changes Monitoring in the Forest of Peninsular Malaysia Using L-Band ALOS PALSAR and JERS-1”. JAXA has provided all the satellites data comprise Japan Earth Resources Satellite (JERS-1) and Phased array type L-band SAR (PALSAR) on-board Advanced Land Observation Satellite (ALOS) which are both in synthetic aperture radar (SAR) mode. The ALOS K&C Initiative is an international collaborative project led by JAXA Earth Observation Research Center (EORC).

The ALOS K & C Initiative is set out to support data and information needs raised by international environmental Conventions, Carbon Cycle Science and Conservation (CCCs) of the environment. The objective of the initiative is to define, develop and validate thematic products derived primarily from ALOS PALSAR data that can be used to meet the

Objektif inisiatif ini adalah untuk mengenal pasti, membangun dan menentusah produk-produk bertemakan penggunaan data ALOS PALSAR yang boleh diguna pakai untuk memenuhi keperluan maklumat spesifik berkaitan CCCS. Ia berasaskan kepada tiga tema utama yang selari dengan biome global iaitu; Hutan, Tanah Lembap, Kawasan Kontang dan Kawasan Separa Kontang. Setiap tema telah mengenal pasti produk utama yang boleh dijana daripada data PALSAR termasuklah pemetaan hutan, pemetaan perubahan hutan dan struktur biojisim hutan, inventori dan perubahan tanah lembap global, sumber air tawar dan pemetaan kawasan kontang. Setiap satu daripada produk ini dijana melalui kombinasi PALSAR, data in-situ dan data sokongan.

Projek ini dilaksanakan dalam tempoh dua tahun, bermula pada April 2012 dan tamat pada Mac 2015. Ia merangkumi keseluruhan kawasan berhutan di Semenanjung Malaysia yang berkeluasan sekitar 6 juta ha. Salah satu objektif adalah untuk memeta litupan hutan dan menentukan perubahan yang telah berlaku antara 1995 dan 2010. Dua imej satelit digunakan, iaitu JERS-1 dan ALOS PALSAR, masing-masing bagi 1995 dan 2010. Kajian mendapati bahawa terdapat pengurangan litupan hutan sekitar 0.4 juta ha dari 1995 hingga 2010 (rujuk jadual). Taburan dan keluasan jenis hutan serta perubahan di Semenanjung Malaysia telah dipetakan manakala kadar perubahan telah ditentukan (rujuk peta). Kajian menunjukkan secara keseluruhan, kadar perubahan litupan hutan adalah sekitar 28,500 ha/thn (atau 0.44 %/thn) dan hutan darat telah mengalami kehilangan paling besar dalam tempoh 15 tahun tersebut.

specific information requirements relating to the CCCs. It is based on the three coordinated themes relating to global biomes; Forests, Wetlands, Deserts and Semi-Arid Regions. Each theme has identified key products that can be generated from the PALSAR data including forest mapping, forest change mapping and forest biomass and structure, global wetlands inventory and change, freshwater resources and desertification. Each of these products is generated using a combination of PALSAR, in situ and ancillary datasets.

This project has been implemented in two years period, which was started from April 2012 and has been completed in March 2015. The study covers the entire forests in Peninsular Malaysia, which has the extents of about 6 million ha. One of the objectives is to map the forest cover and determine changes that have been occurred between years 1995 and 2010. Two satellite images datasets were used i.e. JERS-1 and ALOS PALSAR for the years 1995 and 2010, respectively. The study found that there was a reduction of forest cover of about 0.4 million ha from 1995 to 2010 (refer table). The distribution and extents of forest types and changes of forest cover in Peninsular Malaysia were mapped and the rate of changes has been determined (refer maps). The study indicated that the overall rate of forest cover changes was about 28,500 ha/yr (or 0.44 %/yr) and inland forest suffered a significant loss within the 15-year period.



(a)

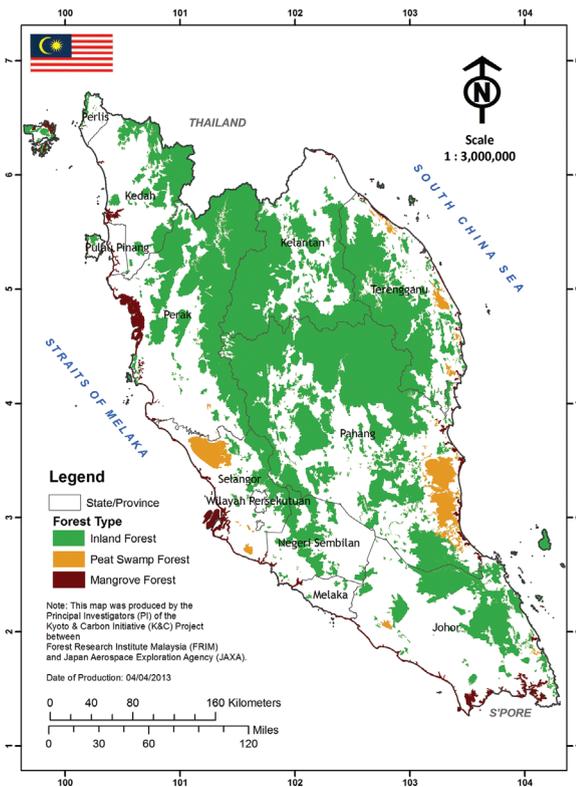


(b)

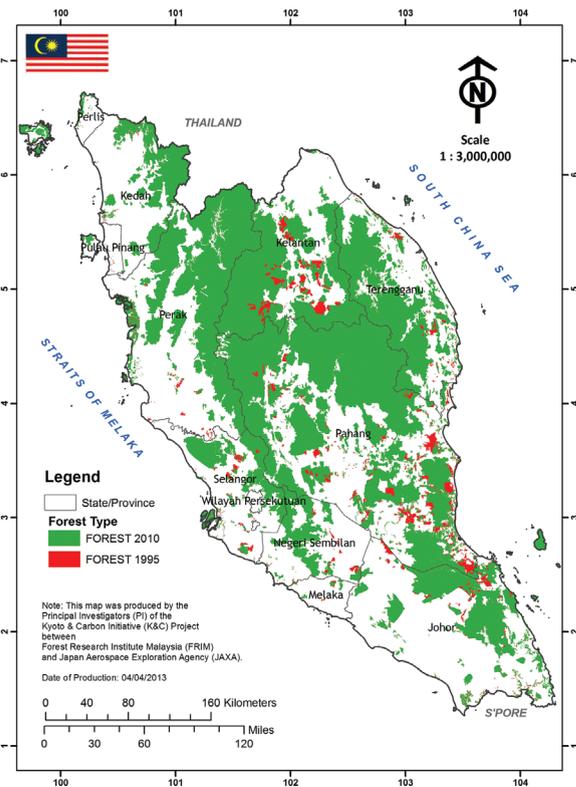
Foto simulasi satelit JERS-1 (a) dan ALOS (b) satelit
Photos of simulated JERS-1 (a) and ALOS (b) satellites
(Sumber/Source: www.eorc.jaxa.jp)

Perubahan litupan hutan antara tahun 1995 dan 2010
Changes of forest cover between years 1995 and 2010

Jenis Hutan Forest Type	Tahun Year		Perubahan Changes (ha) (c) = (a) – (b)	Kadar perubahan Rate of changes (ha/yr)	Kadar perubahan Rate of changes (%/yr)
	1995 (a)	2010 (b)			
Hutan darat Inland forest	6,054,384.47	5,690,815.57	363,568.90	24,237.93	0.40
Hutan paya gambut Peat swamp forest	336,959.15	290,038.47	46,920.68	3,128.05	0.93
Hutan paya laut Mangrove forest	132,168.76	115,180.60	16,988.16	1,132.54	0.86
JUMLAH TOTAL	6,525,507.38	6,098,044.64	427,477.74	28,498.52	0.44



Peta menunjukkan litupan dan jenis hutan di Semenanjung Malaysia bagi 2010
 Map showing forest cover and types in Peninsular Malaysia over the year 2010



Peta menunjukkan taburan spatial perubahan litupan hutan di Semenanjung Malaysia antara 1995 dan 2010
 Map showing spatial distribution of changes of forest cover in Peninsular Malaysia between 1995 and 2010

PENEMUAN SEMULA BIODIVERSITI

Pelbagai haiwan yang unik berjaya ditemui semula setelah lama dikuathiri pupus di Hutan Simpan (HS) Pasoh, Negeri Sembilan melalui projek antarabangsa bertajuk Tropical Ecology Assessment and Monitoring (TEAM).

TEAM merupakan gabungan beberapa organisasi pemuliharaan di bawah pimpinan Conservation International, Smithsonian Institution dan Wildlife Conservation Society merupakan antara organisasi yang turut terlibat. Sehingga kini, TEAM menyokong jaringan saintis dan beroperasi di 17 hutan tropika di Afrika, Asia dan Amerika Latin yang mempraktikkan kaedah kajian yang seragam untuk memperoleh data berkaitan tindak balas tumbuhan dan haiwan terhadap perubahan seperti iklim, penggunaan tanah dan gangguan habitat oleh manusia. Penggunaan metodologi yang seragam oleh ahli yang terlibat membolehkan perbandingan hasil kajian dibuat secara global.

Pada tahun 2011, FRIM menyertai TEAM, lalu menjadi petak kajian pertama di Asia dalam kerjasama tersebut. Projek ini terdiri daripada tiga komponen iaitu; bancian tahunan bagi enam petak bersaiz 1 ha di pelbagai topografi (permatang, kawasan bercerun, lembah), pemantauan harian secara automatik selang setiap lima minit bagi iklim mikro, dan pemantauan fauna selama dua bulan setiap tahun dengan menggunakan perangkap kamera.

Sejak pelaksanaannya, projek tersebut merekodkan perubahan iklim mikro merentasi lebih 870 hari, mendokumentasikan lebih daripada 250,000 gambar hidupan liar dan mengukur lebih daripada 3,000 pokok yang mana diameter aras dadanya (dbh) melebihi 10 cm. Walaupun kadar perubahan dan tindak balas vegetasi dan iklim mikro mengambil masa yang panjang dalam menghasilkan keputusan yang signifikan, pemantauan kepelbagaian fauna menunjukkan hasil yang positif.

Antara mamalia besar yang terdapat di HS Pasoh ialah beruang madu (*Helarctos malayanus*), kucing hutan (kucing kepala leper, *Prionailurus planiceps*), binturong (*Arctictis binturong*) dan kambing gurun (*Capricornis sumatraensis*). Kesemuanya direkodkan buat kali terakhir pada lewat tahun 1970-an. Semenjak itu, kadar penemuan haiwan-haiwan tersebut adalah sangat rendah sehingga pada satu tahap, kesemuanya diandaikan telah pupus di HS Pasoh. Andaian tersebut tidak mustahil kerana ciri-ciri geografi HS Pasoh yang merupakan pulau yang terpisah daripada banjaran hutan utama dan dikelilingi oleh kawasan pertanian dan perumahan. Selain itu, kekurangan data dan kajian mengenai

RE-DISCOVERING BIODIVERSITY

Charismatic animals, once thought to have been lost from the Pasoh Forest Reserve (FR) in Negeri Sembilan have recently been re-discovered and documented through an international collaborative project called Tropical Ecology Assessment and Monitoring (TEAM).

TEAM is a coalition of conservation organisations coordinated by Conservation International. Other key partners include the Smithsonian Institution and the Wildlife Conservation Society. TEAM currently operates in 17 tropical forest sites across Africa, Asia and Latin America supporting a network of scientists committed to standardized methods of data collection to quantify how plants and animals respond to pressures such as climate change, land use change and human encroachment. Standardised methodology is used by all network members to enable cross-site (global) comparison.

FRIM became part of this network in 2011, making it the first plot in Asia to join the network. The project consists of three components; yearly census of six one-hectare vegetation plots placed on different topography (ridge, slope and valley), five-minute interval daily automated micro climate monitoring and annual two-month fauna monitoring using automated camera traps.

Since its commencement, the project has recorded micro climate changes over 870 days, annotated more than 250,000 images of wildlife and measured over 3,000 trees above 10 cm diameter at breast height (dbh). While it will be years before any significant changes or responses from the vegetation and micro climate data can be picked up, the fauna diversity exercise has started showing valuable results.

Larger mammals such as the sun bear (*Helarctos malayanus*), forest cats (i.e. flat-headed cat, *Prionailurus planiceps*), bear cat (*Arctictis binturong*) and serow (mountain goat, *Capricornis sumatraensis*), were last recorded to be present at the reserve in the late 1970s. Since then, their detection has been low and quite rare to a point that it was considered locally extinct. It is not unusual to have such expectations, considering the Pasoh FR is geographically a forest island, detached from the main (central) forest range and surrounded by agriculture land and village landscapes. Data deficiency could also us to believe the absence of these species due to the very fauna few studies in Pasoh FR on a scale matching that of the TEAM Project in aspects of spatial and temporal scale, as well as technology used.

spesies berkenaan pada skala yang besar seperti TEAM dari segi ruang, masa dan teknologi juga telah melahirkan sangkaan bahawa spesies haiwan tersebut telah pupus.

Walaupun demikian, projek TEAM berjaya memproleh bukti gambar yang pertama bagi kewujudan kucing kepala leper, kambing gurun, dan kucing dahan (*Pardofelis marmorata*) di HS Pasoh. Kambing gurun dan kucing dahan bukan sahaja merupakan rekod baharu bagi HS Pasoh, malah merupakan haiwan yang dilindungi di bawah Akta Pemeliharaan Malaysia 2010 dan tersenarai sebagai spesies terancam atau nadir di bawah Senarai Merah IUCN.

Akan tetapi, kemandirian populasi spesies berkenaan menjadi persoalan kerana tekanan kekurangan sumber makanan dan kawasan perlindungan serta pemburuan haram. Data yang diperoleh daripada projek TEAM telah dibentangkan kepada pengarah-pengarah Jabatan Perhutanan Negeri Sembilan (JPNS) dan Jabatan Hidupan Liar dan Taman Negara (PERHILITAN) Negeri Sembilan sebagai usaha untuk meningkatkan langkah-langkah pemuliharaan dan perlindungan hidupan liar di HS Pasoh. Sejak itu, PERHILITAN meningkatkan rondaan untuk aktiviti pemburuan haram dan JPNS juga lebih bertekad untuk memastikan pelaksanaan pengurusan hutan secara mampan termasuk pemuliharaan hutan penyelidikan di dalam HS Pasoh.

Fortunately, the Project has also documented the first photographic evidence of the flat-headed cat, serow and marbled cat (*Pardofelis marmorata*) in Pasoh FR. The serow and marbled cat are also new records for Pasoh FR. Not only are these animals new records for the reserve, but they are also a protected species under the Malaysian Conservation Act 2010 and listed as either endangered or vulnerable to extinction under the IUCN Red List.

The viability of these remaining populations is questionable partly due to pressures of diminishing food resources, protected shelter and poaching. These data have been presented to the directors of the Forestry Department of Negeri Sembilan as well as the Department of Wildlife and National Parks Negeri Sembilan to alert these relevant agencies on the pressing need to enhance conservation and protection measures in the reserve. As a result, the wildlife agency has increased their patrolling efforts in the reserve, particularly in areas where the Project revealed poaching activities while the forestry department is even more keen to ensure the implementation of sustainable forest management practices, including the conservation of the research forest within the reserve.





Kucing kepala rata (*Prionailurus planiceps*), spesies yang dilindungi di Malaysia dan tersenarai sebagai spesies langka di bawah Senarai Merah IUCN

The flat-headed cat (*Prionailurus planiceps*), a protected Malaysian species and listed as endangered under the IUCN Red List



Kambing gurun (*Capricornis sumatraensis*)—merupakan rekod pertama bagi HS Pasoh
The serow, a mountain goat (*Capricornis sumatraensis*)—a first record for Pasoh FR





BAHAGIAN KELUARAN HUTAN

PROSES PRARAWATAN BERKESAN UNTUK MENGURANGKAN SAKU BASAH DALAM PENGERINGAN KONVENSIONAL *Acacia mangium*

Acacia mangium mula ditanam di Sabah sebagai spesies penghalang api pada 1967 dan sebagai tanaman ladang sejak 1974. Kini terdapat 71 000 ha ladang *A. mangium* di Sabah. Di Semenanjung Malaysia, oleh kerana dijangka kekurangan kayu dari hutan asli untuk pemprosesan, program ladang hutan kompensatori diwujudkan oleh Jabatan Perhutanan pada 1982. Kira-kira 51 000 ha *A. mangium* ditubuhkan terutamanya di Johor, Negeri Sembilan, Pahang dan Selangor. Sarawak memulakan ladang *A. mangium* pada 2004, lebih kurang 280 000 ha ditubuhkan dan sasarannya ialah 1 juta ha. *Acacia* merupakan sumber utama bagi eksport serpihan kayu dan pengeluaran pulpa, kayu komposit dan hanya sebahagian kecil diguna untuk pengeluaran produk kayu padu seperti perabot. Papan *A. mangium* jarang digunakan untuk produk kayu padu kerana masalah pengeringan. Kayu ini diketahui mempunyai kandungan lembapan tinggi dan susah dikeringkan serta mempunyai perbezaan kandungan lembapan yang tinggi.

Pengeringan kayu merupakan satu proses penting dalam penggunaan kayu secara cekap. Biasanya pengeringan kayu dilaksanakan di dalam tanur wap konvensional mengikut jadual pengeringan yang dibangunkan untuk spesies kayu tertentu. Untuk mengeringkan kayu yang kurang dikenali

FOREST PRODUCTS DIVISION

EFFECTIVE PRE-TREATMENT PROCESS TO ELIMINATE WET POCKETS IN CONVENTIONAL DRYING OF *Acacia mangium*

Acacia mangium was first introduced to Sabah in 1967 as a fire-break species and planted as plantation crop since 1974. Today some 71 000 ha of *A. mangium* was planted in Sabah. In Peninsular Malaysia, with the anticipated shortage of timber from the natural forest, a plantation programme known as the Compensatory Forest Plantation Programme was initiated by the Forestry Department in 1982. To date, about 51 000 ha of *A. mangium* have been planted mainly in the states of Johor, Negeri Sembilan, Pahang and Selangor. Sarawak started *A. mangium* plantation in 2004, some 280 000 ha was planted and the target is to plant one million ha. *Acacia* has been as a major source of raw material for wood chip export and production of pulp, composite wood products and only a small volume is used for production solid wood products such as furniture. Sawn *A. mangium* boards are used with limited success due to difficulties in drying the timber. The timber is known to have high final moisture content variations due to occurrence of wet pockets.

Timber drying is an important process for efficient utilisation of timber. This is normally carried out by following through a drying schedule developed for the timber species in a conventional steam-heated kiln. For the drying of unfamiliar timber or timber of unknown drying characteristics, normally the density

atau tidak diketahui sifat-sifat pengeringannya, biasanya ketumpatan kayu tersebut dan ciri-ciri pengeringan udara boleh dijadikan panduan untuk memulakan jadual pengeringan daripada satu set jadual pengeringan piawai seperti yang terdapat dalam panduan atau manual pengeringan kayu. Jadual pengeringan awal ini kemudiannya berdasarkan kualiti kayu selepas pengeringan seperti rekahan permukaan dan hujung, penggeledangan dan keseragaman kandungan lembapan kayu serta tempoh pengeringan. Pembangunan jadual pengeringan dan penilaian ke atas *Acacia mangium* dilakukan melalui kaedah tradisional ini. Walau bagaimanapun, masih terdapat julat yang lebar dalam perbezaan kandungan lembapan akhir disebabkan berlakunya “saku basah” di dalam kayu *A. mangium* yang dikeringkan.

Rawatan tradisional seperti masa pengeringan udara yang panjang, prapengewapan dan pengewapan secara kerap semasa pengeringan *A. mangium* tidak dapat mengelak daripada berlakunya “saku basah”. Ini mendorong penilaian ke atas prarawatan lain; salah satunya ialah rawatan rendaman air panas. Penilaian awal terhadap keberkesanan prarawatan ini dilaksanakan menggunakan prosedur ujian yang diambil daripada ujian piawai kadar pengeringan kayu. Penilaian dijalankan menggunakan ketuhar biasa yang ditetapkan pada suhu malar. Pelbagai ketetapan prarawatan telah diuji dan dioptimumkan menggunakan prosedur ujian yang ringkas ini sebelum percubaan penuh dijalankan menggunakan tanur stim konvensional. Prarawatan menggunakan kaedah rendaman air panas terbukti berkesan mengurangkan berlakunya “saku basah” dengan ketara. Jadual pengeringan *A. mangium* juga dioptimumkan, yakni tempoh pengeringan dapat dipendekkan kepada kira-kira 14 hari apabila digunakan bersama-sama rendaman air panas. Amalan konvensional dalam industri ialah pengeringan udara selama dua bulan diikuti pengeringan tanur selama 40 hingga 45 hari untuk kayu akasia berketebalan 25 mm. Dengan teknik prarawatan dan jadual pengeringan yang dicadangkan, dijangka penggunaan kayu *A. mangium* untuk produk bernilai tambah akan meningkat dan menyumbang kepada pendapatan eksport negara.

and air drying characteristics may be used as a guide to start a drying schedule from a set of standard drying schedules prescribed in the timber drying guide or manual. The preliminary drying schedule will then be optimised through subsequent drying trials based on quality of the dried timber, such as surface and end checks, warping, uniformity in final moisture content and drying duration. Development of drying schedule and assessment on *Acacia mangium* has been conducted following this traditional approach. However, the wide variation of final moisture content of *A. mangium* persisted due to occurrence of wet pockets within the dried timber.

Traditional treatment such as extended air drying duration, pre-steaming and regular intermittent steaming during the drying of *A. mangium* had not been successful to eliminate the occurrence of wet pockets. This has prompted the assessment of other pre-treatment options; one of which is hot water bath pre-treatment. Initial assessment on the effectiveness of this pre-treatment was conducted using an experimental procedure adopted from the standard timber drying rate test. The assessment was conducted using a normal oven set at a constant temperature. Various pre-treatment settings were tested and optimised using this simple testing procedure before a full experimental trial was conducted using conventional steam heated kiln drying chamber. Hot water bath pre-treatment applied has been found to lessen the occurrence of wet pocket significantly. The drying schedule for *A. mangium* has also been optimized and when used in conjunction with the hot water bath will shorten the drying duration to about 14 days. Conventional practice in the industry is about two months of air drying followed by kiln drying for between 40 and 45 days for 25 mm *A. mangium* boards. With the proposed pre-treatment and optimised drying schedule for *A. mangium*, the use of the timber for value added products will increase and contributing to income export earnings of the country.



Saku basah dalam *A. mangium*
Wet pockets in *A. mangium*

PEMBANGUNAN KAYU SILANG BERLAMINA MENGGUNAKAN SPESIES KAYU PERINTIS KEPADA PANEL BERSTRUKTUR UNTUK PENGGUNAAN SISTEM BINAAN BERINDUSTRI

Kayu silang berlaminata ialah produk panel kayu kejuruteraan yang dihasilkan melalui kayu bersilang yang dilapis dengan bilangan lapisan yang ganjil. Teknologi yang dibangunkan di Eropah ini merupakan satu kejayaan dalam penggunaan kayu sebagai komponen struktur dalam bangunan. Konsep pembinaan bangunan kayu silang berlaminata adalah sama dengan konsep sistem binaan berindustri (IBS) yang semakin popular dalam industri pembinaan di Malaysia. Reka bentuk kayu silang berlaminata membolehkan kekuatannya sepadan dengan kekuatan kayu padu. Ini menyebabkan kayu dengan sifat-sifat kekuatan mekanikal yang rendah boleh digunakan dalam penggunaan berstruktur. Selain itu, reka bentuknya membolehkan penggunaan untuk struktur yang lebih luas dan lebih panjang dalam pembinaan bangunan. Spesies kayu perintis merupakan alternatif bagi menghasilkan kayu silang berlaminata kerana ia boleh didapati secara meluas dan kos yang rendah walaupun mempunyai sifat kayu yang rendah.

Panel kayu silang berlaminata dihasilkan melalui proses pemotongan, pemilihan kayu, penyambungan jari, perekatan sisi dan muka. Ketebalannya ialah 60–400 mm atau lebih bergantung pada penggunaan dan bilangan lapisan panel. Panjangnya boleh mencapai sehingga 15 m dan lebih bergantung pada keupayaan mesin dan sistem pengangkutan. Seperti IBS, kayu silang berlaminata dihasilkan di kilang dan pemasangannya di tapak pembinaan mengurangkan keperluan buruh dan masa pembinaan. Kesan kepada alam sekitar pula, kayu silang berlaminata berkeupayaan untuk bertindak sebagai penyimpan karbon di peringkat pengeluaran iaitu karbon yang tersimpan di dalam kayu boleh mengurangkan jejak karbon bangunan. Semua ini mengurangkan kesan alam sekitar semasa pembinaan bangunan.

Spesies perintis seperti mahang, ludai, sesendok dan batai mempunyai ciri-ciri yang hampir sama dengan kayu ringan beriklim sederhana seperti spruce, pine, atau fir. Berdasarkan bilangan dan kemudahan untuk mendapatkan kayu, sesendok dipilih untuk kajian ini yang melibatkan penentuan sifat-sifat yang penting, prestasi perekatan bahan dan prestasi panel kayu silang berlaminata. Prototaip kecil juga diwujudkan bagi menilai prestasi dalam perkhidmatan sistem kayu silang berlaminata. Panel tiga lapis dengan panjang 1–3 m dihasilkan menggunakan kayu sesendok dan perekat fenol-resorsinol-formaldehid. Ujian perekatan antara kayu menunjukkan kualiti perekatan yang baik. Ujian delaminasi kayu juga menunjukkan hasil

DEVELOPMENT OF CROSS LAMINATED TIMBER USING PIONEER TIMBER SPECIES INTO STRUCTURAL PANEL FOR INDUSTRIALISED BUILDING SYSTEM APPLICATION

Cross laminated timber (CLT) is an engineered wood produced by laminating timber perpendicular to the grain direction with odd number of layers. This technology that has been developed in European countries is a breakthrough in using timber as structural component in building. The construction of cross laminated timber building is similar to the concept of industrialised building system (IBS) construction which is gaining popularity in Malaysian construction industry. As cross laminated timber is arranged in such a way, the strength of the product is expected to match the strength of solid timber. This enables timber with low mechanical strength properties to be used in structural applications. Furthermore, the design of the product allows wider and longer span in building construction. The underutilised pioneer species timber is the alternative for producing CLT as it is widely available and low priced even though with poorer wood properties.

Cross laminated timber is produced from the process of timber cutting, selection of timber, finger jointing, to edge and face gluing. The thickness of the product is in the range of 60–400 mm depending on the requirement and number of layers. The length of the panel can reach up to 15 m and longer depending on the machine capability and transportation. Similar to IBS, cross laminated timber system prefabricate the material at the plant and assembled on-site which reduces the construction time and labour requirements. In terms of environmental issue, cross laminated timber has the ability to act as carbon storage during the production stage where the carbon is fixed in the wood which reduces carbon footprint of the building. All this lessens the environmental impact of building construction.

Pioneer species such as mahang, sesendok, ludai and batai have the properties that are almost similar to temperate softwood such as spruce, pine, or fir. Based on the availability, sesendok is chosen in this study. The study involves determination of the material properties and the bonding performance of CLT panel. Three layer panels with length ranging from 1.8 to 3 m were produced from sesendok and laminated using phenol resorcinol formaldehyde adhesive. Bonding test between timber member results shows good bonding qualities. Delaminations of the laminated timber also meet the requirement set by international standard as an outdoor structural application. A prototype house will be established to evaluate the in-service performance of the CLT as a building system.

menepati piawaian antarabangsa untuk penggunaan struktur luar.

Kerjasama dengan pihak industri telah dimulakan bagi menggunakan kemudahan untuk penghasilan kayu silang berlamina. Kerjasama ini juga melibatkan aktiviti berkaitan untuk mendirikan prototaip struktur daripada kayu silang berlamina. Hasil projek ini, satu produk berteknologi hijau dengan kelebihan dari segi pembinaan dapat diperkenalkan kepada industri kayu dan pembinaan Malaysia.

Collaboration with an industrial partner was established to utilise the facilities towards the fabrication of the CLT panel. The partnership also involves the activity to embark on a project to set up prototype structure made from cross laminated timber. From this project, a green structural product with many construction advantages is expected to be introduced into the Malaysian timber and construction industry.



KETAHANAN KAYU MALAYSIA BERDASARKAN EUROPEAN STANDARD BS EN 350-1: 1994

Kajian ini adalah untuk menentukan ketahanan kayu Malaysia berdasarkan pendedahannya kepada agen perosak kayu seperti kulat pereput dan anai-anai seperti yang ditetapkan oleh spesifikasi European Standard BS EN 350-1:1994 (EN 350). Ia bertujuan untuk membuat semakan semula pengelasan ketahanan kayu-kayan Malaysia terhadap cuaca dan keadaan persekitaran seperti yang ditetapkan oleh standard Eropah. Dalam kajian ini sebanyak 30 spesies dikenal pasti untuk menjalani ujian ketahanan kayu. Ujian yang akan dijalankan adalah berdasarkan standard antarabangsa yang diterima pakai oleh negara-negara di Eropah. Pengelasan ujian ketahanan kayu Malaysia sedia ada adalah berdasarkan ujian pancang di bawah persekitaran tropika yang panas dan lembap (Malaysia) yang lazimnya mengalami kadar pereputan lebih tinggi berbanding dengan negara beriklim sederhana. Kajian awal mendapati kayu Malaysia yang dikategorikan sebagai tidak tahan melalui kaedah pancang, menjadi tahan apabila ditentukan melalui standard EN 350. Malaysia mengalami kerugian dari segi premium harga apabila kebanyakan kayu Malaysia dimasukkan di dalam Gred 4 dan 5 berdasarkan kajian terdahulu yang mendapati 80% daripada kayu Malaysia dikategorikan sebagai "sederhana tahan" dan "tidak tahan" melalui ujian pancang. Kajian ini dicadangkan untuk membuat penilaian semula ke atas 30 spesies kayu komersial semasa terutamanya untuk pasaran Eropah. Pada masa akan datang, kajian ini akan dikembangkan kepada lain-lain spesies komersial yang digunakan untuk menghasilkan papan lapis dan kayu gergaji.

Output

1. Keberkesanan dan ketahanan kayu Malaysia terhadap serangan kulat dan anai-anai secara ujian makmal.
2. Mendapatkan pengiktirafan secara global dari negara-negara Eropah melalui kerjasama dengan agensi perkayuan terkemuka di luar negara seperti TRADA dan/atau CIRAD melalui program Program Inter Laboratory Cross Check (ILCC).
3. Membangunkan pangkalan data bagi pengelasan spesies kayu Malaysia berdasarkan European standard EN 350.
4. Penyebaran maklumat dan khidmat nasihat dengan memperkenalkan suatu garis panduan berkaitan ketahanan kayu Malaysia untuk industri perkayuan.

NATURAL DURABILITY OF MALAYSIAN TIMBERS BASED ON EUROPEAN STANDARD BS EN 350-1:1994

This study aims to determine the durability of Malaysian wood based on the exposure of wood samples to destroying agents such as wood decay fungi and termites as prescribed by the specification of European Standard BS EN 350-1:1994 (EN 350). It is to revise the durability classification of Malaysian timbers against weather and environmental conditions as prescribed by the European standard. In this study, 30 wood species have been identified for the durability test. The test to be carried out is based on international standards adopted by European countries. Durability classification of existing Malaysian timbers is based on exterior test (graveyard test) under hot and humid Malaysian tropical environment which normally experience a higher decay rate compared to temperate countries. Earlier studies found that Malaysian timbers was categorised not durable through the graveyard test, became durable when determined by the standard EN 350. Malaysia has suffered losses in terms of price premium when most Malaysian timbers are placed in Grades 4 and 5; based on previous studies where 80% of Malaysian timbers have been categorised as moderately durable and not durable through graveyard tests. This study was proposed to evaluate on the 30 Malaysian commercial timber species especially for the European market. In the future, this study will be expanded to other commercial timber species used for production of plywood and sawn timber.

Outputs

1. Effectiveness and durability of Malaysian woods against fungi and termite attack in laboratory tests.
2. Obtain global recognition from European countries through cooperation with leading timber agencies abroad such as TRADA and/or CIRAD through the Inter Laboratory Cross Check Program (ILCC).
3. Develop a database classifying Malaysian timber species based on European standard EN 350.
4. Dissemination of information and advisory services providing related guidelines on Malaysian timber durability; to be introduced and made available to the timber industry.

Keberhasilan

Menyediakan pangkalan data dan pengelasan semula mengenai ketahanan semula jadi 30 spesies kayu yang dikenal pasti berdasarkan European Standard (EN 350).

Impak

Maklumat teknikal ini amat berguna untuk mendapatkan premium harga produk yang setimpal dengan ketahanannya untuk pasaran antarabangsa.

Outcomes

To provide a database and reclassification of the natural durability of the selected 30 wood species identified according to the European standard (EN 350).

Impact

This technical information is very useful and vital to get a premium price for a product which commensurate with the right durability rating for the international market.



Penyesuaian sampel kayu
Conditioning of wood samples



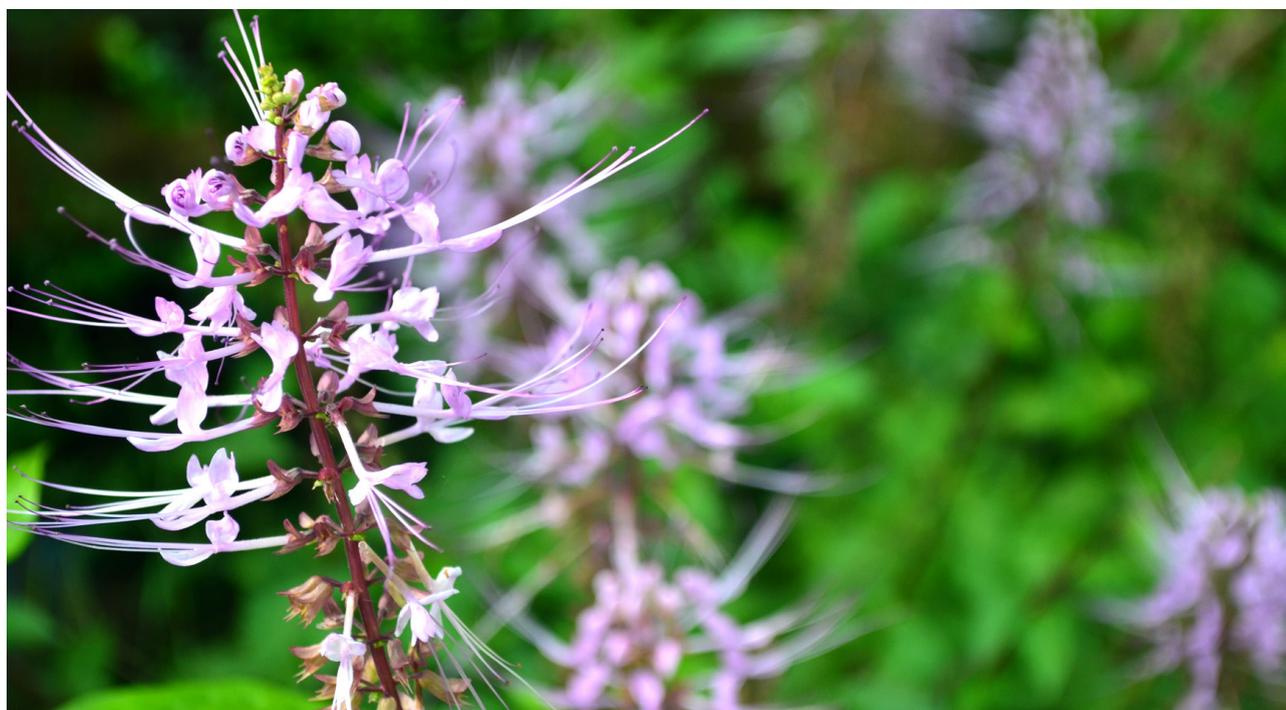
Pemilihan sampel kayu untuk ujian
Selection of wood specimens for test



Ujian pendedahan sampel kayu kepada ujian kulat di dalam bilik penyesuaian (16 minggu)
Exposure test of wood samples to fungi test in the conditioning room (16 weeks)



Penyediaan sampel kayu untuk ujian terhadap kulat berdasarkan European Standard BS EN 350-1:1994 (EN 350)
Preparation of wood samples for test against fungi according to European Standard BS EN 350-1:1994 (EN 350)



BAHAGIAN HASILAN SEMULA JADI

KOMPILASI DATA MAKROSKOPIK, MIKROSKOPIK DAN ANALISIS KIMIA TERHADAP LIMA SPESIES TUMBUHAN UBATAN DAN BERAROMA TERPILIH UNTUK PENGESAHAN BAHAN MENTAH

Setakat manakah keaslian produk herba kita? Keaslian bahan mentah yang digunakan oleh pengusaha herba merupakan elemen yang paling penting sebelum ia diproses menjadi produk. Isu asas dalam penentuan keaslian produk herba ialah kepentingan menggunakan spesies herba yang betul. Dalam pada itu, FRIM telah memperkenalkan satu pendekatan yang merangkumi pencirian morfologi dan kimia. Pencirian morfologi merupakan satu kaedah pengenalpastian spesies menggunakan ciri-ciri morfologi tumbuhan yang termasuk makro- dan/atau kombinasi mikromorfologi. Ia juga dapat memastikan bahan mentah yang digunakan adalah betul sebelum digunakan untuk pencirian kimia. Pencirian kimia yang dibangunkan menumpukan pada kaedah makroskopik FTIR, TLC dan HPLC yang berkelebihan seperti diskriminatif dan keberkesanan, yang menggambarkan maklumat kimia secara keseluruhan. Secara praktik, pemilihan antara kedua-dua kaedah ini adalah bergantung pada bentuk bahan mentah yang sedia ada. Untuk bahan mentah segar yang lengkap dengan bahagian bunga dan buah, pengenalpastian boleh dibuat menggunakan pencirian morfologi atau kimia. Dalam kes bahan mentah berbentuk serbuk, pendekatan kimia merupakan pilihan yang tidak dapat dielakkan.

NATURAL PRODUCTS DIVISION

A DATA COMPILATION OF MACROSCOPIC, MICROSCOPIC AND CHEMICAL ANALYSIS OF FIVE SELECTED MAPS FOR THE AUTHENTICATION OF THEIR RAW MATERIALS

How genuine are our herbal products? The genuineness of raw materials used by any herbal manufacturer is the most important element before they are put through the processing line to produce the final products. The most fundamental issue in establishing the genuineness of an herbal product is that the correct species of herbs must be used. For that, we introduce an approach incorporating both morphological and chemical characterisation. Morphological characterisation is a method used to distinguish a species using morphological characteristics of a plant that consist of macro-morphology and sometimes with the combination of micro-morphology. It also ensures that the starting material is authentic before proceeding with the chemical characterisation. The chemical characterisation in particular focuses on macroscopic FTIR, TLC and HPLC means with the qualities of discriminative and effective, to reflect the overall chemical information of the samples. For practical application, the choice of either morphological or chemical approach depends on what forms of raw materials are available. For fresh material that comes with complete parts of the plant including flowers and fruits, identification can be done by referring to the morphological or chemical characteristics. In the

Penjanaan cap jari autentik adalah sangat berguna dalam pengawalan mutu bagi pihak industri untuk memastikan keselamatan dan keberkesanan dalam penggunaan remedi semula jadi.

Jilid pertama kompilasi mengandungi lima spesies iaitu *Eurycoma longifolia*, *Labisia pumila*, *Orthosiphon aristatus*, *Senna alata* dan *Tinospora crispa*. Perbandingan dibuat antara spesies yang berkaitan rapat melalui pendekatan botani dengan pencirian makroskopik dan mikroskopik serta pencirian kimia dengan FTIR, HPTLC dan HPLC. Penanda analitik juga dikenal pasti dan digunakan untuk pengecaman secara kualitatif. Kompilasi data terdiri daripada gambar tumbuhan, penerangan botani dengan ciri makroskopik dan mikroskopik, serta cap jari kimia dengan profil FTIR, HPTLC dan HPLC. Atlas ini akan digunakan sebagai rujukan untuk pengesahihan MAPs dalam jaminan kualiti MAPs Malaysia.

ASAI CAP-E: ANALISIS KEBOLEHDAPATAN BIO ANTIOKSIDAN PADA PERINGKAT SELULAR DALAM HASILAN SEMULA JADI

Kumpulan penyelidik antioksidan FRIM merupakan kumpulan penyelidik perintis di Malaysia dalam membangunkan asai CAP-e untuk menganalisis kebolehdapatan bio antioksidan pada peringkat sel. Asai ini dibangunkan dengan khidmat latihan dari National Measurement Institute (NMI), Melbourne, Australia. Pembangunan asai CAP-e ini membolehkan FRIM menguji kebolehdapatan bio antioksidan pada peringkat sel dalam hasilan semula jadi dan ekstrak tumbuhan.

Antioksidan sering mendapat sambutan dan perhatian dalam penjagaan kesihatan terutamanya untuk mencegah penyakit kronik degeneratif dan melambatkan tanda-tanda penuaan. Bak kata pepatah “mencegah lebih baik daripada merawat”, antioksidan semula jadi daripada sumber makanan berperanan penting dalam memelihara kualiti kehidupan yang sihat dan sejahtera. Walau bagaimanapun, kebelakangan ini, keberkesanan kesan antioksidan dan pengujiannya bagi hasilan semula jadi dipersoalkan. Adakah pengambilan antioksidan meresap masuk ke dalam sistem badan? Apakah kesan ke atas tisu usus? Adakah ia meresap ke dalam salur darah? Adakah ia meresap ke dalam sel? Bolehkah antioksidan memberi perlindungan kepada kerosakan akibat kesan oksidatif?

Antioksidan adalah relevan jika ia dapat melindungi sel hidup. Asai CAP-e secara khusus mengukur keupayaan antioksidan melintasi membran plasma dan menyerap ke dalam ruang antara sel. Kaedah

case of powdered material, the chemical approach is inevitable. The authentic fingerprints thus generated are very useful for quality control and are applicable to the industries to ensure safe and effective use of our natural remedies.

In the first volume, five species, namely *Eurycoma longifolia*, *Labisia pumila*, *Orthosiphon aristatus*, *Senna alata* and *Tinospora crispa* were selected and comparisons were made with their closely related species through botanical characterisation using macroscopy and microscopy, and chemical characterisation using FTIR, HPTLC and HPLC. Selected analytical markers were identified and used for qualitative identification in the chemical profiles of related species. The compilation consisted plant photos, botanical description using macroscopic and microscopic characters, and chemical fingerprints using FTIR, HPTLC and HPLC profiles. The atlas of MAPs will be used as a reference for authentication of MAPs in the quality assurance of Malaysian MAPs.

CAP-E ASSAY: TESTING ANTIOXIDANT BIOAVAILABILITY AT THE CELLULAR LEVEL FOR NATURAL PRODUCTS

The Antioxidant Research Team of FRIM, with training support from the National Measurement Institute (NMI), Melbourne, Australia, is the pioneer in Malaysia in the establishment of the CAP-e Assay (based on Honzel et al., 2008) for antioxidant testing at cellular level. Upon establishment and optimisation of the CAP-e assay, FRIM can test natural products and plant extracts for antioxidant bioavailability at cellular level.

Antioxidants have gained great momentum and interest in the field of preventive health-care, especially for deterring the onset of chronic degenerative diseases and premature aging symptoms. As the saying goes, “prevention is better than cure”, natural antioxidants from food can play a major role in providing quality life and fitness even as one ages. However, recently, the relevance of antioxidants and antioxidant testing, especially related to claims in natural products, has come into question. Are antioxidants absorbed upon consumption? What is the effect of gut tissue? Is there entry into circulating blood? Is there entry into living cells? Can antioxidants protect from oxidative damage?

Antioxidants are biologically relevant only if they are able to protect living cells. The CAP-e assay specifically measures antioxidants capable of crossing the plasma membrane into the intracellular space. The CAP-e assay is based on a methodology performed in cells of a very simple composition. The assay makes use of erythrocytes from human or



BAHAGIAN BIOTEKNOLOGI PERHUTANAN

PENILAIAN STOK KARBON LANTAI HUTAN DI HUTAN GUNUNG TROPIKA UNTUK PEMETAAN STOK KARBON

Lantai hutan boleh mengandungi 3–6% daripada himpunan karbon global. Variasi ruang stok karbon lantai hutan yang terdiri daripada komponen berbeza iaitu daun kering, hemic, sapric, duff (kombinasi sapric dan hemic) dan jumlah keseluruhannya belum pernah dinilai di hutan gunung tropika walaupun ia mempengaruhi komponen stok karbon tanah. Persempadanan ketebalan lantai hutan berdasarkan lapisan pereputan akan memberikan ukuran stok karbon lantai hutan yang lebih tepat dalam menambah baik strategi pengurusan khusus-tapak (site-specific) di kawasan stok karbon tinggi. Kajian ini bertujuan menentukan ketumpatan pukal dan pecahan karbon komponen lantai hutan secara berasingan untuk menganggarkan stok karbon menggunakan pemodelan matematik. Variasi ruang ketebalan lapisan lantai hutan di kedudukan topografi yang pelbagai juga dinilai. Keputusan bagi ketumpatan pukal terhadap stok karbon lantai hutan dipadankan dalam bentuk model regresi. Duff yang mempunyai ketumpatan pukal yang lebih tinggi (0.19) dan pecahan karbon sebanyak 0.55 dibandingkan

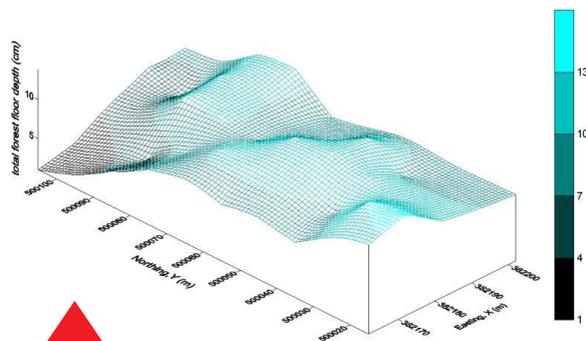
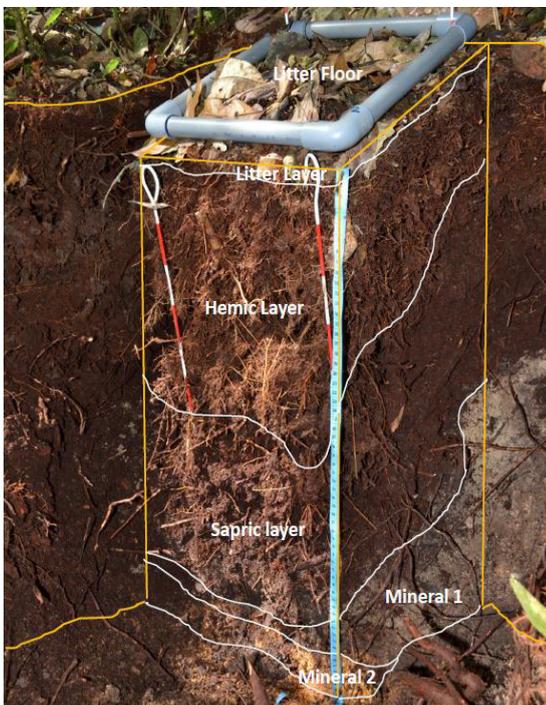
FOREST BIOTEKNOLOGI DIVISION

FOREST FLOOR CARBON STOCKS ASSESSMENT IN TROPICAL MONTANE FOREST FOR CARBON STOCK MAPPING

Forest floor alone may constitute 3–6% of the global carbon (C) pool. Spatial variations of forest floor C stocks which include different components of litter, hemic, sapric, duff (sapric + hemic) and its total, has not been empirically quantified in tropical montane forest although they influence soil C pools. Delineation of forest floor thickness according to decomposing layers will provide refined measurements of forest floor C stocks to improve site-specific management strategies of high C stocks areas. The study was aimed to determine the bulk density and C fraction of forest floor components separately to estimate the C stocks using mathematical models. The spatial variability of forest floor layers thickness at varying topography was also quantified. Results of bulk density against forest floor C stocks were fitted into suitable regression models. Duff had higher bulk density (0.19) and C fraction (0.55) compared to litter, indicating duff C stocks were 6–14 Mg C ha⁻¹ compared to litter (≤ 3 Mg C ha⁻¹). Geostatistical analyses showed that spatial structure and surface maps of test variables differed across topographic positions. They showed distinct

dengan daun kering, menunjukkan stok karbon duff ialah 6–14 Mg C ha⁻¹, manakala daun kering (≤ 3 Mg C ha⁻¹). Hasil analisis geostatistik menunjukkan ujian pemboleh ubah antara struktur ruang dan pemetaan permukaan adalah berbeza di setiap kedudukan yang merentas topografi. Peta permukaan menunjukkan kelompok ruang yang nyata dan memaparkan nilai interpolasi yang boleh diterima. Hemic paling tinggi berada di kaki bukit yang mana ia merupakan 80% daripada keseluruhan lantai hutan. Model regresi yang dibangunkan untuk menganggarkan stok karbon lantai hutan telah difailkan untuk pendedahan reka cipta (FRIM ID 16/2014) dan model tersebut boleh digunakan untuk menganggarkan stok karbon di hutan gunung tropika lain. Pengurus hutan boleh mengamalkan pengurusan khusus-tapak (site-specific) menggunakan peta variasi ruang lantai hutan yang berlandaskan persempadanan topografi untuk memelihara kawasan yang mempunyai stok karbon yang tinggi. Keputusan daripada projek ini dijangka akan melengkapkan maklumat inventori hutan Malaysia untuk laporan stok karbon ke United Nations Framework Convention on Climate Change (UNFCCC). Ia juga boleh memberi nilai yang lebih tepat untuk penilaian stok karbon lapisan hutan ke arah usaha REDD+.

spatial clustering and displayed acceptable accuracy of interpolated values. Hemic was the highest at the toe slope where it constituted approximately 80% out of total forest floor. The regression model developed to estimate forest floor C stocks was submitted for an invention disclosure (FRIM ID 16/2014) and the models may be used to estimate C stocks in tropical montane forests. Forest managers may exercise site-specific management according to forest floor spatial variability maps based on topographic delineation in order to conserve areas with high C stocks. Results from this project are foreseen to bridge information gaps on national forest inventory carbon accounting to the UNFCCC. It may also provide refined values for forest floor C stock assessment for REDD+ efforts.



Peta kepelbagaian ruang bagi keseluruhan kedalaman lantai hutan (cm)
Spatial variability map of total forest floor depth (cm)



Profil lantai hutan di hutan gunung tropika
Forest floor profile at tropical montane forest

MIKROPROPAGASI SPESIES ORKID TERANCAM, *Grammatophyllum speciosum* BLUME BAGI PEMULIHARAAN SECARA IN VITRO DAN PENGHASILAN BAHAN TANAMAN

Grammatophyllum speciosum atau orkid harimau disenaraikan sebagai tumbuhan orkid yang terancam (endangered) oleh CITES. Orkid ini unik kerana ia merupakan orkid yang terbesar di dunia dengan ketinggiannya mencecah sehingga 15 kaki panjangnya. Ia mempunyai masa pembungaan yang tidak menentu dan juga dikutip dengan meluas di dalam hutan untuk diperdagangkan dan sebagai tanaman hiasan. Ia juga dilaporkan mempunyai nilai ubatan iaitu kesan antiradang. Oleh kerana masa pembungaannya yang tidak menentu, pembiakannya adalah melalui pucuk adventitius yang sangat perlahan. Menggunakan kaedah mikropropagasi, pemuliharaan spesies ini adalah secara in vitro dan penghasilan bahan tanaman spesies ini dapat dilakukan.

Mikropropagasi spesies ini menggunakan kaedah kultur tisu konvensional dan sistem perendaman sementara telah dihasilkan di FRIM. Anak-anak pokok berjaya dihasil dan digandakan menggunakan kaedah-kaedah ini dan teknologi ini telah tersedia untuk dilesenkan di bawah perjanjian perlesenan. Projek dua tahun ini telah tamat dan ditaja oleh MOSTI. Beberapa pekerja pelaksana telah terlatih menggunakan teknologi ini menggunakan sistem RITA sebagai sistem perendaman sementara. Seorang siswazah juga telah menjalani latihan industri selama enam bulan di bawah projek ini. Teknologi yang dihasilkan ini akan difailkan sebagai pendedahan reka cipta kepada FRIM dan hasil teknologi akan diterbitkan dalam jurnal. Plantlet yang terhasil daripada teknologi ini akan dijual dan sebahagiannya akan ditanam di kampus FRIM sebagai tumbuhan ikonik projek Warisan UNESCO. Kajian ini tentunya dapat membantu dalam pemuliharaan orkid yang unik ini dan mempunyai potensi yang besar untuk dikomersialkan.

MICROPROPAGATION OF ENDANGERED ORCHID, *Grammatophyllum speciosum* BLUME FOR IN VITRO CONSERVATION AND MASS PRODUCTION

Grammatophyllum speciosum or tiger orchid is listed by CITES as an endangered plant. It is unique because it is the world largest orchid which can reach up to 15 feet in length. It has irregular flowering time and is widely harvested in the forest for commercial and ornamental purposes. It is also reported to have medicinal properties such as anti-inflammatory effect. Due to irregular flowering, propagation is through adventitious shoots which is really slow. Using micropropagation, in vitro conservation and production of this species is possible.

Micropropagation of this species using conventional tissue culture and temporary immersion system have been developed in FRIM. Plantlets were successfully propagated and multiplied using the systems and the technology is ready for licensing. This completed project was funded by MOSTI for a duration of two years. At the end of the project several supporting staffs have been trained to have the know-how of a new technology which uses the RITA system as temporary immersion system. A training of six months was also provided for fresh graduates under this project. The technology established under this project will be submitted for an invention disclosure and journal publication. A working paper in the form of poster presentation has also been prepared to be presented in a seminar next year. The plantlets produced through this established technology are ready for sale and a few hundred plants will be planted in FRIM campus as the iconic plant of the UNESCO Heritage Project. Findings from this project will definitely aid in the conservation of this unique endangered orchid and there is also huge potential for commercialisation.



Pucuk berbilang orkid harimau yang dihasilkan melalui sistem perendaman sementara (Sistem RITA) selepas enam minggu di dalam kultur
Multiple shoots of tiger orchid produced through temporary immersion system (RITA system) after six weeks in culture



Pengikliman anak pokok orkid harimau di rumah hijau selepas satu bulan
Acclimatisation of tiger orchid plantlets in the greenhouse after a month



Anak pokok orkid harimau yang telah tegap dipindah ke dalam pasu di tapak semaian
Hardened plantlets of tiger orchid planted into pots in the nursery



MODEL PENGHUTANAN SEMULA BEKAS LADANG GETAH, MEMORANDUM PERSEFAHAMAN ANTARA FRIM DAN UNIVERSITI TEKNOLOGI MALAYSIA (UTM)

Dalam usaha untuk membangunkan dirian hutan baharu, Jabatan Landskap, Universiti Teknologi Malaysia (UTM), Skudai memulakan kerjasama dengan FRIM pada 2011 untuk menjalankan projek jangka masa panjang dalam pemulihan dirian pokok getah tua dan hutan sekunder di dalam kampus di Skudai, Johor.

Oleh kerana kawasan tersebut dikategorikan sebagai hutan terosot, kerjasama ini merangkumi aktiviti penghutan semula dengan pengayaan dirian pokok getah tua menggunakan pokok hutan komersial termasuk spesies dipterokarpa, bukan dipterokarpa, buluh dan herba. Kerjasama ini bertujuan mendirikan 10 ha dirian hutan pelbagai spesies untuk meningkatkan kepelbagaian di samping membangunkan kawasan tersebut sebagai hutan rekreasi dan pembelajaran. Projek ini dimulakan dengan mengurangkan pokok getah dan spesies pokok sekunder menggunakan kaedah penggelangan. Penanaman bermula sejak 2012 dan secara keseluruhannya, dianggarkan 375–500 anak pokok akan ditanam secara kluster di dalam setiap hektar.

Melalui rawatan-rawatan lepas tanam yang dijadualkan, pencapaian sasaran untuk mewujudkan hutan yang dikayakan dengan pelbagai spesies semakin dekat. Usaha penghutan semula akan diteruskan sehingga 2017 dengan rawatan silvikultur seperti pembajaan, pemangkasan pepanjat, pembukaan ruang melalui penggelangan, pemangkasan dahan (jika perlu) dan pemetongan rumput-rumpai. Penubuhan hutan tropika spesies kayu keras akan memberikan banyak faedah termasuk meningkatkan kepelbagaian dalam dirian pokok getah seluas 150 ha, pemuliharaan spesies langka atau terancam secara ex-situ dan sebagai dirian pokok spesies terpilih. Kawasan yang akan ditanam itu akan dijadikan sebagai hutan rekreasi dan latihan selain menjadi pusat rujukan pembangunan hutan baharu pada masa depan.

REFORESTATION MODEL OF EX-RUBBER PLANTATION: A MEMORANDUM OF UNDERSTANDING BETWEEN FRIM AND UNIVERSITY TECHNOLOGY MALAYSIA (UTM)

In an effort to develop more new forest stands, the Landscape Department of University Technology Malaysia (UTM) and FRIM have mutually agreed to collaborate in July 2011 on a long-term reforestation project carried out in an old abandoned rubber stand and secondary forest located within the UTM campus in Skudai, Johor.

Since the areas were categorized as poor forests, the collaboration included works to reforest the areas by enriching the existing old rubber stands with commercial forest tree species which included dipterocarps, non-dipterocarps, bamboo and herbs. The collaboration aimed to establish a 10 ha mixed forest species stand for biodiversity enrichment, besides developing the area into a recreational and educational forest. Initially, existing old rubber trees and other secondary tree species were gradually removed by girdling. The first planting activities started in February 2012 and a total of approximately 375–500 seedlings ha⁻¹ will be planted in clusters.

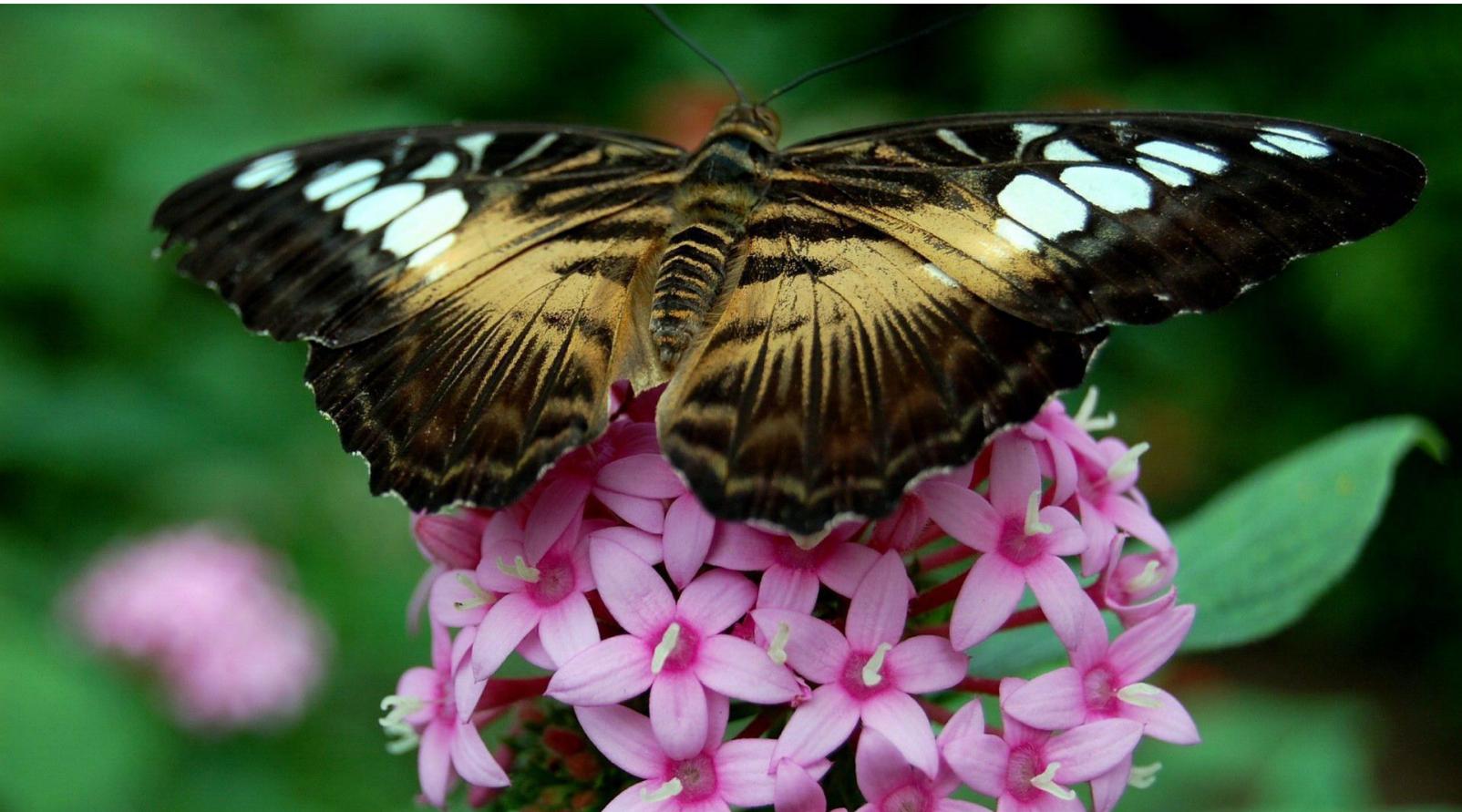
With the current scheduled post-planting treatments, the target to develop the area into new rich mixed forests is promising. The reforestation activities will continue until end of the collaborative period in 2017 with scheduled annual silvicultural treatments which included manuring cycles, regular climber cutting treatments, gap opening through tree girdling, pruning (if necessary) and removal of noxious weeds. The establishment of a mixed tropical hardwood species forest will be beneficial for enriching the biodiversity within the 150-ha area of abandoned rubber forests, for ex-situ conservation of rare or even threatened species and to become potential stands of selected forest species. The selected planting sites will be established as an educational and recreational forest site and as referral centre for the development of new forests, in the future.



Anak-anak pokok cengal (*Neobalanocarpus hemii*)
di bawah dirian pokok getah tua
Saplings of *Neobalanocarpus hemii* grown under
old rubber stand



Anak pokok meranti tembaga (*Shorea leprosula*)
Sapling of *Shorea leprosula*



BAHAGIAN BIODIVERSITI HUTAN

BUKU PANDUAN TENTANG KUPU-KUPU DI SEMENANJUNG MALAYSIA, SINGAPURA DAN THAILAND

Taksonomi kupu-kupu di Semenanjung Malaysia dan Singapura boleh dikatakan lengkap berbanding dengan kumpulan serangga yang lain, iaitu sekurang-kurangnya dua buah buku pengelasan dan taksonomi telah diterbitkan. Akan tetapi, buku-buku ini selalunya digunakan dalam pengelasan spesimen muzium sahaja dan ciri-ciri kupu-kupu yang diberikan tidak mudah dikenali di lapangan. Tambahan pula, kelakuan kupu-kupu di habitat semula jadi jarang dijelaskan dalam buku sebegini. Kupu-kupu telah menjadi fokus ekopelancongan yang sangat terkenal. Pemerhatian pada kupu-kupu dan hidupan liar yang lain menjadi kegiatan biasa kepada masyarakat, dan terdapat komuniti tempatan dan luar negara yang sangat berminat untuk melihat dan mengambil gambar kupu-kupu. Oleh kerana taksonomi kupu-kupu hampir lengkap, ia juga selalu menjadi subjek untuk dikaji seperti penilaian biodiversiti dan perubahan habitat. Oleh itu, buku panduan pengelasan di lapangan menjadi sangat penting. Buku bertajuk *A Naturalist's Guide to the Butterflies of Peninsular Malaysia, Singapore*

FOREST BIODIVERSITY DIVISION

A NATURALIST'S GUIDE TO THE BUTTERFLIES OF PENINSULAR MALAYSIA, SINGAPORE AND THAILAND

The taxonomy of butterflies in Peninsular Malaysia and Singapore is relatively well known. At least two books on their taxonomy and identification have been published. However, these books mainly target the identification of museum specimens and therefore usually use characteristics of butterflies that are not easy to see in the field. In addition, the behaviour of butterflies in the wild is hardly if at all described in books like these. Butterflies, however, have become a popular focus of ecotourism. Visits to see butterflies and other wildlife are becoming common, and there is a community of ardent butterfly watchers and photographers both locally and overseas. Butterflies, being better known taxonomically, are also often the subject of field and ecological studies such as biodiversity assessments and habitat change. Field identification of butterflies has become an important need that is not met by any available publications. The book, *A Naturalist's Guide to the Butterflies of Peninsular Malaysia, Singapore and Thailand*, was written in order to meet this need. The project was originated by John Beaufoy Publishing in the

and Thailand ditulis untuk tujuan tersebut. Projek ini berasal daripada John Beaufoy Publishing di United Kingdom sebagai salah satu buku dalam siri buku panduan, dan ia juga menjadi salah satu komponen dalam projek Kesihatan Hutan dan Pemuliharaan Spesies dalam Rancangan Malaysia ke-10. Buku ini ditulis oleh Dr Laurence G Kirton, Ketua Program Biodiversiti Fauna dan diterbitkan oleh John Beaufoy Publishing Ltd. bersama dengan FRIM. Perancangan, pemilihan spesies, penyediaan teks dan pengumpulan gambar mengambil masa dua tahun dan diterbitkan pada awal tahun 2014.

Buku panduan ini senang dibawa ke lapangan dan ia meliputi 470 spesies yang mana 280 spesies mengandungi gambar berkualiti yang disumbangkan oleh 42 orang jurugambar dari rantau ini. Ia senang dibaca dan difahami, dan menjadi pelengkap kepada buku taksonomi serantau. Bahagian pengenalan mengandungi geografi, iklim dan tumbuhan di rantau ini. Habitat, kelakuan, strategi pertahanan, kitaran hidup dan musim kupu-kupu juga dibincangkan. Buku ini juga menerangkan ciri-ciri badan kupu-kupu dan klasifikasi spesies serta tempat berpotensi untuk melihat kupu-kupu di tiga buah negara. Untuk kupu-kupu yang diberi gambar, deskripsi ciri-ciri kupu-kupu secara ringkas tapi tepat diberi, bersekali dengan taburan, subspecies, kelakuan dan habitatnya. Ciri-ciri utama yang membezakan spesies berkaitan yang tidak bergambar juga diberi. Penulis telah berusaha untuk menggunakan nama biasa asal kupu-kupu dan menukar nama yang mengandungi maksud menghina dalam zaman moden ini. Taksonomi kupu-kupu dalam buku ini adalah terkini.

Buku ini dilancarkan pada 24 April di Singapura dan berjaya menarik perhatian orang awam. Penilaian daripada ulasan pembaca, mereka sangat menghargai buku ini. Salah seorang pembaca berjaya mengecam 37 daripada 40 spesies yang diambil gambar. Buku ini tentunya akan memupuk kesedaran terhadap kupu-kupu dan penghargaan terhadap alam yang seterusnya akan mempromosi pemuliharaan di rantau ini.

United Kingdom as part of the Naturalist's Guide series, and was incorporated as part of FRIM's Tenth Malaysia Plan Project on Forest Health and Species Conservation. The book was authored by Dr Laurence G. Kirton, head of the Biodiversity of Fauna Programme of FRIM, and published by John Beaufoy Publishing Ltd in association with FRIM. Planning, species selection, preparation of the text and sourcing of photographs took less than two years, and the book was published in early 2014.

This spectacular field guide is compact and easy to carry in the field yet covers 470 butterfly species, of which 280 are illustrated in photographs of excellent quality contributed by 42 of the region's best butterfly photographers. It is easy to read and understand, and compliments other more scientific and taxonomic butterfly books in the region very well. The introductory sections cover geography, climate and vegetation in the region. Butterfly habitats, behaviour, defence strategies, life history and seasonality are also discussed. In addition, the book also describes and explains the parts of a butterfly's body and wings, the classification of species, and potential places for butterfly watching in all three countries. For each illustrated butterfly species, a brief but precise description of the features that enable identification are given, together with the distribution, subspecies occurring in the region, and the general habits and habitats of the species. Key characteristics that differentiate related species that are not illustrated are also given. A special attempt is made in the book to use the original common names of butterflies and to change or adapt these where they are derogatory in a modern context. The book is also taxonomically up-to-date.

The book was launched on 24 April 2014 in Singapore. It received great attention from the public. Judging from reviews of readers, many appreciate the book very much. One person successfully identified 37 species from the book out of a total of about 40 species photographed. The book will certainly help promote awareness of butterflies and appreciation of nature, which in turn will help promote conservation in the region.

KAWALAN BIOLOGI SERANGGA LAC DI PULAU CHRISTMAS, AUSTRALIA

Serangga lac *Tachardina aurantiaca* ialah serangga penghisap cecair pelbagai tumbuhan berkayu dan menghasilkan manisan yang menarik pelbagai jenis semut. Di Asia Tenggara, iaitu habitat asalnya, populasinya dikawal oleh musuh semula jadi. Namun, *T. aurantiaca*, sebagai perosak asing di Pulau Christmas, tanpa musuh semula jadinya, dan mutualisme dengan semut gila *Anoplolepis gracilipes*, populasinya turut meningkat apabila populasi semut meningkat. Interaksi ini mengakibatkan rangkaian kesan ekologi yang negatif seperti sesaran ketam merah endemik di Pulau Christmas. Umpan racun untuk *A. gracilipes* adalah tidak mampan secara jangka panjang untuk mengawal koloni semut. Maka, kawalan biologi dilihat sebagai penyelesaian kepada masalah semut gila, dengan mengawal serangga lac, yang merupakan sumber makanan utama semut.

Matlamat utama projek usahasama dengan La Trobe University (Australia) ini adalah untuk memperkenalkan agen kawalan biologi yang paling berkesan dan selamat bagi mengawal serangga lac dan secara tidak langsung mengawal semut gila di Pulau Christmas. Kajian biologi, ekologi, impak serangga lac dan musuh semula jadinya di Semenanjung Malaysia dan Sarawak telah dijalankan. Kajian pembiakan agen kawalan biologi secara besar-besaran sedang dilaksanakan. Projek ini akan menambahkan ilmu pengetahuan kita mengenai musuh semula jadi serangga lac di Malaysia, yang kurang diketahui. Ia juga menjadi kepentingan sejagat dalam membantu menyelesaikan masalah perosak asing ini yang mengancam ekosistem di Pulau Christmas, yang terkenal dengan migrasi tahunan ketam merah.

BIOLOGICAL CONTROL OF LAC SCALE ON CHRISTMAS ISLAND, AUSTRALIA

The lac scale *Tachardina aurantiaca* is a sap-sucking insect on various woody plants and it produces honeydew, which attracts a variety of ants. In Southeast Asia, its native habitat, its population is regulated by its natural enemies. However, *T. aurantiaca*, as an invasive species on Christmas Island, without the regulation of its natural enemies, and given the mutualism with the yellow crazy ant *Anoplolepis gracilipes*, its population has increased remarkably as the ant population increases. The interaction resulted in a series of negative ecological consequences like the displacement of the endemic red crabs on Christmas Island. Toxic baiting of *A. gracilipes* was not sustainable in the long-term suppression of ant colonies. Hence, biological control is seen as a promising solution to the yellow crazy ant problem, by controlling the lac scale, which is a main food source of the ant.

This collaboration project with La Trobe University (Australia) has the ultimate goal of introducing the most effective and safe biological control agent to control *T. aurantiaca* and indirectly control the yellow crazy ant on Christmas Island. Studies on the biology, ecology, impact of the lac scale and its natural enemies in Peninsular Malaysia and Sarawak have been completed. Studies on the mass rearing of the biological control agent are on-going. This project will add to our knowledge of the natural enemies of *T. aurantiaca* in Malaysia, which is poorly known. It will also be of international interest in helping to resolve the problem of this ecologically destructive pest on Christmas Island, which is famed for its annual migration of red crabs.



MELINDUNGI BIODIVERSITI DI GUNUNG KANTHAN

Gunung Kanthan terhasil daripada pembentukan batu kapur yang besar, terletak berhampiran dengan Bandar Chemor di sebelah utara Ipoh. Ia mengandungi beberapa puncak dengan puncak tertinggi mencecah 330 m, satu rabung yang panjang dengan tebing menegak keputihan dan galur-galur yang teduh. Sejak 1960-an, bukit-bukit di bahagian utara telah dikuari untuk pengeluaran simen.

Pada 1991, Persatuan Pencinta Alam Malaysia (MNS) yang telah mengkaji 45 buah gunung batu kapur di Perak melaporkan bahawa Gunung Kanthan sangat penting untuk perlindungan pemuliharaan berdasarkan kekayaan flora dan fauna yang dicatatkan, termasuk beberapa spesies terancam, fosil yang terpelihara dan sistem gua yang menakjubkan.

Pada Mei 2013, Gunung Kanthan menarik perhatian penyelidik FRIM apabila syarikat kuari merancang untuk meluaskan operasi perlombongan mereka ke bahagian selatan yang belum diterokai. Dr Ruth Kiew, penyelaras Projek Flora Semenanjung Malaysia dan juga daripada pasukan asal MNS yang telah menjalankan kajian batu kapur Daerah Kinta pada 1990, menjalankan kaji selidik berulang lebih setahun bertujuan menghasilkan senarai semak tumbuhan yang selengkap mungkin dan membuat spesimen herbarium sebagai rekod kekal.

Senarai semak ini mencatatkan 223 spesies tumbuhan, termasuk 12 spesies terancam dan tiga spesies baharu. Selepas kajian saintifik secara mendalam, ketiga-tiga spesies baharu telah dihurai dan diterbitkan, termasuklah *Gymnostachyum kanthanense* (Acanthaceae), *Meiogyne kanthanensis* (Annonaceae) dan *Vatica kanthanensis* (Dipterocarpaceae). Ketiga-tiga spesies baharu ini dinamakan 'kanthanensis' atau 'kanthanense' kerana hanya diketahui dari Gunung Kanthan dan tidak wujud di tempat lain di dunia ini. Penemuan tiga spesies baharu merupakan penemuan yang menggempar serta membimbangkan kerana kewujudannya yang hampir pupus disebabkan aktiviti kuari.

Tanpa keraguan, hasil kajian tumbuhan FRIM menunjukkan bahawa Gunung Kanthan mengandungi biodiversiti yang amat sensitif, bukan hanya dari segi flora tetapi juga fauna. Sebagai contoh, ia juga merupakan tempat perlindungan kepada beberapa haiwan terancam dan endemik, seperti Kanthan 'trapdoor spider' *Liphistius kanthan*, sejenis cicak yang baru ditemui *Cyrtodactylus guakanthanensis*, siput kecil *Charopa lafargei* dinamakan atas nama syarikat kuari simen yang menentukan kewujudan

PROTECTING GUNUNG KANTHAN'S BIODIVERSITY

Gunung Kanthan is a massive limestone formation, close to Chemor, north of Ipoh. It is a complex of several peaks with the highest summit reaching 330 m, a long ridge with vertical white cliffs and shaded gullies between. Since the 1960s the northern part of the complex has been quarried for cement production.

In 1991, the Malaysian Nature Society (MNS) surveyed 45 limestone hills in Perak and reported that Gunung Kanthan ranked as the most important hill for conservation protection based on its rich flora and fauna that includes several threatened species, its well-preserved fossils and spectacular cave system.

In May 2013, Gunung Kanthan came to our attention when the cement quarry company planned to extend their mining operations to the undisturbed southern part. Dr. Ruth Kiew, co-ordinator of the Flora of Peninsular Malaysia Project and who was part of the original team that conducted the MNS Kinta limestone survey in 1990, organised repeated surveys over a year aimed to compile a plant checklist as complete as possible and to make herbarium specimens to serve as a permanent record.

The checklist recorded 223 plant species including 12 endangered species and 3 species new to science. After indepth scientific investigation, the three new species have been described and published, *Gymnostachyum kanthanense* (Acanthaceae), *Meiogyne kanthanensis* (Annonaceae) and *Vatica kanthanensis* (Dipterocarpaceae). They are all named 'kanthanensis' or 'kanthanense' because they are known only from Gunung Kanthan and nowhere else in the world. The discovery of these three new species, while exciting, is also worrying because they are in danger of extinction from quarrying activities.

FRIM's plant survey shows without a doubt that Gunung Kanthan harbours extremely sensitive biodiversity, not only its flora but also its fauna. For example, it is also home to some critically endangered and endemic animals, such as the Kanthan trapdoor spider *Liphistius kanthan*, the newly discovered bent-toed gecko *Cyrtodactylus guakanthanensis*, a small snail *Charopa lafargei* named after the cement company who determine the future existence of this snail, other minute snails *Opisthostoma trapezium* and *Sinoennea chrysalis*, and the protected serow or kambing gurun, *Capricornis sumatraensis*.

The natural heritage of the Perak limestone hills is invaluable, not only as spectacular landscape features but also for their geological, biological, cultural and

masa depan siput ini, siput-siput yang sangat kecil *Opisthostoma trapezium* dan *Sinoennea kepompong*, dan kambing gurun *Capricornis sumatraensis*, yang dilindungi bawah Akta Perlindungan Hidupan Liar 1972.

Warisan semula jadi bukit batu kapur Perak adalah tidak ternilai, bukan sahaja ciri-ciri landskap yang menakjubkan tetapi juga daripada nilai geologi, biologi, kebudayaan dan pelancongan mereka. Kerajaan Perak berhasrat untuk memasarkan warisan semula jadi di negeri ini untuk meningkatkan industri pelancongan negeri, oleh itu pada 22 November 2014 Geopark Lembah Kinta dilancarkan. Geopark Lembah Kinta merangkumi tiga daerah dan 24 tempat, termasuk Gunung Kanthan. Kerajaan Perak akan memperkenalkan garis panduan baru bagi mengawal selia aktiviti pembuangan dalam kawasan terlibat supaya Geopark Lembah Kinta akan mendapatkan pengiktirafan antarabangsa. Kami amat menyokong usaha Kerajaan Perak untuk melindungi warisan semulajadi berada di Kinta Valley Geopark yang tidak dapat diganti, kerana pada masa ini tiada mana-mana gunung batu kapur yang mempunyai perlindungan undang-undang.

tourist values. The Perak Government aims to market the state's natural heritage to improve tourism and, on 22 November 2014, the Kinta Valley Geopark was launched. It encompasses three districts and 24 localities, including Gunung Kanthan. The Perak Government will introduce new guidelines to regulate activities and aims that the Geopark will obtain international recognition. We strongly support the Perak Government's efforts to protect the Kinta Valley irreplaceable natural heritage, because at present none of the limestone hills has legal protection.

Spesies Terancam di Gunung Kanthan¹/Endangered Species at Gunung Kanthan¹

Spesies/Species	Kategori Terancam/Threatened Category	Kriteria/Criteria
<i>Gymnostachyum kanthanense</i>	Critically Endangered	CR B2ab(iii, iv),D1
<i>Meiogyne kanthanensis</i>	Critically Endangered	CR B2ab(iii, iv),D1
<i>Vatica kanthanensis</i>	Critically Endangered	CR B2ab(iii, iv),D1
<i>Paraboea vulpina</i>	Critically Endangered	CR B2ab(iii)
<i>Actinostachys inopinata</i>	Endangered	EN B1ab(iii)
<i>Corybas calcicola</i>	Endangered	EN B2ab(iii)
<i>Cycas clivicola</i>	Endangered	EN A4cd
<i>Kibatalia laurifolia</i>	Endangered	EN B2ab(iii)
<i>Nephrolepis abrupta</i>	Endangered	B2ab(iii)
<i>Paraboea capitata</i> var. <i>capitata</i>	Endangered	EN B2ab(iii)
<i>Paraboea paniculata</i>	Endangered	EN B2ab(iii)
<i>Microchirita sericea</i>	Vulnerable	VUB1ab(iii)

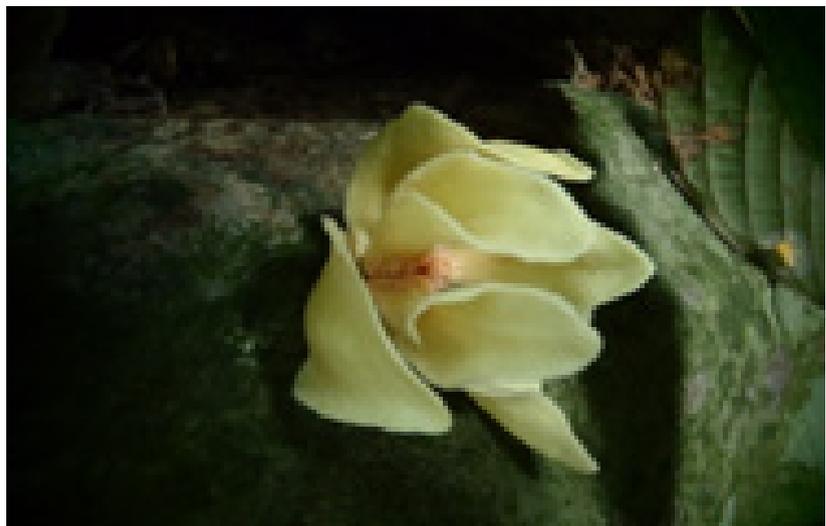
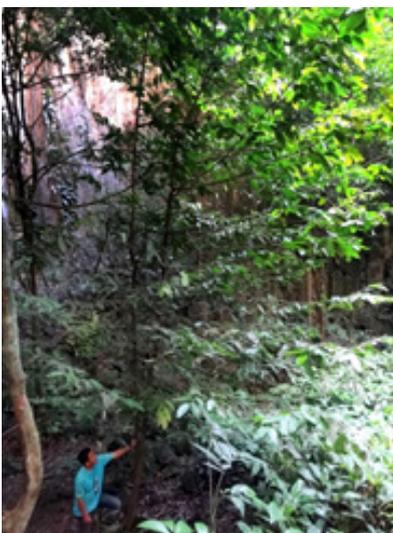
¹IUCN 3.1 Kategori (IUCN, 2012)/¹IUCN 3.1 Categories (IUCN, 2012)



Bahagian utara kuari Kanthan dari udara
Aerial view of Kanthan quarry at the northern end



Gymnostachyum kanthanense Kiew, spesies yang baru diperihalkan dan endemik di Gunung Kanthan
Gymnostachyum kanthanense Kiew, the newly describe species and endemic to Gunung Kanthan



Meiogyne kanthanensis Ummul-Nazrah & J.P.C. Tan, daripada famili durian belanda dengan bunga beraroma buah-buahan seakan-akan limau bali, citrus, laici, plum dan serai
Meiogyne kanthanensis Ummul-Nazrah & J.P.C.Tan, belongs to the soursop family with flowers with a fruity aroma reminiscent of pomelo, citrus, lychee, plum and lemon grass



Vatica kanthanensis Saw, pokok bersaiz sederhana yang boleh mencapai ketinggian sehingga 15–20 m
 Medium-sized tree *Vatica kanthanensis* Saw can grow up to 15–20 m tall



Corybas calcicola, sejenis spesies orkid terancam, merupakan catatan baharu bagi Perak dan Gunung Kanthan/
Corybas calcicola an endangered orchid species is a new record for Perak and Gunung Kanthan

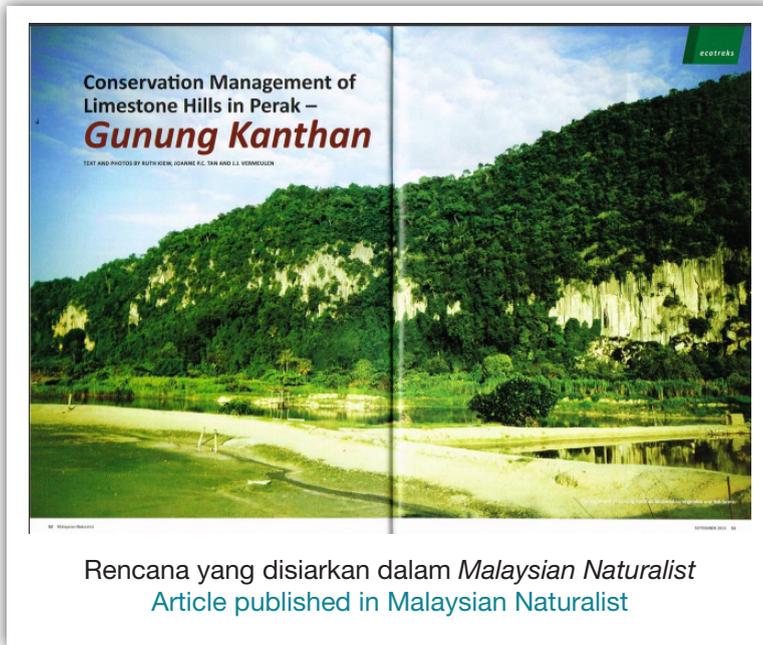


Dr Saw Leng Guan dan pembantu herbarium, Angan Atan mendaki permukaan berbatu yang curam di Gunung Kanthan/
 Dr Saw Leng Guan and herbarium assistant Angan Atan climbing up a steep rock face at Gunung Kanthan

Kajian tumbuhan di Gunung Kanthan memerlukan kerja sepasukan/
 Plant survey in Gunung Kanthan requires team work



Penerbitan/Publications



Laporan berita oleh media/News report by media

極危待搶救

馬六甲自然歷史學會最近對馬六甲州峇株巴轄區內之石灰岩山嶺進行研究，發現該區內之石灰岩山嶺正處於「極危」狀態。該區內之石灰岩山嶺，由於受到地質學家、地質學家及地質學家之研究，發現該區內之石灰岩山嶺正處於「極危」狀態。該區內之石灰岩山嶺，由於受到地質學家、地質學家及地質學家之研究，發現該區內之石灰岩山嶺正處於「極危」狀態。

'Do not wipe out Gunung Kanthan'

BY ISABELLE LAI

FACEBOOK TWITTER GOOGLE+ LINKEDIN

Off limits: A signage erected by Lafarge Malaysian Cement at Gunung Kanthan in Ipoh.

IPOH: Environmentalists are urging Lafarge Malaysia Berhad to mine for limestone underground instead of extending its quarrying activities to the remaining untouched parts of the 400-million-year-old Gunung Kanthan.

Malaysian Nature Society (MNS) president Prof Dr Maketab Mohamad said the company, which is a subsidiary of construction materials manufacturing giant Lafarge Group, should invest in technology to do underground mining in Ipoh.

Laporan oleh Sin Chew Daily dan The Star
 News report by Sin Chew Daily and The Star



BAHAGIAN PERANCANGAN PENYELIDIKAN

PENGETAHUAN TRADISI: MENARIK MINAT KHALAYAK TEMPATAN DAN ANTARABANGSA

Tahun ini menyaksikan peningkatan dalam R&D&C terhadap pengetahuan tradisi (PT) berkaitan kepelbagaian biologi. Dalam usaha pendokumentasian PT dalam kalangan Orang Asli, projek telah disambung dengan penambahan dua lagi komuniti iaitu Kintak di Perak dan Kensiu di Kedah. Pendokumentasian PT secara komprehensif berjaya menarik perhatian negara dan dunia.

Pada pertengahan 2013, Kementerian Pertanian dan Industri Asas Tani meluluskan pembiayaan sebanyak RM3.6 juta kepada Pasukan Penyelidik PT bersama-sama dengan agensi lain untuk mendokumen PT Orang Melayu berkaitan tumbuhan ubatan di Semenanjung Malaysia. Selaku penerima Anugerah Sains dan Teknologi Bank Pembangunan Islam 2012, bank tersebut membiayai sebanyak US\$30 000 kepada Pasukan PT untuk memberi latihan kepada penyelidik di Brunei Darussalam pada 2013–2014

RESEARCH PLANNING DIVISION

TRADITIONAL KNOWLEDGE: ATTRACTING NATIONAL AND INTERNATIONAL INTEREST

The year witnessed further enhancement in R&D&C of the traditional knowledge (TK) related biodiversity. For the documentation of TK among Orang Asli, the project continued with two additional communities, namely the Kintak in Perak and Kensiu in Kedah. This comprehensive TK documentation has attracted national and world attention.

In mid-2013, the Ministry of Agriculture and Agro-Based Industries approved funding amounting to RM3.6 million for FRIM's TK team, together with other agencies, to document the Malay TK on medicinal plants in Peninsular Malaysia. As a winner of 2012 Islamic Development Bank's Science and Technology Prize, with funding US\$30 000 from the bank, FRIM's TK team provides training (2013–2014) to the researchers in Brunei Darussalam in a project entitled "Capacity Building on Documentation of TK on Medicinal Plants in Brunei Darussalam".

menerusi satu projek yang bertajuk “Pembangunan Kapasiti dalam Pendokumentasian PT Tumbuhan Ubatan di Brunei Darussalam”.

Bermula pada Julai 2014 di bawah projek bertajuk “Membangun dan Melaksana Rangka Kerja Kebangsaan Berkaitan Capaian dan Perkongsian Faedah di Malaysia” pihak Program Pembangunan Bangsa-bangsa Bersatu memberi peruntukan berjumlah US\$533 000 untuk menyokong usaha pendokumentasian PT dan pembangunan produk prototaip dalam kalangan tiga komuniti Orang Asli di Semenanjung Malaysia. Tugasan FRIM melibatkan perjanjian berkaitan capaian dan perkongsian faedah, proses persetujuan memberi kebenaran dan protokol komuniti berkaitan dengan capaian dan perkongsian faedah bagi PT Orang Asli dan penduduk tempatan.

Commencing July 2014 under a project entitled “Developing and Implementing a National Access and Benefit Sharing Framework in Malaysia”, the United Nations Development Programme has provided finance (US\$533 000) to support the TK documentation and prototype product development project among three Orang Asli communities in Peninsular Malaysia. FRIM’s tasks involve the demonstration of pilot ABS agreements, Prior Informed Consent (PIC) processes and PIC/ community protocol regarding ABS of indigenous and local communities’ TK.



◀ Pasukan PT FRIM bersama-sama penyelidik Brunei Darussalam
FRIM TK team with researchers from Brunei Darussalam



◀ Aktiviti pendokumentasian tumbuhan oleh Orang Asli yang dibantu Pasukan PT FRIM
Plants documentation activity by Orang Asli guided by FRIM TK Team



◀ Survei mengenai tumbuhan ubatan yang digunakan oleh pengamal perubatan Melayu
Survey on medicinal plants used by Malay traditional practitioners

RANTAIAN NILAI INDUSTRI HERBA TEPILIH DI SEMENANJUNG MALAYSIA

Industri herba telah dikenal pasti sebagai salah satu pemacu kegiatan ekonomi yang berpotensi memberi sumbangan penting kepada pertumbuhan ekonomi Malaysia bagi mencapai status negara maju menjelang tahun 2020 di bawah Program Transformasi Ekonomi (ETP). Sehingga kini, maklumat berkaitan industri herba kurang diselaras dan dikoordinasi. Malah, sehingga kini masih tiada satu pangkalan data yang mengandungi maklumat komprehensif industri herba.

Bagi memenuhi aspirasi ini, kajian berkaitan rantaian nilai industri herba dilihat penting untuk memenuhi keperluan permintaan dan penawaran. Rantaian nilai industri herba merangkumi enam komponen iaitu penanam herba, pengusaha kecil, pengeluar produk herba, pemborong, peruncit dan pengguna. Dua kajian komponen berkaitan rantaian nilai telah dijalankan oleh FRIM iaitu kaji selidik penanam pada 2011 hingga 2012 dan diikuti kajian pengguna pada 2013.

Kajian ini juga telah menghasilkan beberapa penerbitan iaitu sebuah buku bertajuk '*Herbal Cultivation for Wealth Creation in Peninsular Malaysia*', tiga kertas kerja saintifik diterbitkan, satu laporan insituti, dan satu kertas kerja dibentangkan semasa 15th meeting of the ASEAN Expert Group of Herbal and Medicinal plant pada 25 hingga 26 Jun 2012 di Hanoi, Vietnam.

Rentetan daripada inisiatif yang dijalankan oleh FRIM, Mesyuarat Jawatankuasa Pemandu NKEA Pertanian (SC-NKEA) Bil.4/2014 meluluskan peruntukan sebanyak RM1.961 juta di bawah projek khas NRGs bagi melengkapkan kajian rantaian nilai yang telah dijalankan. Aktiviti utama kajian termasuk menjalankan bancian penanam, pengusaha/pengeluar, pemborong dan peruncit produk berasaskan herba, dan seterusnya membangunkan pangkalan data. Objektif utama kajian ini adalah untuk membangunkan pangkalan data industri herba di peringkat hulu dan hiliran, mengenal pasti permintaan dan penawaran bahan mentah dan hasilan produk herba, mengenal pasti jurang dalam landskap industri herba serta mengenal pasti isu dan cabaran dalam industri herba.

Salah satu keberhasilan kajian ialah termetrainya perjanjian antara FRIM dan syarikat herba untuk penghasilan produk herba. Kumpulan kajian juga berperanan sebagai duta R&D herba FRIM dalam meluaskan lagi rangkaian hubungan serta memupuk kesedaran masyarakat mengenai kepentingan herba sekaligus menggalakkan perkembangan industri tersebut.

VALUE CHAIN OF HERBAL INDUSTRY IN PENINSULAR MALAYSIA

The herbal industry has been identified as one of the economic drivers that could potentially make a significant contribution to the economic growth of Malaysia to achieve the status of a developed country by the year 2020 under the Economic Transformation Programme (ETP). To date, information on the herbal industry is scattered. There is yet to be a single database containing comprehensive information.

To further develop the herbal industry, studies related to the herbal industry value chain is very important and it includes the aspect of demand and supply. Value chain of herbal industry includes herbal cultivators, small processors, manufacturers of herbal products, wholesalers, retailers and consumers. Two studies on related actors in the value chain were conducted by FRIM in 2011–2012, namely survey on herbal cultivators and study on consumer preferences in 2013.

Several outputs were produced from this project and these included a book entitled '*Herbal Cultivation for Wealth Creation in Peninsular Malaysia*', three scientific papers, and one institution report. One paper was also presented during the 15th meeting of the ASEAN Expert Group of Herbal and Medicinal plant on 25–26 June 2012 in Hanoi, Vietnam.

The initiatives undertaken by FRIM attracted the interest of the Agriculture NKEA Steering Committee Meeting (SC - NKEA) No.4/2014 which approved an allocation of RM1.961 million under a special NRGs project to complete the herbal value chain study. The main activities include conducting a census of cultivators, producers/manufacturers, wholesalers and retailers of herbal based products, and further enhance the comprehensive database. The main objectives of this study are to develop a database of the herbal industry in upstream and downstream, identify the demand and supply of raw materials and products of herbal products, identify gaps in the herbal industry landscape, and to identify issues and challenges in the herbal industry.

Outcomes for the 2014 study include an agreement between FRIM and a herbal company for the production of herbal products. Besides, the study team also acts as an ambassador for FRIM's R&D on herbs to enhance networking, foster public awareness about the importance of herbs and encourage development of the herbal industry.



Perasmian pejabat operasi projek oleh TKP(O) FRIM pada 25 Ogos 2014
The opening ceremony of the operation office
of the project on 25 August 2014



Latihan kepada kumpulan kajian berkaitan pengecaman herba
Training for the research team on herbal identification



Latihan kepada kumpulan kajian berkaitan penggunaan GPS
Training for the research team on GPS application



Latihan kepada kumpulan kajian berkaitan penanaman, pemprosesan dan industri herba/Training for the research team on herbal cultivation, processing and herbal industry



PENGURUSAN PENYELIDIKAN DAN PEMBANGUNAN MANAGEMENT OF RESEARCH AND DEVELOPMENT

PROJEK R&D YANG DILULUSKAN PADA 2014 APPROVED R&D PROJECTS IN 2014

BIL. NO.	TAJUK PROJEK & PENAJA PROJECT TITLE & FUNDER	KETUA PROJEK PROJECT LEADER	DANA FUND (RM)
1	Isolation and Modification of Polygalacturonic Acid from <i>Morinda citrifolia</i> (Mengkudu) and Its Potential as Oral Insulin-Mimetic Agent (RPP)	Abd. Rashid Li	20,000
2	Biochemical and Histopathological Evaluations of Ovarian Cancer Xenografts in Balb/C Nude Mice Treated with Anticancer Compound EI50 from <i>Eurycoma longifolia</i> (RPP)	Alia Aina Hj. Anuar	20,000
3	Tree Stands for Seed Production (RPP)	Noraliza Alias	20,000
4	Production of Cellulose Acetate from the Residual Waste of Fruits of <i>Averrhoa carambola</i> (RPP)	Nur Zalikha Mohd Taza	20,000
5	Enhancement of the Birdwings Population in FRIM by Planting Their Host and Nectar Plants (RPP)	Phon Chooi Khim	20,000
6	Screening of Local White Rot Fungi for High Yield Cellulose Enzyme Production (RPP)	Rafidah Jalil	20,000
7	Ex-Mining Timbers as an Alternative to Forestry Timbers (RPP)	Dr Roszaini Kadir	100,000
8	Water Bodies and Land Use Change of FRIM (RPP)	Dr Saiful Iskandar Khalit	20,000
9	Oxidation Stability of Biodiesel (B100) from Grease Waste (RPP)	Shaharuddin Hashim	20,000
10	Assessment of Environmental Education Components in FRIM's Guided Nature Walks (RPP)	Sharmillah Saleh	20,000
11	Assessment of Litter and Soil Carbon Stocks in the Natural Heritage Site of FRIM (RPP)	V Jeyanny	20,000
12	Wastewater Treatment System for Biodiesel Pilot Plant (RPP)	Dr Wan Asma Ibrahim	30,000
13	Extraction of Nanocrystalline Cellulose from Local Forest Pioneer Species using Microbial Hydrolysis Assisted Shear Process (MOSTI)	Dr Sharmiza Adnan	227,000
14	DNA Barcoding of 100 Common Medicinal Plants in Malaysia for Species Authentication (MOSTI)	Dr Tnah Lee Hong	255,000
15	Development of High Strength Green Nanocomposites Reinforced with Nanocrystalline Cellulose and Epoxy Resin Polymer (MOSTI)	Dr Zaihan Jalaludin	231,000
16	Hybrid Drying Processes for Refractory Hardwoods to Improve Drying Quality (MOSTI)	Zairul Amin Rabidin	161,500
17	Development of Mycoinsecticide Using <i>Metarhazium anisopliae</i> Obtained from Natural Forest Against the Destructive Tiger Moth (<i>Atteva sciodoxa</i>) Larvae (NRGS)	Dr Mohd Farid Ahmad	286,000
18	Kajian Rantaian dan Nilai Industri Herba Terpilih di Semenanjung Malaysia (NRGS)	Rohana Abd Rahman	1,961,000
19	Developing and Implementing a National Access and Benefit Sharing Framework in Malaysia (GOM-GEF/UNDP) (OTHERS)	Dr Fadzureena Jamaludin	1,500,000
20	Kajian bagi Mereka Bentuk dan Membina Rumah Moden daripada Bahan Lestari Buluh (OTHERS)	Dr Mohamad Omar Mohamad Khaidzir	50,000

BIL. NO.	TAJUK PROJEK & PENAJA PROJECT TITLE & FUNDER	KETUA PROJEK PROJECT LEADER	DANA FUND (RM)
21	Penanaman Pokok di Tasik Bera (OTHERS)	Dr Abd Rahman Kassim	200,000
22	Penanaman Pokok di Tasik Chini (OTHERS)	Dr Abd Rahman Kassim	200,000
23	Kajian dan Kerja-Kerja Pemuliharaan Kolam Ikan di FRIM, Kepong (OTHERS)	Dr Abd Rahman Kassim	300,000
24	Projek Pemuliharaan Tasik Chini Sebagai Warisan Alam dan Rizab Biosfera Malaysia (OTHERS)	Dr Abd Rahman Kassim	510,000
25	Kerja Penanaman Pokok Hutan dan Menaik Taraf Landskap di Paya Indah Wetland (PIW), Dengkil, Selangor (OTHERS)	Adnan Mohammad	400,000
26	Projek Cameron Highlands Montane Park (Chimp): Ke Arah Penubuhan Stesen Penyelidikan FRIM (SPF) Cameron Highlands sebagai Pusat Penyelidikan dan Pemuliharaan Biodiversiti Kawasan Tanah Tinggi Semenanjung Malaysia (OTHERS)	Noorsiha Ayop	600,000
27	Penambahbaikan Hutan Mini 'NRE IN THE FOREST' (OTHERS)	Ahmad Azaruddin Mohd Noor	200,000
28	Penanaman Buluh untuk Makanan Giant Panda (OTHERS)	Abd Razak Othman	100,000
29	Peningkatan R&D dalam Tumbuhan Ubatan & Beraroma Secara Holistik untuk Pemantapan Industri Herba Negara (RMK 10)	Dr Rasadah Mat Ali	2,600,000
30	Penggunaan Sumber BioD bagi Menjana Kekayaan Baru Negara melalui Pendekatan Bioteknologi (RMK 10)	Dr Norwati Muhammad	2,400,000
31	Pengenalpastian Agen Terapeutik Berpotensi daripada Sumber Biologi ke Arah Pembangunan Biofarmaseutikal (RMK 10)	Dr Getha Krisnasamy	950,000
32	Projek Kesihatan Hutan, Pemantapan dan Pemuliharaan (RMK 10)	Dr Lee Su See	350,000
33	Pengurusan dan Pembangunan Sumber Hutan Secara Lestari Melalui Input R&D (RMK 10)	Dr Ismail Harun	2,375,000
34	Projek Mengarusperdanakan Penggunaan Sesenduk FRIM FRIMSRP001 dan Mahang dalam Penghasilan Produk Nilai Tambah bagi Menjamin Kemampanan Industri Perakayuan Negara (RMK 10)	Dr Mastura Mohtar	300,000
35	Dokumentasi & Inventori Flora Malaysia (RMK 10)	Dr Saw Leng Guan/ Dr Richard Chung Cheng Kong	1,300,000
36	Kajian Mengoptimumkan Penggunaan Sumber Hutan (RMK 10)	Dr Rahim Sudin	2,300,000
37	Program Analisis Strategik dan Ekonomi dalam Sektor Perhutanan (RMK 10)	Dr Ismariah Ahmad	850,000
38	Bancian dan Analisis Landskap Keperluan Tree Doctoring PBT Malaysia (RMK 10)	Dr Nor Azlin Yahya	100,000
JUMLAH BESAR/GRAND TOTAL			21,036,500



Mesyuarat Penyelidikan FRIM/FRIM Research Meeting

BIL. NO.	PROJEK R&D YANG TAMAT DAN KEBERHASILAN COMPLETED R&D PROJECTS AND OUTCOMES
1	<p>Tajuk/Title: The Effect of Accelerated Exposure against Fibreboard from <i>Acacia</i> Hybrid</p> <p>Ketua projek/Project leader: Dr Suffian Misran</p> <p>Dana/Fund: RPP (MFRDB)—RM20,000</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Sifat-sifat papan gentian daripada hibrid <i>Acacia</i> yang dipengaruhi oleh keadaan basah telah ditentukan • Keberkesanan rawatan ke atas papan gentian daripada hibrid <i>Acacia</i> dijumlahkan • Properties of <i>Acacia</i> hybrid fibreboard influenced by wet condition were determined. • Effectiveness of treatments to <i>Acacia</i> hybrid fibreboard were quantified.
2	<p>Tajuk/Title: Product Performance Test of <i>Tinospora crisper</i> at Different Dosage</p> <p>Ketua projek/Project leader: Noor Rasyila Mohamed</p> <p>Dana/Fund: RPP (MFRDB)—RM20,000</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Dua rumusan kapsul (rumusan untuk kapsul saiz 1; FTC1 dan rumusan untuk kapsul saiz 2; FTC2) mengandungi 200 mg pati <i>T. crisper</i> yang disokong dengan kajian IPQC/kajian ujian performans bagi dosej yang berbeza diperolehi. • Penentuan kepekatan sebatian bioaktif di dalam pati tulen kapsul 200 mg • Masa pelarutan bagi dua kapsul <i>T. crisper</i> yang berbeza saiz telah dinilai • Two types of capsules formula (formula for capsule size 1; FTC1 and formula for capsule size 2; FTC2) containing 200 mg <i>T. crisper</i> extract supported with IPQC study/ performance tests study for different dosage were obtained. • Determining the concentration of bioactive compound in 200 mg pure extract capsules. • The dissolution time for two different capsules size <i>T. crisper</i> were evaluated.
3	<p>Tajuk/Title: A Computerised Wood Identification Method to Expedite the Identification of Lesser Known Timber Species</p> <p>Ketua projek/Project leader: Nordahlia Abdullah Siam</p> <p>Dana/Fund: RPP (MFRDB)—RM20,000</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Menambah pangkalan data dengan maklumat yang sedia ada mengenai pengecaman kayu bagi spesies kayu dagang terpilih • Menyediakan rujukan dan maklumat secara dalam talian tentang kayu dagang kepada saintis dan industri • Enhanced the database with already established information on wood identification for selected commercial wood species. • Providing online references and information on commercial timber to scientists and also the industry.

BIL. NO.	PROJEK R&D YANG TAMAT DAN KEBERHASILAN COMPLETED R&D PROJECTS AND OUTCOMES
4	<p>Tajuk/Title: Analysis of Wood Extractives as an Innovative Green Preservative Ketua projek/Project leader: Dr Roszaini Kadir Dana/Fund: RPP (MFRDB)—RM20,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> Bahan pengawet kayu tidak toksik daripada sumber tumbuhan Non-toxic wood preservative from plants source
5	<p>Tajuk/Title: Development of Malaysian Standard for Mechanical Testing of Timber Scaffold Plank Ketua projek/Project leader: Mohd Jamil Abd. Wahab Dana/Fund: RPP (MFRDB)—RM20,000</p> <ul style="list-style-type: none"> Menentukan ketegaran dan kekuatan kayu Malaysia mengikut kaedah ujian AS 1577 Determining the stiffness and strength of Malaysian timber according to AS 1577 test method
6	<p>Tajuk/Title: Pharmacokinetic Study of Borapetoside B, Borapetoside C and Syringin from <i>Tinospora crispa</i> Aqueous Extract in Rat Ketua projek/Project leader: Mohd Kamal Nik Hasan Dana/Fund: RPP (MFRDB)—RM20,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> Data farmakokinetik bagi Borapetosida B, Borapetosida C & Siringin. Ini merupakan kajian farmakokinetik pertama yang dijalankan terhadap Borapetosida B, Borapetosida C Data farmakokinetik yang berguna untuk rumusan dan dos herba Penyediaan prosedur operasi standard (SOP) bagi kajian farmakokinetik yang dapat digunakan untuk sampel lain Kaedah baharu bagi penentuan sebatian bioaktif dalam pati herba Pharmacokinetic data for Borapetoside B, Borapetoside C & Syringin. This is the first pharmacokinetic study being done on Borapetoside B and Borapetoside C. Useful pharmacokinetic data for herb formulation and dosing The writing of the pharmacokinetic study SOP which can be used to the other sample for pharmacokinetic study. New method for determination of bioactive compound in herb's extract
7	<p>Tajuk/Title: Evaluation of Prepm as Plant Based Preservative Develop from <i>Piper muricatum</i> Ketua projek/Project leader: Norul Aiman Yusoff Dana/Fund: RPP (MFRDB)— RM15,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> Bahan pengawet makanan dan kosmetik daripada sumber tumbuhan Food & cosmetic preservative from plants source
8	<p>Tajuk/Title: Assessment of Forest Floor Carbon Stocks in Tropical Montane Forest for Carbon Stock Mapping Ketua projek/Project leader: V. Jeyanny Dana/Fund: RPP (MFRDB)—RM15 000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> Peta kepelbagaian ruang tanah dan stok karbon lantai hutan menggunakan model geostatistik diunjurkan Kadar penguraian sarap dan lantai hutan bagi hutan gunung tropika diramalkan Maklumat tambahan tentang strategi pemuliharaan karbon di hutan gunung tropika bagi pengurus hutan diperoleh Spatial variability maps of soil and forest floor C stocks projected using geo-statistical model Litter and forest floor decomposition rates for tropical montane forest predicted Additional information for forest managers on C conservation strategies in tropical montane forest
9	<p>Tajuk/Title: The CAP-e Assay: Testing Antioxidant Bioavailability at the Cellular Level of Natural Products Ketua projek/Project leader: Dr Vimala Subramaniam Dana/Fund: RPP (MFRDB)— RM20,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> Asai CAP-e dibangunkan untuk ujian keupayaan antioksidan pada tahap selular CAP-e assay established for antioxidant capacity testing at cellular level

BIL. NO.	PROJEK R&D YANG TAMAT DAN KEBERHASILAN COMPLETED R&D PROJECTS AND OUTCOMES
10	<p>Tajuk/Title: Development of an Assay to Assess the Toxic Effects of Extracts/Compounds from Medicinal and Aromatic Plants in Response to Light Exposure Ketua projek/Project leader: Dr Mary Khoo Gaik Hong Dana/Fund: RPP (MFRDB) – RM20,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Satu asai baharu dibangunkan di FRIM • A new assay established in FRIM
11	<p>Tajuk/Title: Documentation on Essentials Oils Collection of Selected Aromatic Plants from FRIM Campus Ketua projek/Project leader: Mailina Jamil Dana/Fund: RPP (MFRDB) – RM20,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Peningkatan bilangan minyak pati di Perpustakaan Minyak Pati di PPH • Increment of the number of essential oils in PPH's Essential Oil Library
12	<p>Tajuk/Title: Antidiabetic Effects of <i>Phyllanthus pulcher</i> against Carbohydrate Metabolizing Enzymes Ketua projek/Project leader: Mohd Jemain Mohamad Ridhwan Dana/Fund: RPP (MFRDB) – RM20,000</p>
13	<p>Tajuk/Title: Development of Botanical Herbal Mix Beverage from <i>Aquilaria malaccensis</i> Leaves Standardised Extract Ketua projek/Project leader: Siti Humeirah Abd Ghani Dana/Fund: RPP (MFRDB) – RM20,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Teh karas yang boleh dijadikan piawai • Karas tea that can be standardised
14	<p>Tajuk/Title: Elucidation on the Mechanisms and Therapeutic Target(s) of Cardiac Glycoside Compound (SNA209) from <i>Cerbera odollam</i> in Ovarian Cancer for Discovering its Potential as Anti-Cancer Drug Candidate (MOSTI) Ketua projek/Project leader: Dr Nurhanan Murni Yunos Dana/Fund: ScienceFund (MOSTI) – RM277,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Sebatian SNA209 sebagai calon ubatan anti kanser • SNA209 compound as medicinal candidate for anti-cancer
15	<p>Tajuk/Title: Development of Strategies and Techniques to Control the Asian Subterranean Termite <i>Coptotermes gestroi</i> Wassman in Urban Settlements Ketua projek/Project leader: Dr Shawn Cheng Dana/Fund: ScienceFund (MOSTI) – RM218,450 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Perkhidmatan pengecapjarian DNA koloni anai-anai dalam kawalan anai-anai • DNA fingerprinting service for termites colony in the control of termites
16	<p>Tajuk/Title: Effective Pre-Treatment Process to Eliminate Wet Pockets in Conventional Drying of Acacia Ketua projek/Project leader: Dr Gan Kee Seng Dana/Fund: ScienceFund (MOSTI) – RM169,640 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Kaedah pengeringan kayu Akasia menggunakan gelombang mikro • Acacia wood drying method using microwave
17	<p>Tajuk/Title: Development of Corrugated Particleboard (CPB) as a New Innovative Product for Structural Application Ketua projek/Project leader: Mohd Yusouf Abdul Latif Dana/Fund: ScienceFund (MOSTI) – RM22,6000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Produk papan serpai • Chipboard product

BIL. NO.	PROJEK R&D YANG TAMAT DAN KEBERHASILAN COMPLETED R&D PROJECTS AND OUTCOMES
18	<p>Tajuk/Title: Large Scale Production of <i>Grammatophyllum speciosum</i> Blume (Tiger Orchid) Using Temporary Immersion Bioreactor System</p> <p>Ketua projek/Project leader: Haliza Ismail</p> <p>Dana/Fund: ScienceFund (MOSTI) – RM125,880</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Kaedah perambatan orkid harimau secara besar-besaran menggunakan bioreactor • Mass propagation method for tiger orchid using bioreactor
19	<p>Tajuk/Title: Development of Multi-Purpose Measurement Device and System for Forest Inventory and Mapping</p> <p>Ketua projek/Project leader: Dr Ismail Harun</p> <p>Dana/Fund: ScienceFund (MOSTI) – RM147,000</p>
20	<p>Tajuk/Title: Exploitation of Industrial Bio-Residues for the Production of Nano-Sized Cellulose Materials</p> <p>Ketua projek/Project leader: Dr Rafeadah Rusli</p> <p>Dana/Fund: ScienceFund (MOSTI) – RM230 000</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • selulosa nanohablur daripada bioresidu dihasilkan • sifat-sifat selulosa nanohablur daripada bioresidu dihasilkan • Pemerosesan/teknik dalam mengoptimumkan pengasingan selulosa nanohablur daripada bioresidu industri dibangunkan • Cellulose nanocrystal produced from bio-residues • Characteristics of cellulose nanocrystal produced from bio-residues • Processing/technique in optising the isolation of cellulose nanocrystal from the industrial bio-residues were developed
21	<p>Tajuk/Title: Projek Kajian Ketahanan Kayu Malaysia Berdasarkan Keperluan Standard Eropah (LEVY)</p> <p>Ketua projek/Project leader: Dr Rahim Sudin</p> <p>Dana/Fund: Levy (MPIC) – RM1,426,109</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • 22 spesies kayu komersial Malaysia berjaya diperolehi dan dijalankan ujian
22	<p>Tajuk/Title: Forest Cover and Carbon Mapping in The Greater Mekong Sub Region and Malaysia (OTHERS)</p> <p>Ketua projek/Project leader: Dr Khali Aziz Hamzah</p> <p>Dana/Fund: ScienceFund (MOSTI) – RM496,640</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Maklumat tentang status kawasan hutan untuk Jabatan Hutan disediakan • Information on the status of forest areas for Forest Department provided
23	<p>Tajuk/Title: Identification and Production of Elite Planting Materials of <i>Labisia pumila</i> (Kacip Fatimah) for Sustainable Supply</p> <p>Ketua projek/Project leader: Dr Farah Fazwa Md Ariff</p> <p>Dana/Fund: (NRGS) – RM233,000</p> <p>Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Klon terpilih kacip fatimah untuk penanaman • Selected kacip fatimah clone for planting

BIL. NO.	PROJEK R&D YANG TAMAT DAN KEBERHASILAN COMPLETED R&D PROJECTS AND OUTCOMES
24	<p>Tajuk/Title: Multi-Locational Assessment and Agro-Ecological Requirements of <i>Eurycoma longifolia</i> Across the Climatic Boundaries in Peninsular Malaysia (NRGS) Ketua projek/Project leader: Dr Wan Rasidah W Ab Kadir Dana/Fund: (NRGS) – RM308,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Penambahbaikan protokol amalan agronomi bagi penanaman <i>E. longifolia</i> • Suai padan spesies-tapak bagi protokol/panduan amalan agronomi baik untuk <i>E. longifolia</i> berprestasi tinggi • Improvement of agronomic practices protocols for planting <i>E. longifolia</i> • Species-site matching of high yield <i>E. longifolia</i> good agronomic practices protocols/manual for <i>E. longifolia</i>
25	<p>Tajuk/Title: Assessment on the Virulent Strains of Entomopathogenic Fungi Obtained from Natural Forest with Potential for Control of the Economically Important Insect Pests of Tongkat Ali Ketua projek/Project leader: Dr Mohd Farid Ahmad Dana/Fund: (NRGS) – RM250,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Produk pembunuh serangga perosak secara biologi • Biologically pest killer product
26	<p>Tajuk/Title: Provenance Trial of <i>Eurycoma longifolia</i> Ketua projek/Project leader: Dr Mohd Zaki Abdullah Dana/Fund: (NRGS) – RM250,000 Keberhasilan/Outcomes:</p> <ul style="list-style-type: none"> • Bahan tanaman dari 27 kawasan hutan simpan di seluruh Semenanjung Malaysia diperoleh • Dua dirian sumber provenans di SPF Mata Ayer dan SPF Maran dibangunkan • Empat petak percubaan pelbagai lokasi ditubuhkan di SPF Mata Ayer, SPF Jeli, SPF Maran & UTM Skudai • Provenans yang berpotensi dengan kandungan fitokimia tertinggi C polisakarida dan eurycomanone dikenal pasti • Satu artikel jurnal, satu prosiding, dua kertas kerja dan dua poster diterbitkan • Planting materials from 27 forest reserve areas throughout Peninsular Malaysia • Two provenance resource stands at SPF Mata Ayer and SPF Maran established • Four multi-location trial plots at SPF Mata Ayer, SPF Jeli, SPF Maran & UTM Skudai established • Potential provenances with highest phytochemical content C polysaccharide and eurycomanone identified • One journal article, one proceedings, two oral papers and two posters published

Nota/Notes:
RRP

Research, Pre-commercialisation and Publications Grant (Penyelidikan, Prakomersialisasi dan Penerbitan)

NRGS

National Research Grant Scheme (Skim Geran Penyelidikan Kebangsaan)

MOA

Ministry of Agriculture and Agro-Based Industry (Kementerian Pertanian dan Industri Asas Tani)

MFRDB

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

MPIC

Ministry of Plantation Industries & Commodities Malaysia (Kementerian Perladangan Industri dan Komoditi Malaysia)



INOVASI DAN KOMERSIALISASI INNOVATION AND COMMERCIALISATION

Pada tahun ini, FRIM mengendalikan sebanyak 62 khidmat perundingan yang bernilai RM3.27 juta kepada kedua-dua sektor awam dan swasta. Daripada jumlah ini, FRIM menerima sebanyak RM733 700 untuk kos pengurusan dan pentadbiran. Hasil penyelidikan FRIM juga berjaya memperoleh 26 pendedahan reka cipta, tujuh pemfailan paten dan satu pengiktirafan paten. FRIM juga telah berjaya menandatangani satu perjanjian kontrak pengilangan. Senarai khidmat perundingan, pendedahan reka cipta dan perjanjian adalah seperti yang berikut:

During the year, FRIM conducted 62 consultancy services worth RM3.27 million. From these consultancy services, FRIM received RM733 700 as management fees. FRIM's new research findings led to 26 invention disclosures, seven patents filing and one patent granted. FRIM also successfully signed one contract manufacturing agreement. The lists of the consultancy services, invention disclosures and agreement are given as follows:

Khidmat Perundingan Consultancy Services

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
1	Penyelenggaraan Sistem Pengurusan Gaji dan eOT MARDI/Maintenance of MARDI Salary Management System and eOT	Wan Zahiri Wan Yaacob	Institut Penyelidikan dan Kemajuan Pertanian Malaysia/ Malaysian Agriculture Research & Development Institute (MARDI)
2	Inventori keseluruhan dirian jati sebelum tebang seluas 13.30 ha di Blok A (6.91ha), B (6.39ha) di Runggu, Jalan Apas, Tawau, Sabah/Inventory for 13.30 ha pre-felling teak at Blocks A & B, Runggu, Jalan Apas, Tawau, Sabah	Dr Ahmad Zuhaidi Yahya	Royal Garden Enterprise
3	Demonstrasi penyediaan sap, analisis dan pemisahan fiber batang kelapa sawit menggunakan kaedah R&D FRIM/Demonstration on preparation of sap, analysis and separation of oil palm trunk fiber using FRIM R&D methods	Dr Wan Asma Ibrahim	Biological Resources and Post-Harvest Division
4	Bengkel pemahaman nilai dan sumbangan pokok dalam konteks TPO khusus kepada sumbangan stok karbon/Workshop on understanding of tree value and contribution in TPO context of carbon stock	Adnan Mohammad	Iskandar Regional Development Authority
5	Penentuan nisbah gentian perekat dalam penghasilan pellet/Determination of glue fiber ratio in pellet production	Puad Elham	Novapave Sdn Bhd
6	Orientasi dan pendedahan kepada inovasi dalam perladangan jati/Orientation cum exposure to teak plantation innovations	Dr Mohamad Lokmal Ngah	Odisha Forestry Sector Development Project
7	Kajian inventori dan kesesuaian spesies pokok di Taman Persekutuan, Bukit Kiara, Kuala Lumpur Study on inventory and suitability of tree species at Taman Persekutuan, Bukit Kiara, Kuala Lumpur	Adnan Mohammad	Jabatan Landskap Negara

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
8	Penggunaan asid piroligneus daripada biojisim nanas sebagai bioawetan ke atas agen biodegradasi kayu/ <i>Application of pyroligneous acid from pineapple biomass as bio-preservative against wood biodegradable agents</i>	Dr Salmiah Ujang	Universiti Teknologi Malaysia
9	Mereka bentuk prototaip produk dengan bahan kayu/ <i>Designing of product prototype using wood material</i>	Dr Khairul Awang	Arkitek Tressie Yap
10	Pembuatan dan pengujian produk kertas menggunakan sembilan resin berbeza/ <i>Making and testing of paper products using nine different resins</i>	Dr Sharmiza Adnan	Malayan Adhesives & Chemicals Sdn Bhd
11	Pembuatan dan pengujian produk kertas menggunakan tiga resin dengan kandungan pepejal berbeza/ <i>Making and testing of paper products using three resins with different solid contents</i>	Dr Sharmiza Adnan	Malayan Adhesives & Chemicals Sdn Bhd
12	Penghutan semula kawasan bekas lombong bijih timah/ <i>Reforestration of tin tailing area</i>	Dr Hj Ahmad Zuhaidi Yahya	Rahman Hydraulic Tin Sdn Bhd
13	Penyelenggaraan tahunan sistem eTNT MARDI <i>Maintenance of MARDI eTNT system</i>	Zahari Othman	MARDI
14	Pensijilan rantaian nilai (kilang papan) <i>Chain of custody certification (sawmill)</i>	Azharizan Mohd Norizan	Prosys Solution Management
15	Penyelenggaraan Tahunan Sistem Pengurusan Gaji, eOT, Penyata Gaji Bulanan dan Cukai Tahunan/ <i>Maintenance of MARDI salary management , eOT, monthly pay slip and income tax systems</i>	Wan Zahiri Wan Yaacob	MARDI
16	Aplikasi Sistem Panjar Wang Runcit (e-PWR) MARDI Application of MARDI petty cash system (e-PWR)/ <i>Application of MARDI petty cash system (e-PWR)</i>	Wan Zahiri Wan Yaacob	MARDI
17	Pembangunan kilang komersial pengeluaran pellet berkeupayaan 9 tan/jam/ <i>Development of pellet production mill with 9 tonnes h-1 capacity</i>	Puad Elham	Ribuan Azamat Sdn Bhd
18	Inventori pokok di kawasan cadangan Pembangunan Bandar Malaysia, Kem Sg. Besi, Kuala Lumpur/ <i>Tree inventory at the proposed Malaysian urban development area, Kem Sg. Besi, Kuala Lumpur</i>	Adnan Mohammad	1MDB Real Estate
19	Saksi pakar untuk arbitrase antara Paramount Engineering and Construction vs Deluxe Home Interior Sdn Bhd: Projek membekal dan memasang kabinet dapur dan almari pakaian/ <i>Expert witness for arbitration between Paramount Engineering and Construction vs Deluxe Home Interior Sdn Bhd: Supply and installation of kitchen cabinets and wardrobes project</i>	Dr Mohd Khairun Anwar Uyup	Ching, Tan & Associates

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
20	Pemantauan, diagnosis dan pengecaman perosak dan penyakit di ladang-ladang Acacia Monitoring, diagnosis and identification of pests and diseases in Acacia plantations	Dr Lee Su See	Grand Perfect Sdn Bhd
21	Ketahanan produk TNB (kabel) terhadap serangan anai-anai, penyelesaian terhadap masalah yang dihadapi dan perkara-perkara yang berkaitan Durability of TNB product (cables) against termite attack, the solution and other related matters	Dr Roszaini Kadir	Tenaga Nasional Berhad
22	Penilaian terperinci kesan alam sekitar ke atas cadangan Projek Hidroelektrik Tekai, Jerantut, Pahang untuk Tenaga Nasional Berhad (TNB) Detailed environmental impact assessment (DEIA) for the proposed Tekai Hydroelectric Project, Jerantut, Pahang for TNB	Dr Christine Fletcher	Asia Pacific Environmental Consultants Sdn Bhd
23	Kerja-kerja penempatan semula dan pindah tanam pokok untuk PJ Sentral Development/ Tree relocation and transplanting work for PJ Sentral Development	Ahmad Azaruddin Mohd Noor	Biaxis (M) Sdn Bhd
24	Pemantapan pelan pengurusan Tapak RAMSAR Tasek Bera, Pahang/ Stabilisation of the management plan of RAMSAR Site, Tasek Bera, Pahang	Dr Khali Aziz Hamzah	Bahagian Pengurusan Biodiversiti dan Perhutanan, NRE Biodiversity & Forestry Management Division, NRE
25	Pemantauan, diagnosis dan pengecaman pelbagai penyakit di ladang-ladang eucalyptus Monitoring, diagnosis and identification of the various diseases in Eucalypt plantations	Dr Lee Su See	Syarikat Samling Timber Sdn Bhd
26	Penilaian risiko pokok/ Tree risk assessment	Dr Elizabeth Philip	The Datai Langkawi
27	Penghasilan pellet gentian selulosa menggunakan kemudahan R&D FRIM/ Production of cellulose fibre pellet using FRIM R&D facilities	Puad Elham	Novapave Sdn Bhd
28	Pendaftaran dua produk tradisional—Kapsul daun gelenggang dan kapsul rosel/ Registration of two traditional products—gelenggang leaf and roselle capsules	Dr Pin Kar Yong	Nutratrix Biotech Sdn Bhd
29	Pengecaman pokok di Kota Kemuning, Shah Alam Tree identification at Kota Kemuning, Shah Alam	Dr Richard Chung	Eco World Development Sdn Bhd
30	Mendirikan sebuah kilang yang menghasilkan satu tan pulpa sehari daripada jerami padi untuk acuan pulpa/ Setting-up a pulp mill producing one ton per day pulp from rice straw for pulp moulding	Dr Rushdan Ibrahim	Free The Seed Sdn Bhd
31	Demonstrasi penyediaan sap daripada batang sawit melalui proses penyerpaian menggunakan kaedah R&D FRIM kepada industri/ Demonstration on preparation of sap from oil palm trunk through chipping process using FRIM R&D methods to the industry	Dr Wan Asma Ibrahim	Biological Resources and Post-Harvest Division

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
32	Penghasilan arang briket daripada batang kelapa sawit menggunakan kemudahan R&D FRIM Production of briquette charcoal from oil palm trunk using FRIM R&D facilities	Puad Elham	Uncle Bugs Creation Sdn Bhd
33	Penjantinaan molekular Arowana Asia yang ditawan-biak menggunakan penanda tapak yang ditanda secara jujukan/Molecular sexing of captive-bred Asian Arowana using a sequence-tagged-site marker	Dr Shawn Cheng	Rapid Labs Sdn Bhd
34	Penghasilan pellet daripada residu buluh Production of pellet from bamboo residues	Puad Elham	Biomass-SP
35	Penyediaan model hijau dan model pemuliharaan diversiti flora—Pemulihan ekosistem di Universiti Teknologi Petronas (UTP)/Provision of greening model and floral diversity conservation model—rehabilitation and restoration of ecosystem in UTP	Dr Ang Lai Hoe	Institute of Technology Petronas Sdn Bhd
36	Pembuatan dan pengujian kertas menggunakan resin pada dos berbeza/Paper making and testing using resins with different dosage	Dr Sharmiza Adnan	Malayan Adhesives & Chemicals Sdn Bhd
37	Penyelenggaraan Sistem Pengurusan Gaji (eSPG)—Lanjutan Kedua/Maintenance of eSPG—Second Extension	Wan Zahiri Wan Yaacob	Lembaga Koko Malaysia
38	Inventori pokok dan pemeriksaan pokok tua menggunakan Ficus di Majlis Perbandaran Pulau Pinang/Tree inventory and old tree inspection using Ficus at Pulau Pinang City Council	Adnan Mohammad	UPM Consultancy & Services Sdn Bhd
39	Mendokumen pengetahuan tradisi berkaitan perhutanan bagi perkhidmatan ekosistem di negara-negara ASEAN/Documenting traditional forest-related knowledge for ecosystem services in ASEAN countries	Dr Lim Hin Fui	Asia Pacific Association of Forestry Research Institutions (APAFRI)
40	Sapulut Forest Development Sdn Bhd kepada keperluan Kriteria & Indikator Malaysia (MC & I) bagi Pensijilan Pengurusan Hutan (Hutan Asli) [MC & I (Hutan Ladang)] dan Skim Pensijilan Kayu-Kayan Malaysia GFMC2/2014/Sapulut Forest Development Sdn Bhd against the requirements of the Malaysian Criteria and Indicators for Forest Management Certification (Natural Forest) [MC & I (Forest Plantations)] and Malaysian Timber Certification Scheme GFMC2/2014	Dr Lim Hin Fui	SIRIM Qas International Berhad
41	Analisis gentian/Fiber analysis	Dr Rushdan Ibrahim	Free The Seed Sdn Bhd
42	Ketahanan rawatan A—“Organik” dan rawatan B—“Ekstrem” bagi kayu keras tropika terjurutera dan kayu lembut Eropah terjurutera terhadap anai-anai bawah tanah/Durability of treatment A—“Organic” and treatment B—“Extreme” on engineered tropical hardwood and engineered European softwood against subterranean termites	Dr Roszaini Kadir	Venturer Pte Ltd

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
43	Penyediaan dan pengujian papan serpai daripada sabut kelapa/ <i>Preparation and testing of fibreboard from coconut husk</i>	Dr Suffian Misran	MARDI
44	Pembangunan kertas A4 untuk percetakan <i>Development of A4 paper for printing</i>	Dr Rushdan Ibrahim	Pusat Penyelidikan Mineral, Jabatan Mineral dan Geosains/ <i>Mineral Research Centre, Mineral & Geoscience Department</i>
45	Kajian kemungkinan untuk pengubahsuaian penyaman sembur sedia ada bagi meningkatkan keupayaan pengeluaran kpd 1–2 tan sejam <i>Feasibility study for modification of the existing spray cooler to increase its production capacity to 1–2 tonnes per hour</i>	Dr Pin Kar Yong	Sunzen Biotech Berhad
46	Pemantauan, diagnosis dan pengecaman perosak dan penyakit di ladang-ladang Acacia/ <i>Monitoring, diagnosis and identification of pests and diseases in Acacia plantations</i>	Dr Lee Su See	Grand Perfect Sdn Bhd
47	Cadangan pengindahan dan kemudahan rekreasi di Taman Eko Ara Damansara (Sambungan Projek UP 12/2013)/ <i>Proposal for beautifying and recreational facilities for Taman Eko Ara Damansara (Project extension of UP 12/2013)</i>	Dr Ang Lai Hoe	Jabatan Pengairan dan Saliran Malaysia Department of irrigation & D
48	Memproses nitroselulosa/ <i>Processing of nitrocellulose</i>	Dr Rushdan Ibrahim	Universiti Pertahanan Nasional Malaysia
49	Pengkuantifikasian biojisim hutan di kawasan tadahan empangan menggunakan teknologi penderiaan jauh/ <i>Quantifying forest biomass in dam catchments by using remote sensing technology</i>	Hamdan Omar	TNB Research Sdn Bhd
50	Pensampilan DNA anai-anai khas untuk Stekken Sdn Bhd/ <i>Termite DNA Sampling exclusively for Stekken Sdn Bhd</i>	Dr Shawn Cheng	Stekken Sdn Bhd
51	Penilaian penglibatan komuniti setempat terhadap program pemulihan dan pemuliharaan hutan paya gambut di Selangor/ <i>Evaluation of community involvement in rehabilitation and conservation of peat swamp forest programme</i>	Mohd Parid Mamat	Qubah Qasturi
52	Peer Review: Shin Yang Kuala Baram Forest Plantation Management Unit (FPMU)—Draf akhir Laporan Tahap 2 / <i>Final Draft Stage 2 Report</i>	Dr Woon Weng Chuen	SIRIM Qas International Berhad
53	Peer Review: Segan Forest Plantation Management Unit (FPMU)—Draf akhir Laporan Tahap 2/ <i>Final Draft Stage 2 Report</i>	Dr Woon Weng Chuen	SIRIM Qas International Berhad
54	Peer Review: Sabah Forest Industries Forest Plantation Management Unit (FPMU)—Draf akhir Laporan Tahap 2/ <i>Final Draft Stage 2 Report</i>	Dr Woon Weng Chuen	SIRIM Qas International Berhad
55	Pendaftaran satu produk tradisional—Kapsul kunyit putih/ <i>Registration of one traditional product—kunyit putih capsule</i>	Adib Zubaidi Rashid	BR Herba Resources

BIL. NO.	BIDANG FIELD	PENGURUS PROJEK PROJECT MANAGER	PELANGGAN CLIENT
56	Pembuatan dan pengujian kertas pada suhu simpanan resin berbeza/ <i>Paper making and testing on different temperature of resin storage</i>	Dr Sharmiza Adnan	Malayan Adhesives & Chemicals Sdn Bhd
57	Pengecaman pokok di kawasan kilang Spritzer Bhd/ <i>Tree identification on the factory grounds of Spritzer Bhd</i>	Dr Saw Leng Guan	Spritzer Bhd
58	Khidmat nasihat berkenaan kabel elektrik yang telah diserang oleh anai-anai/ <i>Electric cable attacked by termites</i>	Dr Roszaini Kadir	Power Cables Malaysia Sdn Bhd
59	Bengkel harta intelek dan komersialisasi/ <i>Workshop on intellectual properties and commercialisation</i>	Izanudin Zakaria	Pusat Penyelidikan Mineral <i>Mineral Research Centre</i>
60	Pembuatan dan pengujian kertas menggunakan tiga jenis resin/ <i>Paper making and testing using three types of resin</i>	Dr Sharmiza Adnan	Malayan Adhesives & Chemicals Sdn Bhd
61	Pendaftaran satu produk tradisional—(AkuaRiz) ekstrak gamat/ <i>Registration of one traditional product—(AkuaRiz) gamat extract</i>	Dr Pin Kar Yong	Coral Waves Sdn Bhd
62	Penyelenggaraan Sistem eOT, eSLIP dan eCUKAI <i>Maintenance of eOT, eSLIP and eCUKAI</i>	Wan Zahiri Wan Yaacob	Institut Penyelidikan Keselamatan Jalan Raya Malaysia (MIROS)

Khidmat Perundingan Consultancy Services

BIL. NO.	TEKNOLOGI TECHNOLOGY	PELESEN LICENSEE
1	Penghasilan produk kapsul (Rosel dan <i>Moringa olifera</i>) <i>Production of capsule product (Roselle and Moringa olifera)</i>	Nutatix Biotech Sdn Bhd (Contract Manufacturing Agreement)

Pendedahan Reka Cipta Invention Disclosure

BIL. NO.	REKA CIPTA INVENTION	KETUA PEREKA CIPTA LEAD INNOVATOR
1	Microsatellite DNA Markers for the Asian Subterranean Termite, <i>Coptotermes gestrol</i>	Dr Shawn Cheng
2	Rapid Production of <i>Labisia pumila</i> Using Temporary Immersion System	Siti Suhaila A. Rahman
3	Ster-pouch: An Innovative Tool for Pre-treatment of Plant Samples in the Field for Tissue Culture Purpose	Dr Nor Hasnida Hassan
4	Weight Management Properties of Polysaccharide from Juice and Pomace of Pink Guava (<i>Psidium guajava</i>)	Mohd Kamal Nik Hasan
5	Polysaccharide Extract from Juice and Pomace Extract of <i>Psidium guajava</i> as Anti-atherogenic Agent	Ihsan Safwan Kamarazaman
6	Energy Booster Effect in Rat after Consumption of <i>Mayvera</i>	Mohd Kamal Nik Hasan
7	Polysaccharide from Juice and Pomace of Pink Guava (<i>Psidium guajava</i>) as Potential Alpha-amylase Inhibitor	Abd Rashid Li

BIL. NO.	REKA CIPTA INVENTION	KETUA PEREKA CIPTA LEAD INNOVATOR
8	Ergogenic aids of betaglucan from <i>Eurycoma longifolia</i> in Sprague Dawley	Mohd Kamal Nik Hasan
9	Ergogenic aids of pectin from <i>Eurycoma longifolia</i> in Sprague Dawley	Mohd Kamal Nik Hasan
10	Ergogenic aids of polysaccharide (root) from <i>Eurycoma longifolia</i> in Sprague Dawley	Mohd Kamal Nik Hasan
11	Strength grading machine for sorting Malaysian Hardwoods	Ong Chee Beng
12	Ergogenic aids of polysaccharide (leaves) from <i>Eurycoma longifolia</i> in Sprague Dawley rat	Mohd Kamal Nik Hasan
13	System and methods to split palm logs into different wood quality	Dr Wan Tarmeze Wan Ariffin
14	Protocol for microwave pre-treatment of <i>Acacia mangium</i> boards	Dr Gan Kee Seng
15	Producing pulp and chemicals from rice straw	Dr Rushdan Ibrahim
16	Models and their derivation process to estimate forest floor carbon stocks in tropical montane forest	Dr Jeyanny Vijayanathan
17	Superior clone of kacip fatimah (KFS001)	Dr Farah Fazwa Md. Ariff
18	Natural active ingredient from <i>Aquilaria malaccensis</i> for weight management use	Siti Humeirah Ab Ghani
19	Methods and apparatus for processing palm splits into mats of scrim	Dr Wan Tarmeze Wan Ariffin
20	Polyploidisation technique for enhancement of the phytochemical production in <i>A. malaccensis</i> (karas)	Siti Suhaila A. Rahman
21	Protocol for hot water bath pre-treatment of <i>Acacia mangium</i> boards	Dr Gan Kee Seng
22	Engineered lumbers from splitted and crushed palm logs	Dr Wan Tarmeze Wan Ariffin
23	OPF pellet	Puad Elham
24	Method of producing bamboo solid fuel	Puad Elham
25	Laser engraved wood products from bakau timber (<i>Rhizophora</i> spp.*)	Nik Adlin Nik Mohamed Sukri
26	Process for production of valuable compounds PkC and PkE from basidiomycetes strain FRIM550	Dr Getha Krishnasamy

Pemfailan Paten
Patent Filing

BIL. NO.	PATEN PATENT	NO. HI IP NO.	KETUA PEREKA CIPTA KEY INNOVATOR
1	Anti-gout standardized extract (SEBF) from <i>Baeckea frutescens</i>	PI 2014000187	Dr Fadzureena Jamaludin
2	Borapetoside B, Borapetoside C and Syringin form <i>Tinospora crispa</i> extract as hypocholesterolemic agent	PI 2014000188	Dr Rasadah Mat Ali
3	Producing antimicrobial biodegradable moulded products from kenaf core	PI 2014700313	Dr Rushdan Ibrahim
4	Good budget system version2 (GBS V.2)	PI 2014700686	Mohamad Jemain Mohamad Ridhwan
5	Agarwood identification system (AIS)	PI 2014700916	Dr Nor Azah Mohamad Ali
6	Method and apparatus for splitting palm logs	PI 2014702722	Dr Wan Tarmeze Wan Ariffin
7	Protocol for microwave pre-treatment for <i>Acacia mangium</i>	PI 2014702722	Dr Gan Kee Seng

Pengiktirafan Paten Patent Granted

BIL. NO.	PATEN PATENT	NO. MY MY NO.	PEREKA CIPTA INNOVATOR
1	Engineered Wood from Palm Trunk	MY-152497-A	Dr Abdul Hamid Saleh Yanti Abdul Kadir Dr Hamdan Husain Dr Khairul Awang Dr Mohamed Nor Mohd Yusoff Khairul Masseat Dato' Dr Marzalina Mansor

FMBioSis

Sembilan buah syarikat FMBioSis telah menerima tawaran untuk graduasi dan FRIM juga menawarkan keseluruhan saham pegangan FRIM kepada pemegang saham syarikat yang berminat. Saham syarikat Ligni Energy Sdn Bhd berjaya dijual kepada Pengarah Urusan Kumpulan MIFF iaitu Tuan Haji Ab Razak Ab Hadi. Bagi pelanjutan tempoh penggunaan teknologi FRIM, penyambungan perjanjian bagi pemindahan teknologi telah ditandatangani. Berikut ialah senarai 10 syarikat FMBioSis.

Nine FMBioSis companies accepted offer for graduation and FRIM offered all its stakes in shares to interested company shareholders. Ligni Energy Sdn Bhd's shares were sold to its MIFF Group Managing Director, Tuan Haji Ab Razak Ab Hadi. For extending the use of FRIM technologies, the agreement for extension for the transfer of technology was signed. The following table lists ten FMBioSis companies:

BIL. NO.	TEKNOLOGI TECHNOLOGY	PELESEN LICENSEES
1	Komersialisasi bahan api biojisim kayu pellet dan briket beraromaterapi	Ligni Energy Sdn Bhd
2	Pemprosesan biodiesel dan penambahan nilai hasil sampingannya daripada bahan mentah biji <i>Jatropha curcas</i> dan minyak masak terpakai	Xtract Tech Sdn Bhd
3	Komersialisasi dan pengeluaran ekstrak berasaskan air dan aktif fraksi daripada spesies herba tempatan dan servis pengekstrakan	Polyextract Sdn Bhd
4	Komersialisasi teknologi kultur tisu bagi penghasilan anak benih bamboo, aglaonema, orkid dan <i>Nepenthes</i>	Bio Blooms Sdn Bhd
5	Komersialisasi anti-MRSA antiseptik dan disinfektan berasaskan bahan semula jadi	Nature Profusion Sdn Bhd
6	Komersialisasi <i>Aquilaria malaccensis</i> (karas), kelapa sawit (supergene) dan spesies <i>Eucalyptus</i> melalui mikropropagasi dan teknologi kultur tisu	Agriclone Sdn Bhd
7	Komersialisasi produk yang sesuai untuk diabetes dalam bentuk makanan (biskut), minuman dan suplemen	Nourish Care Sdn Bhd
8	Komersialisasi kultur tisu teknologi bagi penghasilan anak benih nanas MD2, sesenduk dan <i>Jatropha</i>	Phytotech Sdn Bhd
9	Komersialisasi kultur tisu teknologi bagi penghasilan anak benih vanila, pisang dan tongkat ali	Uni Bio Plants Sdn Bhd
10	Komersialisasi produk HOME-SPA berasaskan ekstrak tumbuhan dan minyak pati yang mengandungi komponen bio-fungsi seperti terapi aroma dan pemulihan asas kulit.	Bio Nature Formula Sdn Bhd



HARI INOVASI

FRIM menyambut Hari Inovasinya yang bertemakan “Inovasi Pemangkin Kecemerlangan” tahun ini pada 20 November dengan penyampaian pelbagai anugerah dan hadiah kepada staf bagi menghargai sumbangan, inovasi cemerlang dan idea kreatif mereka. Hari Inovasi yang dilaksanakan setiap tahun ini bertujuan untuk memberi pengiktirafan kepada hasil usaha penjawat awam FRIM yang berjaya menghasilkan inovasi yang berkualiti dan bernilai tinggi serta menggalakkan percambahan idea inovatif dan kreatif. Ketua Pengarah FRIM, Dato’ Dr Abd Latif Mohmod telah menyempurnakan Majlis Perasmian Hari Inovasi FRIM yang bertempat di Auditorium FRIM, serta menyampaikan pelbagai anugerah dan hadiah utama.

Pelbagai aktiviti telah dilaksanakan pada tahun ini sempena sambutan Hari Inovasi antaranya, Pertandingan Sudut Kualiti Terbaik (24 Oktober); Pertandingan Persekitaran Kerja Terbaik (6 dan 11 November); Pertandingan ZON QE/5S Terbaik, Pertandingan Montaj dan Pertandingan Inovasi & Rekacipta (18 November); serta Mini Konvensyen Kumpulan Inovatif dan Kreatif (KIK) (19 November). Anugerah-anugerah lain yang turut disampaikan termasuk Anugerah Pendedahan Reka Cipta; Anugerah Pemfailan Paten; Anugerah Pengiktirafan Paten; Anugerah Pameran Pertandingan ITEX/MTE

INNOVATION DAY

FRIM celebrated its Innovation Day, themed ‘Innovation, Catalyst of Excellence’ this year on 20 November with the presentation of various awards and prizes to staff for their contribution, excellent innovations and creative ideas. This annual event was intended to accord recognition to FRIM staff for their efforts in generating high quality and high value innovations as well as to encourage sharing of innovative and creative ideas. FRIM Director General (KP), Dato’ Dr Abd Latif Mohmod, officiated the launching ceremony held at the FRIM Auditorium, and presented awards and prizes for the major categories. They included prizes for various competitions organised in conjunction with this celebration such as the Best Quality Corner competition held on 24 October; Best Work Place (6 and 11 November); Best Zone QE/5S, Montage Competition, and Innovation and Invention Contest (18 November); and Mini Convention on Innovative and Creative Circle (ICC) (19 November).

Other awards categories included Invention Disclosure Award; Patent Filing Awards; ITEX/MTE 2014 Awards; BIOMALAYSIA 2013; Best Auditor; Best Quality Management Implementation; Special Director General’s Awards and the Director General’s Innovation Award.

2014 dan BIOMALAYSIA 2013; Anugerah Juruaudit Terbaik; Anugerah Pelaksanaan Pengurusan Kualiti Terbaik; Anugerah Khas Ketua Pengarah; dan Anugerah Inovasi Ketua Pengarah.

Anugerah Inovasi Terbaik dimenangi oleh Mohd Faizul Kamarudin dari Bahagian Perhutanan dan Alam Sekitar dengan inovasi yang bertajuk, “Terrestrial Photographic Forest Mapping (TPFM)”. Pertandingan KIK pula dimenangi oleh pasukan Kumpulan Bijak Wang dari Bahagian Kewangan dengan tajuk projek “Less Efficient Store Management”.

Sembilan Anugerah Khas Ketua Pengarah diberikan kepada pemenang berdasarkan sumbangan idea dan kreativiti yang memberikan impak yang tinggi kepada FRIM. Dr Rushdan Ibrahim menerima Anugerah Inovasi Ketua Pengarah bagi Kategori Reka Cipta dan Khairuddin Kamaruddin bagi Kategori Penulisan.

Mohd Faizul Kamarudin from the FRIM Forestry and Environment Division won the Best Innovation Award for “Terrestrial Photographic Forest Mapping (TPFM)”.

The Kumpulan Bijak Wang team from the Finance Department again emerged as the champion of the ICC competition with the presentation of its project entitled “Less Efficient Store Management”.

Nine Special Director General’s Awards were presented to winners selected based on their contribution of high-impact ideas and creativity. Dr Rushdan Ibrahim received the Director General’s Innovation Award for Innovation Category whilst Khairuddin Kamaruddin bagged the award for Writing Category.

Ketua Kumpulan Team Leader	Bahagian Division	Reka Cipta Innovation	Anugerah Award
Mohamad Faizul Kamarudin	Perhutanan & Alam Sekitar Forestry & Environment	Terrestrial Photographic Forest Mapping (TPFM)	Emas & Anugerah Inovasi Terbaik/Gold & Best Innovation Award
Norulaiman Yusof	Hasilan Semula Jadi Natural Products	PrePM-Plant Based Preservative	Emas Gold
Dr Mohd Noor Mahat	Inovasi & Komersialisasi Innovation & Commercialisation	INOGA-Inokulum Gaharu	Emas Gold
Shah Mohd Darus	Keluaran Hutan Forest Products	The Development of U-Shape Laminated Veneer (U-PLAY)	Emas Gold
Dr Rushdan Ibrahim	Keluaran Hutan Forest Products	Produding Pulp and Chemicals from Rice Straw	Emas Gold
Anee Suryani Sued	Hasilan Semulajadi Natural Products	Simple Mobile Air Rotation Technology (SMART)	Emas Gold
Dr Getha Krishnasamy	Hasilan Semulajadi Natural Products	Innovative Fermentation Process to Increase Production of Biopharmaceuticals from Basidiomycetes in Shake-flask	Perak Silver
Muhammad Fuad Yahya	Bioteknologi Perhutanan Forest Biotechnology	Optimisation of Acclimatisation Process for Tongkat Ali Plantlets Using Simple Acclimatise Glass Chamber (S-Accha)	Perak Silver
Dr Abdul Hamid Saleh	Keluaran Hutan Forest Products	Multipurpose Interlock ‘V’ Shape	Perak Silver
Dr Suffian Misran	Keluaran Hutan Forest Products	Terobos : Wavy-Cored-Panel for Flooring Application	Perak Silver
Nurul Hilal Hj Ahmad Tarmidzi	Perkhidmatan Teknikal Technical Services	Rainwater Harvesting System (RWHS)	Perak Silver
Mohd Azahari Faidi	Perhutanan & Alam Sekitar Forestry & Environment	Mobile Ground Truthing Data Collector (MobileGT)	Perak Silver

Ketua Kumpulan Team Leader	Bahagian Division	Reka Cipta Innovation	Anugerah Award
Dr Gan Kee Seng	Keluaran Hutan Forest Products	Hot Water Pre-Treatment on <i>Acacia mangium</i> Timber	Perak Silver
Dr Farah Fazwa Md Ariff	Bioteknologi Perhutanan Forest Biotechnology	Mini Portable Shade House for Kacip Fatimah Planting	Gangsa Bronze
Mohamad Farhan Mohamad Nazri	Perancangan Penyelidikan Research Planning	Coconut Saka (CS)	Gangsa Bronze
Dr Abdul Hamid Saleh	Keluaran Hutan Forest Products	Particleboard from Bamboo Veneer Waste	Gangsa Bronze
Dr Mohd Noor Mahat	Inovasi & Komersialisasi Innovation & Commercialisation	Mesin Penyulingan Minyak Gaharu	Gangsa Bronze
Puad Elham	Keluaran Hutan Forest Products	Bamboo Pellet	Gangsa Bronze
Dr Suffian Misran	Keluaran Hutan Forest Products	DC Helper : Drum Chipper Aligner for Small Plank Processing	Gangsa Bronze
Dr Suffian Misran	Keluaran Hutan Forest Products	T-Bun : Method for Processing Wood from Urban Tree Resources	Gangsa Bronze
Dr Khairul Awang	Keluaran Hutan Forest Products	Piece 2 Piece Chair	Gangsa Bronze

Bahagian Division	Kumpulan Team	Tajuk KIK ICT Title	Tempat Place
Kewangan Finance	BIJAK WANG	Pengurusan Stor Kurang Efisien	Pertama First
Hasilan Semula Jadi Natural Products	GANNU	Pembaziran Air Ketika Proses Pengekstrakan Menggunakan Evaporator	Kedua Second
Sumber Manusia Human Resource	HUMANS	Penambahbaikan ke Atas Sistem Permohonan Jawatan Secara Atas Talian	Ketiga Third
Keluaran Hutan Forest Products	LESTARI	Penggunaan Sisa Kayu untuk Produk Bernilai Tambah	Keempat Fourth
Inovasi & Komersialisasi Innovation & Commercialisation	FRIM INNOVATIVE TEAM (FIT)	Kontaminasi Bahan Mentah di Herbal Technology Centre (HTC)	Saguhati Merit
Perhutanan & Alam Sekitar Forestry & Environment	HYDRO RANGERS	Aplikasi Interaktif Indeks Kualiti Air (IKA) dan Profil Sungai (IKAPS)	Saguhati Merit
Pentadbiran Administration	TAG	Alat Pencegahan Kecurian Paip	Saguhati Merit
Bioteknologi Perhutanan Forest Biotechnology	COMMITTED SOIL INVESTIGATORS (CSI)	Two in One	Saguhati Merit
Perancangan Penyelidikan Research Planning	SMS	SMS (Survey Made Simple) Kit	Saguhati Merit
Perkhidmatan Teknikal Technical Services	PHONETIX PHOENIX	Penambahbaikan Kaedah Pemberitahuan Status Aduan Melalui ADUNET	Saguhati Merit

Anugerah Pelaksanaan Sistem Pengurusan Kualiti Terbaik (Bahagian)/Best Quality Management System Implementor Award (Division)

Bahagian Perhutanan & Alam Sekitar/Forestry & Environment Division: **(Dr Ismail Harun)**

Anugerah Inovasi Ketua Pengarah/Director General Innovation Award

Kategori Reka Cipta/Innovation Category: **Dr Rushdan Ibrahim**

Kategori Penulisan/Writing Category: **Khairuddin Kamaruddin**

Bil. No.	Kategori Category	Penerima Recipient
1	Pencetus Budaya Seni Dalam Media-like kedua FB melepasi 100; dengan 3 gambar/Pioneer of Arts Culture in the Media- Second FB Like Exceeding 100; with 3 Pictures	Asmar Hasan
2	Pencetus Budaya Muka Buku (Facebook)-like pertama FB melepasi 100; satu gambar dengan 37 ulasan Pioneer in Facebook Culture-First FB Like Exceeding 100; One picture with 37 Comments	Norhayati Nordin Yusni Idris
3	Penyelidik Dengan Jumlah Liputan Akhbar Terbanyak Researcher with Most Newspaper Coverage	Dr Tnah Lee Hong
4	Liputan Media Dengan Nilai PR Tertinggi Media Coverage with Highest PR Value	Abd Razak Othman Dr Mohd Tamizi Mustafa Dr Hamdan Husain Haliza Ismail
5	Bilangan Petikan Tertinggi JTFS oleh Warga FRIM Highest Number of JTFS Cited by FRIM Staff	Dr Pin Kar Yong Prof Dr Luqman Chuah Abdullah Abdull Rashih Ahmad Dr Mazura Md. Pizar Dr Fadzureena Jamaludin Dr Vimala Subramaniam Dr Rasadah Mat Ali
6	Program Penglibatan Awam Terbaik di FRIM (A Day As A Forester)/Best Public Involvement Programme at FRIM	Unit Pengurusan Korporat Corporate Management Unit
7	Kumpulan Penggerak Kualiti FRIM	Unit Pengurusan Kualiti (PJK) Quality Management Unit
8	Pelaksanaan Idea Terbaik Best Idea Implementation (Roof Garden)	Ahmad Azaruddin Mohd Noor Samsol Bohari Siti Noor Hidayah Abdullah Roslan Abd Rahman Mohd Saiful Hizad Yaakob Muhammad Syahmi Farid Mohamed Azni Mohd Haniff Mohd Najib Azman Ahmad Mohd Zulfadli Mat Yasin Mohd Afendi Hussin
9	Pelaksanaan Idea Terbaik Best Idea Implementation (Rainwater Harvesting System)	Dr Khali Aziz Hamzah Nurul Hilal Ahmad Tarmidzi Mohd Rizuwan Mamat Mohd Azmi Omar Vasuthevan a/I Narayana Ablah Mohd Noor

KERJASAMA PENYELIDIKAN RESEARCH COLLABORATIONS

MEMORANDUM PERSEFAHAMAN/PERJANJIAN

FRIM memenuhi tanggungjawabnya dalam pemindahan teknologi dan menyediakan nasihat teknikal dan kepakaran kepada para pemegang taruhnya menerusi kerjasama penyelidikan dan teknikal yang dilaksanakan menerusi pemeteraian memorandum persefahaman (MoU) dan perjanjian. Pada 2014 FRIM menandatangani sebanyak 10 kerjasama penyelidikan.

24 April

Antara lain, FRIM menandatangani Perjanjian antara MFRDB dan Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd (KPKKT) di FRIM, Kepong. Pemeteraian Perjanjian antara kedua-dua pihak ini merupakan pembaharuan hubungan yang telah terjalin sejak 2008. Perjanjian ini bertujuan untuk meneruskan Rancangan Kerjasama Projek Sistem Geoinformasi Perhutanan KPKKT yang telah tamat pada 30 September 2013. Penyambungan kerjasama dalam Projek “Quantification of KPKKT Forest Resources for Efficient Planning and Management” diadakan kerana terdapat aktiviti-aktiviti projek yang masih aktif dan membantu operasi pengurusan oleh pihak KPKKT. Tambahan pula, terdapat penemuan oleh penyelidik Program Geoinformasi dari segi teknik penilaian sumber hutan melalui GIS yang didapati mampu membantu KPKKT dalam membuat ramalan jumlah pengusahasilan bagi sebahagian kawasan pengeluaran.

MEMORANDUM OF UNDERSTANDING/ AGREEMENT

FRIM fulfills its obligation in transferring technology and providing technical advice and expertise to its clients through research collaborations and technical cooperation. Most of the collaborations are formalised through the signing of memoranda of understanding (MoUs) or agreements. In 2014, FRIM signed 10 research collaborations.

24 April

Among others, MFRDB has signed Agreement with Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd (KPKKT) at the FRIM main campus in Kepong. The Agreement was signed to renew the long term relationship forged between the two parties since 2008. The agreement was aimed at continuing the Forestry Geoinformation System Project Collaborative Plan with KPKKT which ended on 30 September last year. The collaboration in Project “Quantification of KPKKT Forest Resources for Efficient Planning and Management” is being extended as some of the activities are still active and found useful for facilitating the management operation of KPKKT. Moreover, there were some findings by researchers of the FRIM Geoinformation Programme which showed GIS was useful in assisting KPKKT in predicting timber stocking and harvest scheduling of a production area.



3 Julai

FRIM turut memeterai MoU dengan Universiti Kyoto untuk melanjutkan kerjasama penyelidikan dalam hidrologi hutan yang merangkumi bidang sains hutan dan keluaran hutan. Pemeteraian MoU antara FRIM dan Sekolah Siswazah Pertanian (GSA) dan Pusat Pengajian Asia Tenggara (CSEAS) Universiti Kyoto adalah berdasarkan keperluan pemahaman lebih mendalam tentang kepentingan kitaran hidrologi tropika terhadap isu-isu alam sekitar global; serta pentingnya penyelidikan sains hutan dan hasil hutan dalam memastikan kelestarian hutan untuk pembangunan ekonomi.



3 July

FRIM also signed an MoU with the Kyoto University to extend their collaborative research in forest hydrology to include forest sciences and forest products. The signing of the MoU by FRIM with the university's Graduate School of Agriculture (GSA) as well as the Center for Southeast Asian Studies (CSEAS), was undertaken based on the need for a greater understanding of the importance of tropical hydrological cycle to the global environmental issues; and the significance of enhanced research in forest sciences and forest products in achieving the sustainability of forests for economic development.

29 Ogos

FRIM, Jabatan Pertanian Malaysia (DOA) dan Syarikat Zalekah Simat menandatangani satu MoU untuk bekerjasama dalam penanaman herba terpilih di SPF Maran, Pahang. Kerjasama yang terjalin ini akan menggalakkan penghasilan bahan mentah berkualiti yang memenuhi standard Malaysian Good Agricultural Practice/Skim Organik Malaysia (MyGAP/SOM), dan meningkatkan pendapatan usahawan serta sumber bahan mentah berkualiti. SPF Maran yang mendapat akreditasi MyGAP/SOM bagi herba (patawali) yang pertama di Malaysia juga berfungsi sebagai hab pengumpulan dan pengendalian lepas-tuai bagi kluster herba atau rempah ratus di daerah Maran dan kawasan sekitarnya.

29 August

FRIM has signed an MoU with Department of Agriculture (DOA) and Syarikat Zalekah Simat to cooperate on the cultivation of selected herbs at the FRIM Research Station in Maran (SPF Maran). The collaboration aims at producing quality raw materials that meet the standards of Malaysian Good Agricultural Practice/Malaysian Organic Scheme (MyGAP/SOM); and increasing local entrepreneurs' income as well as sources of quality raw materials. SPF Maran, which has obtained the first MyGAP/SOM accreditation for herbal (patawali) cultivation in Malaysia, serves as a hub or centre for the collection and post-harvest handling of herbs and spices for the Maran District and the surrounding areas.



7 Oktober

FRIM menandatangani MoU dengan Persatuan Pengusaha Industri Perabot Bumiputera (PETRA) untuk bekerjasama dalam bidang pensijilan perabot bagi mematuhi keperluan standard pasaran tempatan dan antarabangsa. MoU ini membolehkan kedua-dua pihak meneroka standard, prosedur dan garis panduan yang berkaitan dengan pensijilan produk perabot untuk jaminan kualiti, memastikan kualiti produk yang dihasilkan memenuhi syarat-syarat pasaran kebangsaan dan antarabangsa sekaligus mengukuhkan hubungan kerjasama antara kedua-dua pihak.

7 October

FRIM has signed an MoU with the Bumiputera Furniture Industry Entrepreneurs Association Malaysia (PETRA) to collaborate in the field of certification for quality assurance of furniture products, in line with national and international market. The MoU signing ceremony was held at FRIM, Kepong. The MoU aims at exploring the standard, procedures and guidelines in relation to the certification of furniture products for quality assurance, ensuring the quality meets the standard requirements of national and international market while further strengthens the relationship between both parties.

BIL. NO.	RAKAN KERJASAMA/ KETUA PROJEK/TARIKH TANDA TANGAN/ COLLABORATOR/ PROJECT LEADER/SIGNING DATE	JENIS/BIDANG KERJASAMA TYPE/FIELD OF COLLABORATION
1	The Programme for the Endorsement of Forest Certification Schemes (PEFC) Ketua projek/ <i>Project leader</i> : Dr Lilian Chua Swee Lian Tarikh tandatangan/ <i>Signing date</i> : 7 Januari/ <i>January</i>	MoU: Pembangunan langkah-langkah pemuliharaan khusus dan prosedur pemantauan bagi mengekal dan meningkatkan kaedah pemuliharaan di Jerangau HCVF, Terengganu/ <i>Development of specific conservation measures and monitoring procedures to maintain and enhance the conservation attribute in Jerangau HCVF, Terengganu, Malaysia</i>
2	Dewan Bandaraya Kuala Lumpur Ketua projek/ <i>Project leader</i> : Hj Adnan Muhammad Tarikh tandatangan/ <i>Signing date</i> : 18 Mac/ <i>March</i>	Perjanjian/ <i>Agreement</i> : Pengurusan taman botani, taman koleksi khas dan taman rekreasi awam/ <i>Management of botanical gardens, special collection gardens and public recreational gardens</i>
3	World Wildlife Fund (WFF) Ketua projek/ <i>Project leader</i> : Dr Abdul Rahman Kassim Tarikh tandatangan/ <i>Signing date</i> : 30 Mac/ <i>March</i>	Perjanjian/ <i>Agreement</i> : Usaha pemuliharaan kepelbagaian biologi (biodiversiti) merangkumi perkongsian data, pertukaran sumber kepakaran dan pengetahuan berkaitan dengan pemuliharaan hutan, pengurusan spesies terancam, penggunaan tanah secara mampan, pengurusan kawasan perlindungan, pemuliharaan air tawar dan ekopelancongan/ <i>Biodiversity conservation including data sharing and exchanging expertise as well as knowledge resources on forest conservation, endangered species management, sustainable land use change, protected areas management, freshwater conservation and ecotourism.</i>

BIL. NO.	RAKAN KERJASAMA/ KETUA PROJEK/TARIKH TANDA TANGAN/ COLLABORATOR/ PROJECT LEADER/SIGNING DATE	JENIS/BIDANG KERJASAMA TYPE/FIELD OF COLLABORATION
4	Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd (KPKKT) Ketua projek/ <i>Project leader</i> : Dr Abdul Rahman Kassim Tarikh tandatangan/ <i>Signing date</i> : 24 April/ <i>April</i>	Perjanjian/ <i>Agreement</i> : Rancangan Kerjasama Projek Sistem Geoinformasi Perhutanan KPKKT/ <i>Forestry Geoinformation System Project Collaborative Plan with KPKKT</i>
5	Lifeline Initiative Ketua projek/ <i>Project leader</i> : Dr Samsudin Musa Tarikh tandatangan/ <i>Signing date</i> : 15 Mei/ <i>May</i>	MoU: Memperkukuh, menggalak dan membangunkan kerjasama dalam aktiviti penanaman dan menjalankan aktiviti Program Pendidikan Alam Sekitar melalui pertukaran maklumat mengenai penubuhan tapak semaian dan aktiviti penanaman semula hutan di Sabah dan Sarawak/ <i>Strengthen, promote and develop cooperation in Borneo through joint Environmental Education Programmes; exchange of information regarding nursery establishment; and reforestation activities in Sabah and Sarawak</i>
6	Kyoto Universiti Ketua projek/ <i>Project leader</i> : Dr Siti Aishah Shamsudin Tarikh tandatangan/ <i>Signing date</i> : 3 Julai/ <i>July</i>	MoU: Melanjutkan kerjasama penyelidikan dalam hidrologi hutan serta merangkumi bidang sains hutan dan keluaran hutan/ <i>Extend collaborative research in forest hydrology to include forest sciences and forest products</i>
7	Syarikat Zalekah Simat Ketua projek/ <i>Project leader</i> : Dr Rasadah Mat Ali Tarikh tandatangan/ <i>Signing date</i> : 29 Ogos/ <i>August</i>	MoU: Penghasilan bahan mentah berkualiti yang memenuhi standard Malaysian Good Agricultural Practice/Skim Organik Malaysia (MyGAP/SOM), dan meningkatkan pendapatan usahawan serta sumber bahan mentah berkualiti/ <i>Producing quality raw materials that meet the standards of Malaysian Good Agricultural Practice/ Malaysian Organic Scheme (MyGAP/SOM); and increasing local entrepreneurs' income as well as sources of quality raw materials.</i>
8	Persatuan Pengusaha Perabot Bumiputera (PETRA) Ketua projek/ <i>Project leader</i> : Dr Rahim Sudin Tarikh tandatangan/ <i>Signing date</i> : 30 September	MoU: Meneroka standard, prosedur dan garis panduan yang berkaitan dengan pensijilan produk perabot untuk jaminan kualiti, memastikan kualiti produk yang dihasilkan memenuhi syarat-syarat pasaran kebangsaan dan antarabangsa/ <i>Exploring the standard, procedures and guidelines in relation to the certification of furniture products for quality assurance, ensuring the quality meets the standard requirements of national and international market.</i>

BIL. NO.	RAKAN KERJASAMA/ KETUA PROJEK/TARIKH TANDA TANGAN/ COLLABORATOR/ PROJECT LEADER/SIGNING DATE	JENIS/BIDANG KERJASAMA TYPE/FIELD OF COLLABORATION
9	Furniture Industry Technology Center (FITEC) Ketua projek/ Project leader: Dr Abdul Hamid Salleh Tarikh tandatangan/ Signing date: 26 November	MoU: Reka bentuk perabot dan pembangunan produk/ Furniture design and product development
10	Zoo Negara & Jawatankuasa Kemajuan dan Keselamatan Kampung (JKKK) Kampung Kundur Hulu Ketua projek/ Project leader: Hj. Abd. Razak Othman Tarikh tandatangan/ Signing date: 25 Disember/ December	MoU: Membekalkan <i>Dendrocalamus asper</i> (buluh betong) sebagai sumber makanan bagi dua ekor panda gergasi di Zoo Negara/ Supply of <i>Dendrocalamus asper</i> for the two giant pandas at Zoo Negara

Nota/Note: Memorandum Persefahaman/Memoranda of Understanding (MoU)





PEMINDAHAN TEKNOLOGI TECHNOLOGY TRANSFER

SEMINAR / PERSIDANGAN / DIALOG / BENGKEL / KURSUS / KONSULTASI PEMEGANG TARUH YANG DIANJUR / ANJURAN BERSAMA OLEH FRIM

SEMINARS / CONFERENCES / DIALOGUES / WORKSHOPS / COURSES / STAKEHOLDER CONSULTATIONS ORGANISED / CO-ORGANISED BY FRIM

BIL. NO.	PERKARA ITEM	TEMPAT VENUE	TARIKH DATE
1	Kursus Interpretasi Data Survei Tanah dan Makmal Tanah/Course on Interpretation of Soil Survey and Soil Laboratory Data	FRIM	7–9 Januari/January
2	Bengkel Interaktif kepada Usahawan Herba/Penduduk Kawasan Luar Bandar di Sarawak Herbal Entrepreneurs/Community Interactive Workshop in Sarawak	Simunjan Sadong Jaya	2–3 Februari/February 2 Mac/March
3	Bengkel Serantau Projek-Projek REDD+ di Semenanjung Malaysia/Regional Workshop on REDD+ Projects in Peninsular Malaysia	Kuala Lumpur	4–5 Februari/February
4	Bengkel Kesedaran Pengetahuan Tradisi (TK) berkaitan Tumbuhan Ubatan & Beraroma Workshop on Traditional Knowledge Awareness on Medicinal & Aromatic Plants	Perak	21 Februari/February
5	Bengkel Kesedaran Pengetahuan Tradisi (TK) berkaitan Tumbuhan Ubatan & Beraroma Workshop on Traditional Knowledge Awareness on Medicinal & Aromatic Plants	Kelantan	22 Februari/February
6	Kursus Teknologi Pulpa & Kertas/Course on Pulp & Paper Technology	FRIM	25 Februari/February–1 Mac/March & 17–21 Mei/May
7	Kursus Pengenalan Pokok & Daun/Course on Tree & Leaf Identification	FRIM	25–26 Februari/February, 1–2 April, 10–11 Jun/June, 26–27 Ogos/August
8	Seminar Kesedaran Pencegahan Kebakaran Seminar on Fire Prevention Awareness	FRIM	28 Februari/February
9	Bengkel Interaktif kepada Usahawan Herba/Penduduk Kawasan Luar Bandar di Sarawak/Interactive Workshop to Herbal Entrepreneurs/Community in Sarawak		
10	Seminar on the Use of Finger Jointed Laminated Door Jambs for Fire Rated Doorsets	Ampang	6 Mac/March
11	Bengkel Kesedaran bagi Projek Penanaman Pokok Hutan di Sekolah Seluruh Malaysia Awareness Workshop on Forest Tree Planting Project in Schools in Peninsular Malaysia	SMK Matang Jaya, Kuching	13–14 Mac/March
12	Seminar Pembayaran Perkhidmatan Ekosistem Hutan Tropika/Seminar on Payment for Ecosystem Service (PES) of Tropical Forest	Kuala Lumpur	13 Mac/March

BIL. NO.	PERKARA ITEM	TEMPAT VENUE	TARIKH DATE
13	Kursus Penanaman Karas/Course on Karas Planting	Limbang, Sarawak	18–20 Mac/March
14	Teknik Pembiakan Beberapa Spesies Pokok Herba/Plant Propagation Techniques for Some Herbal Species	SPF Mata Ayer, Perlis	19–20 Mac/March
15	Bengkel Konsultasi Pemegang Taruh Kajian Impak Penyelidikan dan Pembangunan (R&D) serta Khidmat Teknikal FRIM/Workshop on Stakeholders Consultation for Impact Study of FRIM's R&D and Technical Services	Kuala Lumpur	20 Mac/March
16	Program Kesedaran Alam Sekitar TABIKA KEMAS FRIM/Environmental Awareness Programme for FRIM's TABIKA KEMAS	FRIM	21 Mac/March
17	Kursus Penanaman Karas/Course on Karas Planting	Kapit, Sarawak	23–25 Mac/March
18	Kursus Landskap dan Penyelenggaraan Pokok/Course on Landscape and Tree Maintenance	FRIM	1–4 April, 9–10 April, 23–26 April, 11–13 September, 1–2 Oktober / October, 7–9 Oktober /October & 7–9 November
19	Bengkel Pendedahan Pembangunan Produk Herba & Teknologi Herba bagi Program Teknousahawan MARA-FRIM/Workshop on Exposure of Herbal Products Development & Herbal Technology for MARA-FRIM Technopreneurship Programme	FRIM	10–11 April
20	Kursus Teknik dan Pengurusan Herbarium/ Course on Herbarium Techniques and Management	FRIM	22–25 April, 2–5 Disember/ December
21	Bengkel Konsultasi Pemegang Taruh Projek ITTO REDDES/Workshop on Stakeholders Consultation for ITTO REDDES Project	Kuantan, Pahang	23 April
22	Simposium Konservasi 2013/National Conservation Symposium	Kuching, Sarawak	13–16 Mei/May
23	Kursus Pengecaman Spesies Pokok Hutan/ Course on Forest Tree Species Identification	FRIM	13–16 Mei/May
24	Bengkel Meningkatkan Kesedaran di bawah Projek Menanam Pokok di Sekolah Seluruh Malaysia/Workshop on Raising of Awareness under Nationwide School Forest Tree Planting Project	Kuching, Sarawak	15–16 Mei/May
25	Kursus Teknologi Herba/Course on Herbal Technology	FRIM	27–30 Mei/May
26	Kursus Penggunaan Nivo Total Station & Kamera 360/Course on Handling of Nivo Total Station & 360 Camera	Mata Ayer, Perlis	29 Mei/May–1 Jun/June
27	Bengkel Pengurusan Data & Analisa Data MyERNET/Workshop on MyERNET Data Management and Analysis	FRIM	6–7 Jun/June

BIL. NO.	PERKARA ITEM	TEMPAT VENUE	TARIKH DATE
28	Taklimat mengenai Peranan FRIM sebagai Badan Pensijilan Produk Perabot Berasaskan Kayu bagi Sistem Kontrak Berpusat/ <i>Briefing on FRIM's Role as a Wood-Based Furniture Products Certification Body for the Central Contract Panel System</i>	FRIM	11 Jun/June
29	Kursus Teknologi Pulpa & Kertas/ <i>Course on Pulp & Paper Technology</i>	FRIM	19–20 Jun/June
30	Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara/ <i>National Seminar on the Conservation of Coastal Forest</i>	Universiti Malaysia Terengganu (UMT)	11–13 Jun/June
31	Bengkel Pengendalian Biji Benih Spesies Hutan/ <i>Workshop on Handling of Forest Species Seeds</i>	FRIM	18–20 Jun/June
32	Kursus Biologi/ <i>Course on Biology</i>	SPF Pasoh	25 Jun/June
33	Seminar R&D & Pempatenan & Komersialisasi/ <i>Seminar on R&D & Patenting & Commercialisation</i>	FRIM	27 Jun/June
34	Kursus Pengenalan Interpretasi Alam/ <i>Course on Introduction to Nature Interpretation</i>	Kepong/ FRIM/Kuala Selangor	1–5 Julai/July
35	Bengkel Pangkalan Data Carian Paten Lexis Nexis/ <i>Workshop on Lexis Nexis Patent Search Database</i>	FRIM	8 Julai/July
36	Bengkel Konsultasi Pemegang Taruh mengenai Pengetahuan Tradisi Melayu/ <i>Stakeholder Consultation Workshop on Malay Traditional Knowledge</i>	FRIM	29 Julai/July
37	Bengkel/ <i>Workshop on the Diagnostics of Scale Insects of Agricultural Importance</i>		20–27 Ogos/August
38	Kursus Analisis Pelepasan Formaldehid daripada Produk Komposit Kayu/ <i>Course on Formaldehyde Emission Analysis from Wood Composite Products</i>	FRIM	10–11 September
39	Seminar Agri Dana/ <i>Seminar on AgriFund</i>	Shah Alam, Selangor	10–11 September
40	Bengkel Pemudahcara Pendidikan Alam Sekitar untuk Pembelajaran di Luar Bilik Darjah (Guru)/ <i>Workshop for Nature Education Facilitators for Outside-Classroom Learning (Teachers)</i>	FRIM	11–12 September
41	Seminar Kebangsaan Pengurusan Kawasan Hijau/ <i>National Seminar on Green Area Management</i>	Putrajaya	1–2 Oktober/October
42	Seminar Landskap & Taman-Taman Awam/ <i>Seminar on Landscape & Public Parks</i>	Kuala Lumpur	1–2 Oktober/October
43	Kursus Perlindungan Kayu dalam Pembuatan Perabot/ <i>Course on Wood Protection in Furniture Making</i>	FRIM	2 Oktober/October

BIL. NO.	PERKARA ITEM	TEMPAT VENUE	TARIKH DATE
44	Seminar Papan Lapis untuk Pasaran Jepun/ Seminar on Plywood for the Japanese Market	FRIM	22–23 Oktober/October
45	Seminar Kebangsaan Kumpulan Kerja Sektor Perubahan Guna Tanah dan Perhutanan (LULUCF)/Working Group National Seminar for Land-Use, Land-Use Change and Forestry Sector	Petaling Jaya	1 November
46	Persidangan Penyelidikan Perhutanan dan Keluaran Hutan/Conference on Forestry & Forest Products Research (CFFPR) 2013	Kuala Lumpur	11–12 November
47	Bengkel Teknologi Penghasilan Reka Bentuk Inovatif Secara Bersepadu 2013/ Workshop on Integrated Innovative Design Technology	Kuala Terengganu	3–6 Disember/December
48	Kongres Antarabangsa Persatuan Mikrobiologi Malaysia 2013/International Congress of the Malaysian Society for Microbiology 2013	Langkawi	12–15 Disember/December
PAMERAN YANG DISERTAI/DIANJURKAN OLEH FRIM EXHIBITIONS PARTICIPATED/ORGANISED BY FRIM			
1	Hari Hijau Malaysia Airports Holding Bhd/ Malaysia Airports Holding Bhd Green Day	Pejabat Korporat Malaysia Airports, KLIA Sepang/Malaysia Airports Corporate Office, KLIA Sepang	5 Februari/February
2	Program Sahabat Taman Kejiranan Ayer Panas, Kuala Lumpur/Friends of Taman Kejiranan Ayer Panas, Kuala Lumpur Programme	Taman Kejiranan Air Panas, Setapak, KI	8 Februari/February
3	Ekspo Teknologi Malaysia/Malaysia Technology Expo (MTE)	Pusat Dagangan Dunia Putra, Kuala Lumpur/Putra World Trade Centre, Kuala Lumpur	20–22 Februari/February
4	Pameran Transformasi NRE Bersama Jabatan/NRE with Departments Transformation Exhibition	NRE, Putrajaya	27 Februari/February
5	Pesta Perabot Antarabangsa Malaysia/ Malaysian International Furniture Fair (MIFF)	Pusat Dagangan Dunia Putra, Kuala Lumpur/ Putra World Trade Centre, Kuala Lumpur	4–8 Mac/March
6	Simposium Maklumat Geospasial Kebangsaan Ke-6 (NGIS-6)/6th National Geospatial Information Symposium	Pusat Konvensyen Antarabangsa Putrajaya/Putrajaya International Convention Centre (PICC)	17–18 Mac/March
7	Selamatkan Alam Sekitar/Save The Nature	Dewan Sultan Ahmad Shah, Maktab PDRM, Kuala Lumpur	19–20 April
8	Pameran Antarabangsa Reka Cipta, Inovasi & Teknologi ke-25/25th International Invention, Innovation & Technology Exhibition (ITEX 2014)	Pusat Konvensyen Kuala Lumpur/ Kuala Lumpur Convention Centre	8–10 Mei/May
9	Pameran Herba Malaysia/Malaysian Herbal Exhibition	Pusat Dagangan Dunia Putra/ Putra World Trade Centre, Kuala Lumpur	23–24 Mei/May
10	Pameran Orkid & Bonsai Kuala Lumpur Orchid & Bonsai Show (KLOBS)	Taman Botani Perdana, Kuala Lumpur	23 Mei/May–1 Jun/June

PAMERAN YANG DISERTAI/DIANJURKAN OLEH FRIM EXHIBITIONS PARTICIPATED/ORGANISED BY FRIM			
11	Pertandingan Mengenal Burung Antarabangsa Bukit Fraser/ <i>Fraser's Hill International Bird Identification Competition</i>	Bukit Fraser/ <i>Fraser's Hill</i>	21–22 Jun/ <i>June</i>
12	Hari Terbuka Bahagian Perkhidmatan Teknikal, Cawangan Arkib & Antikuiti, Cawangan Pameran/ <i>Technical Services Division, Archive & Antiquity Branch and Exhibition Branch Open Day</i>	Auditorium FRIM/ <i>FRIM Auditorium</i>	25 Jun/ <i>June</i>
13	Persidangan & Pameran Bioteknologi Johor ke-4/ <i>4th Johor Biotechnology Conference & Exhibition (Bio Johor 2014)</i>	Pusat Konvensyen Antarabangsa Persada Johor/ <i>Persada Johor International Convention Centre, Johor Bahru</i>	25–27 Ogos/ <i>August</i>
14	Festival Sains, Teknologi & Inovasi Negeri Terengganu/ <i>Terengganu Science, Technology & Innovation Festival</i>	Pusat Konvensyen, Taman Tamadun Islam, Terengganu/ <i>Convention Centre, Taman Tamadun Islam, Terengganu</i>	27–30 Ogos/ <i>August</i>
15	Program Rimba & Alam Sekitar Tanggungjawab Anda (RASTA2014)/ <i>Forest & Environment Your Responsibility Programme</i>	Dewan Seri Iskandar, UiTM Perak/ <i>Seri Iskandar Hall</i>	10 September
16	Aseanwood WoodTech 2014	Pusat Dagangan Dunia Putra/ <i>Putra World Trade Centre, Kuala Lumpur</i>	4–6 April
17	Pameran & Persidangan Antarabangsa GreenTech & Eco Products Malaysia ke-5/ <i>5th International GreenTech & Eco Products Exhibition & Conference Malaysia (IGEM 2014)</i>	Pusat Konvensyen Kuala Lumpur/ <i>Kuala Lumpur Convention Centre</i>	16–19 Oktober/ <i>October</i>
18	Pameran & Persidangan Antarabangsa GreenTech & Eco Products Malaysia ke-5/ <i>5th International GreenTech & Eco Products Exhibition & Conference Malaysia (IGEM 2014)</i> (Gerai pameran di bawah NRE/ <i>Booth under NRE</i>)	Pusat Konvensyen Kuala Lumpur/ <i>Kuala Lumpur Convention Centre</i>	16–19 Oktober/ <i>October</i>
19	Persidangan Ubatan Tradisional & Komplementari Antarabangsa ke-8/ <i>8th International Traditional & Complementary Medicine Conference (INTRACOM)</i>	Pusat Konvensyen Sunway Pyramid/ <i>Sunway Pyramid Convention Centre, Selangor</i>	30 Oktober/ <i>October</i> –2 November
20	Sambutan Minggu Alam Sekitar Malaysia (MASM) Peringkat Kebangsaan Malaysian/ <i>Environmental Week Celebration (National Level)</i>	Taman Tasik Darulaman, Kedah/ <i>Darulaman Lake Garden</i>	1 November
21	Hari Inovasi NRE/ <i>NRE Innovation Day</i>	NRE, Putrajaya	3–4 November
22	Pameran & Persidangan Zon Biz Perniagaan & Pelaburan Dunia OIC ke-5/ <i>5th OIC World Biz Business & Investment Zone Exhibition & Conference</i>	Pusat Dagangan Dunia Putra/ <i>Putra World Trade Centre, Kuala Lumpur</i>	11–14 November

PAMERAN YANG DISERTAI/DIANJURKAN OLEH FRIM EXHIBITIONS PARTICIPATED/ORGANISED BY FRIM			
23	Persidangan Antarabangsa Bakau Negara-negara Asia Pasifik berkenaan Perubahan Iklim/ <i>International Conference on Mangroves of Asia Pacific Countries in View of Climate Change</i>	Kuala Lumpur	11–13 November
24	Program Hari ICT & NGIS NRE/ <i>NRE ICT & NGIS Day Programme</i>	NRE, Putrajaya	17 November
25	Simposium Kebangsaan Teknologi Reka Bentuk Inovatif Bersepadu/ <i>National Symposium on Integrated Innovative Design Technology</i>	Melaka/Malacca	17–18 November
26	Bioteknologi Asia 2014 (Anugerah BioInnovasi)/ <i>Biotechnology Asia 2014 (BioInnovation Award)</i>	Pusat Konvensyen Kuala Lumpur/ <i>Kuala Lumpur Convention Centre</i>	19–21 November
27	Hari Inovasi FRIM/ <i>FRIM Innovation Day</i>	FRIM	18–20 November
28	Persidangan Seabad Pengurusan Hutan Bakau Matang, Perak / <i>Perak Conference on a Century of Matang Mangrove Forest Management</i>	Ipoh, Perak	24–26 November
29	Showcase Satu Daerah Satu Industri (SDSI)/ <i>One District One Industri Showcase</i>	Pusat Dagangan Antarabangsa Melaka/ <i>Malacca International Trade Centre (MITC)</i>	4–7 Disember/ December
30	Seminar MyBioD/ <i>MyBioD Seminar</i>	Kuala Lumpur	5 Disember/ December

7 Januari

FRIM menganjurkan forum khas untuk memperkenalkan sistem rawatan kayu menggunakan pengeringan suhu tinggi (HTD) kepada pembekal kayu, pengeluar produk berasaskan kayu, pengusaha kilang tanur pengeringan serta pihak lain yang berminat. Forum yang dianjurkan bersama dengan Lembaga Perindustrian Kayu Malaysia (MTIB) dan Majlis Perkayuan Malaysia (MTC) di FRIM ini berjaya menarik 150 peserta dari industri berasaskan kayu.

Majlis perasmian forum dan pelancaran Trademark HTD FRIM disempurnakan oleh Timbalan Menteri NRE, Dato' Sri Dr James Dawos Mamit. Majlis turut menyaksikan pertukaran dokumen perjanjian perlesenan antara FRIM dan syarikat Advanced Low Pressure System (ALPS) Sdn Bhd. Sesi perbincangan panel mengenai cabaran-cabaran yang dihadapi oleh industri turut diadakan. Selain itu, pasukan projek HTD FRIM juga mengadakan sesi bertemu pelanggan untuk perbincangan lanjut mengenai aplikasi teknologi HTD selepas forum berkenaan.

7 January

FRIM has organised a special forum in Kepong to introduce its award-winning High Temperature Drying (HTD) system for wood treatment to local wood suppliers, wood-based product manufacturers, kiln drying operators and interested parties. The forum, co-organised with Malaysian Timber Industry Board (MTIB) and Malaysian Timber Council (MTC) at FRIM, Kepong, was attended by 150 participants from wood-related industries in the country.

Deputy Minister of NRE, Dato' Sri Dr James Dawos Mamit, officiated the opening of the forum and launching of the FRIM HTD Trademark. The event also saw the exchange of licensing agreements signed between FRIM and Advanced Low Pressure System (ALPS) Sdn Bhd for commercialisation of the technology in Malaysia and Thailand. There was also a panel discussion on challenges faced by the industry. The FRIM HTD project team also conducted a meet-the-clients session with interested parties after the forum.

23–25 Mei

FRIM menganjurkan Pameran Herba Malaysia (PHM2014) di Kuala Lumpur dan berjaya menarik ribuan pengunjung. Majlis Perasmian PHM2014 yang bertemakan “Herba dan Pengetahuan Tradisi: Khazanah Negara” disempurnakan oleh Menteri NRE, YB Datuk Seri G Palanivel.

Palanivel juga melancarkan produk prototaip yang dibangunkan oleh FRIM berasaskan spesies tumbuhan untuk melindungi pengetahuan tradisi Orang Asli subetnik Semelai di Tasik Bera, Pahang. Beliau turut melancarkan buku baharu terbitan FRIM bertajuk “*Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan dan Beraroma Orang Asli Semai*”, hasil daripada pelaksanaan projek “Pendokumentasian Pengetahuan Tradisi Orang Asli Berkaitan Tumbuhan Ubatan dan Beraroma di Semenanjung Malaysia”.

Projek ini dilaksanakan dengan kerjasama Jabatan Kemajuan Orang Asli (JAKOA) sejak 2007 di bawah Rancangan Malaysia Kesembilan (RMK9) dan Kesepuluh (RMK10). FRIM dengan kerjasama JAKOA turut menganjurkan Seminar Pemuliharaan dan Pemeraksanaan Pengetahuan Tradisi (TK) 2014 pada 23–24 Mei yang bertemakan “Melestari Legasi Pengetahuan Tradisi”.

11–14 Ogos

FRIM menganjurkan Simposium Kebangsaan Konservasi yang bertemakan “Melestari Khazanah Warisan Negara” di Kota Kinabalu, Sabah. Majlis perasmian disempurnakan oleh Timbalan Ketua Pengarah (Operasi), Dr Norini Haron, yang mewakili Ketua Pengarah FRIM. Simposium ini diadakan bertujuan untuk menggabungkan kepakaran saintis FRIM dan agensi-agensi kerajaan lain serta institut pengajian tinggi awam dalam pelbagai bidang termasuklah usaha pemuliharaan khazanah warisan negara. Seramai 65 peserta dari pelbagai agensi kerajaan dan swasta menyertai program ini. Sejumlah 15 kertas kerja dibentangkan oleh penceramah pakar termasuk saintis FRIM.



23–25 May

FRIM has organised Herba Malaysia Exhibition 2014 (PHM2014), themed “Herbs and Traditional Knowledge: National Heritage” in Kuala Lumpur, attracting thousands of visitors, officiated by Minister of NRE, YB Datuk Seri G Palanivel.

Palanivel also launched a prototype product, developed by FRIM based on a plant species, to protect the traditional knowledge (TK) of Orang Asli sub-ethnic Semelai from Tasik Bera, Pahang. Apart from the product launching, Palanivel also launched a new book, entitled *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan dan Beraroma Orang Asli Semai*. The book was published by FRIM to share its findings and experience in the implementation of the project on “Database on Medicinal and Aromatic Plants of the Orang Asli in Peninsular Malaysia”. This project was implemented by FRIM with the support of the Department of Orang Asli Development (JAKOA) since 2007 under the 9th and 10th Malaysia Plan.

In conjunction with PHM2014, FRIM in collaboration with JAKOA also conducted a seminar on TK conservation and empowerment from 23 to 24 May 2014 themed “Preserving the Legacy of Our Traditional Knowledge”.

11–14 August

FRIM has organised the National Conservation Symposium 2014, themed: “Sustaining the National Heritage Treasures” in Kota Kinabalu, Sabah. The launching ceremony of the symposium was officiated by Deputy Director General (Operations) Dr Norini Haron on behalf of FRIM Director General. The aim of this programme was to gather experts from FRIM and various other public agencies in Malaysia including public higher learning institutions to share their knowledge and experience on conservation methods or techniques. Attended by 65 participants from the government and private sector including the local universities and colleges, the symposium presented 15 expert speakers from FRIM.



26 November

FRIM dan Pusat Sumber Teknologi Perabot MARA (FITEC) menganjurkan Simposium Reka Bentuk Perabot Nasional 2014 (SRPN 2014) di Port Dickson, Negeri Sembilan yang dihadiri oleh lebih 200 peserta. FRIM dan FITEC juga menandatangani MoU untuk bekerjasama dalam reka bentuk perabot dan pembangunan produk bagi tempoh dua tahun. Matlamat simposium ini adalah untuk menggalak dan mengukuhkan industri perabot Malaysia di peringkat global. Ia juga bertujuan meningkatkan kesedaran orang ramai akan pentingnya hubungan kait antara reka bentuk, bahan mentah, teknologi dan pasaran dalam usaha meningkatkan nilai eksport perabot negara. FRIM turut melancarkan penerbitan terbarunya yang bertajuk, "*Pembuatan Kapal Kayu Tradisional Melayu*".

7 April

FRIM menganjurkan kursus mengenai pengukuran pelepasan gas daripada aktiviti pengurusan hutan seperti pengusahasilan dan rawatan silvikultur berkaitan dengan Pengurangan Pelepasan Gas daripada Nyah Hutan dan Degradasi Hutan di Negara Membangun (REDD), di Pahang. Program ini bertujuan untuk melatih para penyelidik dan pengurus hutan kaedah menjalankan pengukuran ini. Ia disertai oleh 30 peserta dari FRIM, Jabatan Perhutanan Pahang dan Universiti Kebangsaan Malaysia (UKM). Modul latihan ini telah dilaksanakan oleh tiga orang pemudah cara jemputan, iaitu Felipe Casarim dan Katherine Goslee dari Winrock International dan Gabriel Eickhoff dari Forest Carbon.

Kursus ini merupakan sebahagian daripada aktiviti pembangunan kapasiti Projek FRIM-International Tropical Timber Organization (ITTO) REDDES dengan kerjasama USAID-LEAF (Program Lowering Emissions from Asia's Forest yang dibiayai Agensi Amerika Syarikat untuk Pembangunan Antarabangsa), Jabatan Perhutanan Semenanjung Malaysia (JPSM) dan Jabatan Perhutanan Negeri Pahang.

2-4 September

Kursus Teknologi Pemiawaian Tumbuhan Ubatan dan Peningkatan Kualiti Produk Herba yang dianjurkan oleh FRIM ini diadakan untuk meningkatkan pengetahuan dan mendedahkan peserta mengenai teknik-teknik pemiawaian dan peningkatan kualiti produk herba.

26 November

FRIM and Furniture Industry Technology Center (FITEC) had successfully co-organised the National Symposium on Furniture Design 2014 (SRPN 2014), attended by over 200 participants in Port Dickson, Negeri Sembilan. FRIM and FITEC also signed an MoU for a two-year collaboration in furniture design and product development. The objective of the symposium was to promote and strengthen the Malaysian furniture industry at the global level. The symposium also aimed to create awareness on the importance of designs, materials, technologies and markets in order to increase Malaysia's furniture exports. FRIM also launched its new publication entitled *Pembuatan Kapal Kayu Tradisional Melayu*.

7 April

FRIM has conducted a course in Pahang on measuring carbon emissions from forest management operation particularly timber harvesting and silvicultural practices in relation to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) in Pahang. The calculation of total carbon emission from trees removed during harvesting often does not include trees felled from logging roads and skid trails; wastage such as stumps and crown left behind and incidental damages; as well as silvicultural practices such as replanting. The aim of the course was to train researchers and forest managers to conduct the measurements for inclusion in the assessment of total emission from various forest management operations.

Thirty local participants from FRIM, Forestry Department of Pahang state (PFD) and the National University of Malaysia (UKM) attended the course, which was conducted by invited facilitators, namely Felipe Casarim and Katherine Goslee from Winrock International, and Gabriel Eickhoff from Forest Carbon. The training was part of the capacity building activities of the FRIM-International Tropical Timber Organization (ITTO) REDDES Project in collaboration with USAID-LEAF (the US Agency for International Development-supported Lowering Emissions from Asia's Forest), Forestry Department Peninsular Malaysia (FDPM) and PFD.

2-4 September

The course on Technology for Standardisation of Medicinal Plants and Quality Improvement on Herbal Products was organised by FRIM was aimed to enhance the knowledge and expose the participants on the techniques of standardisation

Kursus ini adalah penting untuk meningkatkan pengetahuan para peserta bagi menangani isu-isu semasa termasuk penghasilan kualiti produk herba yang tidak konsisten disebabkan oleh pemilihan spesies yang salah untuk bahan-bahan mentah, pencemaran bahan-bahan mentah, tidak mengikuti protokol pemiawaian semasa pemrosesan, kurangnya penggunaan Amalan Pengilangan Baik (GMP), tidak menggunakan ekstrak piawai dalam formulasi produk, kekurangan data daripada R & D dan kawalan kualiti dalam pembangunan produk. Oleh itu, kursus ini meliputi sesi ceramah dan demonstrasi tentang pemilihan, pengesahan dan pengeluaran bahan-bahan mentah, teknologi lepas tuai, analisis fitokimia, penilaian potensi bioaktiviti dan penilaian kawalan kualiti.

17–20 November

FRIM menganjurkan Simposium Teknologi Reka Bentuk Inovatif Kebangsaan 2014 yang berlangsung di Melaka. Majlis perasmian disempurnakan oleh Ketua Menteri Melaka, Datuk Idris Haron. Simposium yang bertemakan “Transformasi Reka Bentuk” ini bertujuan untuk memupuk dan menyemarakkan budaya kreatif dan inovatif dalam kerja-kerja reka bentuk khususnya dalam kalangan penjawat awam. Program simposium ini merangkumi pelbagai aspek berkaitan dengan reka bentuk terkini dan inovatif melalui penggunaan sumber hutan seperti kayu dan buluh, reka bentuk penghasilan perabot, reka bentuk dan teknologi pembinaan rumah, seni binaan tradisional, inovasi daripada bahan gantikan tanaman, reka bentuk taman Malaysia, kraf tangan serta teknologi penghasilan animasi. Seramai 70 peserta dari 30 jabatan/agensi kerajaan dan swasta serta institusi pengajian tinggi menghadiri simposium ini.

Simposium ini dianjurkan dengan kerjasama Jabatan Ketua Menteri Melaka, Kementerian Sains, Teknologi dan Inovasi (MOSTI), Kementerian Pendidikan Malaysia, Kementerian Pelancongan Malaysia, Perbadanan Kemajuan Kraftangan Malaysia (Melaka), Majlis Bandaraya Melaka Bersejarah (MBMB), Perbadanan Teknologi Hijau Melaka, Jabatan Penerangan Melaka, Jabatan Penyiaran Melaka, UiTM Perak, KUIM, ISMMA, Kolej Antarabangsa Sains dan Teknologi Melaka (MiCoST), MDec, MRM, Jabatan Landskap Negara, MIMOS Berhad, SIRIM Berhad, Bio-Nature Formula Sdn Bhd, Nature Profusion Sdn Bhd, Borneo to the World Sdn Bhd dan Dayang Salhah Kek Sarawak.

and improvement on the quality of herbal products. This course is important as to provide knowledge in addressing the current issues that include inconsistency in the quality of herbal products that might be due to the wrong selection of species for raw materials; contamination of raw materials; lack of standardised protocol for processing, lack of use of Good Manufacturing Practice (GMP), lack of use of standardised extracts in product formulation; lack of R&D data and quality control in the product development. Hence, the course covered lectures and demonstration sessions on topics of selection, authentication and production of raw materials, post harvest technology, phytochemical analysis, bioactivity potential and quality control assessments.

17–20 November

FRIM has organised the National Innovative Design Technology Symposium 2014 in Melaka. The opening ceremony was officiated by the Melaka Chief Minister, Datuk Idris Haron. The symposium, themed “Transformation Design”, aimed to foster and promote a creative and innovative culture in design particularly among civil servants. The programme covered aspects of the latest and innovative design through the forest resources usage such as wood and bamboo, furniture production design, house construction design and technology, traditional architecture, innovation from plant fibre materials, Malaysia garden design, craftsmanship and animation production technology. The symposium was attended by 70 participants from 30 government agencies and private companies, as well as institutions of higher learning.

The event was organised with support from the Melaka Chief Minister Department, Ministry of Science, Technology and Innovation (MOSTI), Ministry of Education Malaysia, Ministry of Tourism Malaysia, Malaysian Handicraft Development Corporation (Melaka), Melaka Historic City Council, Melaka Green Technology Corporation, Melaka Information Department, Melaka Broadcasting Department, UiTM Perak, KUIM, ISMMA, Melaka International College of Science and Technology, MDec, MRM, National Landscape Department, MIMOS Berhad, SIRIM Berhad, Bio-Nature Formula Sdn Bhd, Nature Profusion Sdn Bhd, Borneo to the World Sdn Bhd and Dayang Salhah Kek Sarawak.



HARI ANUGERAH AWARD DAY



A. ANUGERAH LEMBAGA MFRDB/MFRDB AWARD

- Tiada penerima/No recipient

B. ANUGERAH KETUA PENGARAH/DIRECTOR GENERAL AWARD

Pasukan Projek Memperkasakan Landskap Zoo Negara

- | | |
|---|---|
| <ul style="list-style-type: none"> • Adnan Mohammad (Ketua) • Govindarajoo Manikam • Mohd Afendi Hussin • Khairil Azuar Khalid • Nik Adlin Nik Mohamed Sukri • Hafizul Abd Rashid • Abd Razak Othman • Muhammad Syahmi Farid Mohamed Azri • Dr Wan Tarmeze Wan Ariffin • Azam Shah Mat Rata Muhammad • Ammar Hamzah • Khairul Anuar Mohamed • Dr Mohd Omar Mohd Khaidzir | <ul style="list-style-type: none"> • Muzaini Faizal Mostofar • Mazli Abd Wahab • Ahmad Norsidar Ab Halim • Abd Rahim Hj. Yunus • Noor Baihaky Che Jamaludin • Roslan Abdul Rahman • Muhammad Farid Abdul Rashid • Zairi Sudin • Mohd Hassan Buang • Mohd Haniff Mohd Najib • Mohd Norazian Azahari (KoFRIM) • Mohd Saifulhizad Yaakob • Bohari Zainal (KoFRIM) |
|---|---|

Pasukan Monumen Ikonik Panda

- | | |
|--|---|
| <ul style="list-style-type: none"> • Nik Adlin Nik Mohamed Sukri (Ketua) • Dr Mohd. Tamizi Mustafa • Dr Wan Tarmeze Wan Ariffin • Dr Hamdan Husain • Dr Mohamad Omar Mohamad Khaidzir • Dr Rahim Sudin | <ul style="list-style-type: none"> • Dr Khairul Awang • Othman Mohd Desa • Abd Rahim Ahmad • Mohd Yatim Abd. Aziz • Rodziah Hashim |
|--|---|

C. ANUGERAH SAINTIS TERBAIK FRIM/FRIM BEST SCIENTIST AWARD

- Dr Elizabeth Philip
- Dr Wan Asma binti Ibrahim

D. ANUGERAH PENYELIDIKAN TERBAIK FRIM/FRIM BEST RESEARCH AWARD

1. Pertama/First

- Development Of Moulded Laminated Bamboo Veneer As Component For Selected Furniture Design

Ahli Kumpulan/Team Members:

- Dr Abdul Hamid Saleh (Ketua), Yanti Abdul Kadir, Tuan Anis Nadia, Tuan Saipuddin, Dato' Dr Marzalina Mansor, Dr Hamdan Hussain, Khairul Maseat, Ab Jalil Muhammad, Mohd Sopian Mokhtar, Noraznizam Ahmad & Othman Desa



2. Kedua/Second

- Aboveground Biomass and Carbon Stock Mapping and Changes Monitoring in the Forest of Peninsular Malaysia Using L-Band ALOS PALSAR and JERS-1

Ahli Kumpulan/Team Members:

- Hamdan Omar (Ketua), Dr Khali Aziz Hamzah, Dr Samsudin Musa & Dr Ismail Harun

3. Ketiga/Third

- Research and Development of Palm Plywood from Oil Palm Trunk

Ahli Kumpulan/Team Members:

- Hashim W. Samsi (Ketua), Puad Elham, Dr Rahim Sudin, Dr Zaihan Jalaludin, Dr Rafeadah Rusli, Jalali Saleh & Muhamad Nabil Fikri Shuhaimi

**E. ANUGERAH PEKERJA TERBAIK TAHUNAN/BEST EMPLOYEE AWARD
Kumpulan Pengurusan & Profesional/Management & Professional Group**

- Adnan Mohammad

Kumpulan Pelaksana 1/Implementor Group 1

- Kamarudin Saleh
- Md Nasir Dayat



**F. ANUGERAH PERKHIDMATAN CEMERLANG—INDIVIDU/
EXCELLENT SERVICE AWARD—INDIVIDUAL**



- Norhara Hussein
- Sim Heok Choh (Dr)
- Ang Lai Hoe (Dr)
- Richard Chung Cheng Kong (Dr)
- Adnan Mohammad
- Mohd Arshad Saru
- Mohd Ilham Adenan
- Sharmiza Adnan (Dr)
- Farah Fazwa Mohd Ariff (Dr)
- Nik Adlin Mohamed Sukri
- Siti Suhaila A. Rahman
- Nur Farhana Jamaludin
- Rosdi Mohamad
- Wan Mohd. Nafizul Hal-Alim Wan Ahmad

- Ramzul Iklas Ablah
- Shahrizal Samudin
- Zawiah Ngah
- Nor Afizah Arshad
- Fatimah Abd Rahman
- Mohd Norin Nizan Mohd Janah
- Suzanaakma Mansor
- Mohd Khaidir Othman
- Nasri Nasir
- Apuk Kasim
- Ramli Ponyoh
- Othaman Hasin
- Azmi Mat Isa

**G. ANUGERAH PERKHIDMATAN CEMERLANG – KUMPULAN/
EXCELLENT SERVICE AWARD – GROUP**



BIL. NO.	NAMA NAMES	AHLI KUMPULAN TEAM MEMBERS
1.	Pertama/First <ul style="list-style-type: none"> Kumpulan Reorganisasi BSM 	Dr Nor'ini Haron (Penasihat) Imaludden Abdullah (Ketua) Norhara Hussein Salamah Selamat Liza Ismail Mohd Asmawee Ismail Azuarni Abdul Adzis Ruziah Ripin Nur Azani Abd Rasid Samsor Saleh Suzanaakma Mansor Mohd Fadzlan Husien
2.	Kedua/Second <ul style="list-style-type: none"> Kumpulan Pembangunan Sistem 	Wan Zahiri Wan Yaacob (Ketua) Zahari Othman Norul Maslissa Ahmad Omarali Abdul Rahim Intan Farah Wahida Khabir
3.	Ketiga/Third <ul style="list-style-type: none"> Kumpulan Monumen Ikonik FRIM 	Dr Mohamed Nor Mohd Yusoff (Penasihat) (Ketua/Head) Dr Rahim Sudin (Ketua) Mohd Izani Ishak Nooraznizam Ahmad Dr Mohamad Omar Mohamad Khaidzir Dr Hamdan Husain Dr Mohd Tamizi Mustafa Jamal Abd. Razak Dr Khairul Awang Dr Gan Kee Seng Mahmudin Saleh Yaacob Zahari Noorsuhanis Abdul Latif Dr Mohamad Nasir Mat Arip Mohammad Iqbal bin Marazlen Abdul Akid Abdul Razak

H. AUGERAH PENERBITAN FRIM / FRIM PUBLICATION AWARD

Kategori / Category A: Penerbitan Teknikal / Technical Publications

1. Pertama / First

Mohamad Nasir Mat Arip, Lee Yook Heng, Musa Ahmad & Salmiah Ujang

- A cell-based potentiometric biosensor using the fungus *lentinus* sajor-caju for permethrin determination in treated wood.
- *Talanta*: 116(1): 776–781

2. Kedua / Second

Lee Soon Leong, Lillian Chua Swee Lim, Kevin Ng Kit Siong, Hamidah Mamat, Lee Chai Ting, Ng Chin Hong, Tnah Lee Hong & Hong Lay Thong

- Conservation management of rare and predominantly selfing tropical trees: an example using *Hopea bilitonensis* (Dipterocarpaceae).
- *Biodiversity and Conservation* 22(1): 2989–3006

3. Ketiga / Third

Gan Kee Seng, Khairul Azmi Jabar, Zairul Amin Rabidin, Pang Suet Kum, Tan Yu Eng, Lau Li Har, Mohd Adawi Ton Omar & Zaihan Jalaludin

- (i) Fire performance of timber door frames.
- *Journal of Tropical Forest Science* 25(3): 429–436

Hamdan Omar, MR Khairunnisa, AA Ammar, I Mohd Hasmadi & Khali Aziz Hamzah

- (ii) Mangrove carbon stock assessment by optical satellite imagery
- *Journal of Tropical Forest Science* 25(4): 554–565

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

1. Pertama / First

Dato' Dr Marzalina Mansor

- Diversity and conservation of tropical forestry species in Southeast Asia
- Pp 317–345 in Normah MN, Chin HF & Reed BM (eds) *Conservation of Tropical Plant Species*. Springer, New York.

2. Kedua / Second

Chew Ming Yee, Saw Leng Guan & Kamarul Hisham Mustafa

- Pulau Tioman, a lush tropical paradise revisited *Conservation Malaysia* 17: 1–5

3. Ketiga / Third

Sharmiza Adnan & Mahmudin Saleh

- Proficiency testing to benchmark paper testing laboratory performance. Pp 167–169 in *Proceedings REPTech 2012 International Symposium on Resource Efficiency in Pulp and Paper Technology*. 20–22 November 2012, Bandung

Kategori / Category C: Buku / Books

Hadiah Merit / Merit Prize

Mohd Afendi Hussin, Dato' Marzalina Mansor, Tariq Mubarak Husin & Wan Tarmeze Wan Ariffin

- *Tumbuhan Pesisir Pantai—Fenologi dan Penyediaan Bahan Tanaman*
— Editor: Sarifah Kunju Ahmad

Kategori / Category D: Buku Panduan / Handbooks

- Tiada pemenang

Kategori/Category E: Buku Mesra Ilmu/Knowledge-Friendly Book

Hadiah Merit/Merit Prize

Gan Kee Seng, Lim Seng Choon & Rahim Sudin

- Forest products R&D at FRIM—Yesterday and Today.

Vimala Subramaniam, Nor Azah Mohamad Ali, Ling Sui Kiong, Nik Musa'adah Mustapha, Fadzureena Jamaludin, Chee Beng Jin, Tan Ai Lee, Mailina Jamil, Shalini Markandan, Siti Nur Aisyah, Mohd Hashim, Rohana Sahdan, Chang Yu Shyun & Zainon Abu Samah

- Malaysian Herbal Heritage
— Editor: Vimala Subramaniam

Hadiah Merit/Merit Prize

Noor Atizza Hj Mansor, Wan Zahiri Wan Yaacob, Khali Aziz Hamzah & Nik Zanariah Nik Mahmood

- Khazanah Warisan Alam Semula Jadi—Koleksi Produk dan Artifak FRIM

Kategori/Category F: Tesis/Thesis

Tesis Terbaik/Best Thesis: PhD

Mohamad Nasir Mat Arip

- Pembangunan sensor kimia dan biosensor untuk penentuan racun serangga perosak permetrin

Hadiah Merit/Merit Prize: PhD

Mary Khoo Gaik Hong

- Investigation of troglitazone hepatotoxicity by a metabolomics approach

Tesis Terbaik/Best Thesis: MSc.

- Tiada Pemenang

**I. INSENTIF PENERBITAN DALAM JURNAL BERFAKTOR IMPAK DAN TERKEMUKA
INCENTIVE FOR PUBLICATIONS IN IMPACT FACTORED AND RENOWNED JOURNALS**

Kategori: Individu/Category: Individual

Bil. No.	Nama Name	Faktor Impak Kumulatif Cumulative Impact Factor	Hadiah Prize (RM)
1.	Latifah Jasmani	6.233	1500
	Mohamad Nasir Mat Arip	4.810	1000
	Khairul Kamilah Abdul Kadir	3.334	750
	Lee Soon Leong	2.972	500
	Lee Chai Ting	2.904	500
	Nor Azah Mohamad Ali	2.421	500
	Lillian Chua Swee Lian	2.264	500
	Shawn Cheng	2.196	500
	Roszaini Kadir	1.884	250
	Nurhanan Murni Yunos	1.713	250
	Siti Syarifah Mohd Mutalip	1.713	250
	Norhayati Ismail	1.458	250
	Avelinah Julius	1.295	250
	Imin Kamin	1.295	250
	Muhd Haffiz Jauri	0.921 = 1.00	250

Kategori/Category: Bahagian/Division

Tempat Pertama/First Prize: Keluaran Hutan/Forest Products

- Faktor Impak Kumulatif/Cumulative Impact Factor: 30.681
— Hadiah/Prize: RM2000

Tempat Kedua/Second Prize: Bioteknologi Perhutanan/Forest Biotechnology

- Faktor Impak Kumulatif/Cumulative Impact Factor: 19.99
– Hadiah/Prize: RM1000

Tempat Ketiga/Third Prize: Perhutanan & Alam Sekitar/Forestry & Environment

- Faktor Impak Kumulatif/Cumulative Impact Factor: 19.18
– Hadiah/Prize: RM500

**INSENTIF BAGI ARTIKEL YANG DITERBITKAN DALAM JTFS
INCENTIVE FOR ARTICLES PUBLISHED IN JTFS**

Bil./No.	Nama/Names
1	Mohd Jamil AW, Mohd Azmin J, Mohamad Omar MK
2	Norhayati I, Getha K, Muhammad Haffiz J, Mohd Ilham A, Lili Sahira H, Siti Syarifah MM, Muhammad Syamil, A
3	Joann Cristine L, Serafina Christine Fletcher, Abd Rahman K
4	Norul Izani MA, Paridah MT, Mohd Nor MY, Mohd Khairun Anwar U
5	Nor Azah MA, Saidatul Husni S, Mailina J, Sahrim L, Abdul Majid J & Mohd Faridz Z.
6	Syahida Emiza S, Ruth K, Haron NW & Staples G.
7	Gan KS, Khairul Azmi J, Zairul Amin R, Pang SK, Tan YE, Lau LH, Mohd Adawi TO & Zaihan J
8	Ahmad Zuhaidi Y
9	Lam TY, Abd Rahman K & Shamsudin I
10	Siti Zalifah M, Abdul Hamid S, Izran K, Mansur A & Mohd Nazip S.
11	Hamdan O, Khairunnisa MR, Ammar AA, Mohd Hasmadi I & Khali Aziz H
12	Jeyanny V, Balasundram SK, Husni MHA, Wan Rasidah WAK & Arifin A

J. ANUGERAH KHIDMAT MASYARAKAT/COMMUNITY SERVICE AWARD

Mohd Nasir Dayat

K. ANUGERAH KHIDMAT SETIA/LOYAL SERVICE AWARD

- Dr Wan Tarmeze Wan Ariffin
- Nor Azman Hussein
- Ahmad Fauzi Mohd. Shariff
- Idris Ahmad
- Md. Azimi Abu Bakar
- Rosmaidi Ibrahim
- Mohamad Zin Salim
- Zairi Sudin

L. ANUGERAH KECEMERLANGAN SUKAN/SPORT EXCELLENT AWARD

Pasukan Terbaik/Best Team

Badminton

- Muhammad Farid Abdul Rashid – Pengurus
- Nazly Jamaluddin
- Suhaimi Mohammed Eskak @ Khairi
- Suhaimi Husein
- Hamidol Muhsi Mohd Salleh
- Abdul Muhaimin Mohd Razali
- Firmansyah Julius Syafri
- Ong Chee Beng
- Samsuddin Abdul Hamid
- Abdul Rahim Yunus
- Noor Satira Mokhtar
- Nurfarahin Mohamad Yusoff
- Nur Wahida Tajudin
- Ong Su Ping
- Hasnidarul Ahmad

Pengurus Pasukan Terbaik/Best Team Manager

Futsal Wanita

- Nadiah Salmi Mohd Nadzri

Olahragawan/Sportsman

- Mohamad Faizal Sharuddin

Olahragawati/Sportswoman

- Dr Christine Serafina Fletcher

Anugerah Kepimpinan Sukan/Sport Leadership Award

- Dr Ismail Harun



PELAWAT RASMI OFFICIAL VISITS

BIL. NO.	PELAWAT VISITORS	TARIKH DATE
1	Universiti Teknologi MARA (UiTM) Perak	13 Januari January
2	Fakulti Perhutanan, Universiti Suleyman Demirel, Turki/ <i>Faculty of Forestry, Universiti Suleyman Demirel, Turki</i>	28 Januari January
3	Persatuan Juruukur Tanah Bertauliah Malaysia (PEJUTA/ <i>Association of Authorised Land Surveyors Malaysia</i>)	11 Februari February
4	YB Datuk Peter Nansian Ngusie, Menteri Muda Pembangunan Perindustrian Sarawak & Menteri Muda Pembangunan Komuniti Sarawak serta rombongannya/ <i>YB Datuk Peter Nansian Ngusie, Assistant Minister of Sarawak Industrial Development Ministry & Assistant Minister of Sarawak Community Development Ministry and the group</i>	8 Mac/ <i>March</i>
5	Persatuan Pengusaha Industri Perabot Bumiputera Malaysia (PETRA)/ <i>Malaysian Bumiputera Furniture Industries Manufacturer Association</i>	17 Mac/ <i>March</i>
6	Peserta Regional Technical Training on Carbon Assessment/ <i>Participants of the Regional Technical Training on Carbon Assessment</i>	3 April
7	YB Datuk Seri G Palanivel, Menteri NRE/ <i>YB Datuk Seri G Palanivel, Minister of NRE</i>	9 April
8	YB En Khairy Jamaludin, Menteri Belia dan Sukan/ <i>YB En Khairy Jamaludin, Minister of Youth & Sports</i>	18 April
9	Delegasi China—Mr Liu Dongsheng (ketua), Pembantu Pentadbir, State Forestry Administration (SFA), Beijing, China & 3 orang pegawai pengiring dari Perhilitan <i>Delegation from China—Mr Liu Dongsheng (head), Vice Administrator, State Forestry Administration (SFA), Beijing & 3 escort officers from Perhilitan</i>	24 Jun/ <i>June</i>
10	Projek FRIM-ITTO REDDES—Dr Helmut Dotzauer (Gesellschaft für Internationale Zusammenarbeit (GIZ)/ <i>FRIM-ITTO REDDES Project—Dr Helmut Dotzauer (Gesellschaft für Internationale Zusammenarbeit (GIZ))</i>	9 Ogos/ <i>August</i>
11	Delegasi "German Federal Ministry of Food and Agriculture" —Mr Cagus Caesar, Ahli parlimen (ketua)/ <i>Delegation from German Federal Ministry of Food and Agriculture—Mr Cagus Caesar, member of parliament (head)</i>	19 Ogos/ <i>August</i>
12	Menteri NRE, YB Datuk Seri G Palanivel dan rombongan— lawatan kerja ke SPF Mata Ayer, Perlis/ <i>Minister of NRE, YB Datuk Seri G Palanivel and a group of NRE senior officials— working visit to Mata Ayer Research Station, Perlis</i>	26 September
13	Delegasi Energy Institute Malaysia —R Carles T Dunn, Pengarah Urusan, Asia Tenggara (ketua)/ <i>Delegation from Energy Institute Malaysia— R Carles T Dunn, Managing Director Southeast Asia (head)</i>	8 Oktober October
14	Jabatan Perhutanan Myanmar —En Khin Maung Oo, Pengarah Bahagian Perancangan & Statistik (ketua)/ <i>Myanmar Forestry Department—Mr Khin Maung Oo, Director Planning & Statistic Division (head)</i>	23 Oktober October
15	YB Datuk Dr Abu Bakar Mohamad Diah, Timbalan Menteri Sains, Teknologi & Inovasi/ <i>Deputy Minister of Science, Technology & Innovation (MOSTI)</i>	23 Oktober October
16	Korea Forest Service, Republic of Korea	18 November

BIL. NO.	PELAWAT VISITORS	TARIKH DATE
17	Delegasi Allah Valley Landscape Development Alliance (AVLDA), Filipina <i>Delegation from Allah Valley Landscape Development Alliance (AVLDA), Philippines</i>	26 November
18	Delegasi Australian Forestry School Golden Anniversary Meeting <i>Delegation from Australian Forestry School Golden Anniversary Meeting</i>	2 Disember December
19	Delegasi Vietnam & Myanmar/ <i>Delegation from Vietnam & Myanmar</i>	16 Disember December

28 Januari

Delegasi dari Fakulti Perhutanan, Universiti Suleyman Demirel, Turki mengadakan lawatan ke FRIM, Kepong untuk meninjau kemungkinan mengadakan kerjasama dengan FRIM dalam bidang pendidikan dan latihan. Kumpulan ini diketuai oleh Prof. Madya Dr Ergun Güntekin termasuk Prof. Madya Dr Birol Uner, Prof. Madya Dr Yılmaz Catal, Prof. Madya Dr Nebi Bilir and Prof. Madya Dr Süleyman Gulcu.

28 January

A delegation from Faculty of Forestry, Suleyman Demirel University, Turkey, paid a visit to FRIM in Kepong to explore the possibility of collaborating with the Institute on education and training. The Turkish delegation, comprising five members is led by Assoc. Prof. Dr Ergun Güntekin includes Assoc. Prof. Dr Birol Uner, Assoc. Prof. Dr Yılmaz Catal, Assoc. Prof. Dr Nebi Bilir and Assoc. Prof. Dr Süleyman Gulcu.



9 April

Menteri NRE, Datuk Seri G Palanivel mengadakan lawatan korporat ke FRIM untuk mengetahui dengan lebih mendalam mengenai institut ini. Beliau diiringi oleh Timbalan Ketua Setiausaha (Pengurusan Alam Sekitar) NRE, Datuk Dr Abdul Rahim Nik dan beberapa pegawai NRE.

9 April

The Minister of NRE, Datuk Seri G Palanivel, conducted his first official corporate visit to FRIM to learn more about the Institute. The Minister was accompanied by the NRE Deputy Secretary General (Environment Management), Datuk Dr Abdul Rahim Nik and other NRE officers.

Dato' Dr Abd Latif Mohmod menyampaikan taklimat kepada Menteri mengenai sejarah, objektif, misi, visi, aktiviti-aktiviti penyelidikan dan pembangunan (R&D), pencapaian serta cabaran yang dihadapi oleh FRIM. Palanivel turut melawat pameran yang diadakan oleh semua bahagian penyelidikan melalui penyelarasan Pengarah Perancangan Penyelidikan, Dato' Dr Marzalina Mansor yang memaparkan aktiviti, penemuan dan produk R&D FRIM yang terkini. Beliau juga merasmikan Galeri Buluh dan Palma

Dato' Dr Abd Latif Mohmod made a presentation to enlighten the Minister of the Institute's history, its objectives, mission, vision, major research and development (R&D) activities, achievements and challenges. The Minister visited an exhibition set up by the various FRIM research divisions, coordinated by FRIM Research Planning Director Dato' Dr Marzalina Mansor, to showcase some of the major recent research and development (R&D) activities and products. Palanivel also officiated the opening of

FRIM yang ditubuhkan pada tahun 2013. Galeri ini mempamerkan koleksi lebih daripada 100 barangan tradisional dan produk moden yang dihasilkan melalui teknologi baharu. Menteri seterusnya menanam anak pokok buluh china (*Phyllostachys viridis*) di pekarangan galeri tersebut.

the FRIM Bamboo and Palm Gallery, set up in 2013. The gallery showcases over 100 exhibits comprising traditional items as well as modern products made from bamboo or palm through new technology. The Minister then planted Chinese bamboo (*Phyllostachys viridis*) near the gallery to mark the special occasion.



19 Ogos

Satu delegasi dari Jerman melawat FRIM untuk mempelajari tentang amalan pengurusan hutan secara mampan (SFM) di Malaysia. Rombongan 10 orang ahli ini terdiri daripada wakil-wakil Parlimen Jerman; Kementerian Makanan dan Pertanian Persekutuan Jerman; Tabung Alam Sedunia (WWF) Jerman; Majlis Perhutanan Jerman; dan agensi pembangunan Jerman (GIZ); sedang mengadakan kunjungan misi pencarian fakta mengenai SFM dan perladangan kelapa sawit.

19 August

A delegation from Germany paid a visit to FRIM campus to learn about the sustainable forest management practices in the country. The 10-member delegation, comprising representatives from the German Parliament; German Federal Ministry of Food and Agriculture; German Forestry Council; World Wide Fund for Nature (WWF) Germany; and German Development Cooperation (GIZ); is here on a fact finding mission into SFM and oil palm plantations from 18 to 25 August.





PENGURUSAN KEWANGAN FINANCIAL MANAGEMENT

PENDAHULUAN

Di bawah Akta Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia 1985 (Akta 319), sebuah dana ditubuhkan bagi membiayai aktiviti penyelidikan dan pembangunan perhutanan Lembaga. Secara keseluruhannya kedudukan dana dan prestasi kewangan Lembaga bagi tahun berakhir 31 Disember 2014 adalah baik, terkawal dan memuaskan. Lembaga bernasib baik kerana mendapat peruntukan mengurus, pembangunan dan R&D daripada Kerajaan Persekutuan yang tinggi melebihi peruntukan tahun sebelumnya sebanyak RM17.57 juta iaitu RM96.34 bagi tahun 2014 berbanding dengan RM78.77 pada tahun 2013 bagi menampung perbelanjaan kos operasi harian Lembaga dan menjalankan aktiviti R&D untuk pembangunan berterusan industri perhutanan dan pemuliharaan alam sekitar. Jumlah perbelanjaan turut meningkat sejajar dengan peningkatan aktiviti dan jumlah pembiayaan yang diterima seperti yang dinyatakan di atas.

Pendapatan

Jumlah pendapatan Lembaga pada tahun 2014 adalah sebanyak RM117.20 juta, iaitu meningkat sebanyak RM19.20 juta atau 19.2% berbanding RM98.00 juta pada tahun sebelumnya. Peningkatan tersebut adalah disebabkan oleh pertambahan jumlah peruntukan mengurus yang diterima daripada 53.62 juta pada tahun 2013 kepada RM57.96 juta pada tahun 2014. Selain itu, jumlah pendapatan geran kerajaan yang lain turut meningkat sebanyak RM13.23 juta iaitu RM38.38 juta berbanding RM25.15 juta pada tahun 2013. Jumlah daripada pendapatan selain geran kerajaan kekal sekitar RM12 juta. Rekod pendapatan Lembaga untuk lima tahun kebelakang adalah seperti yang berikut:

INTRODUCTION

Under the Malaysian Forestry Research and Development Board Act 1985 (Act 319), a fund was created to finance Board's forestry research and development activities. In summary, fund's financial position and financial performance of the Board for the year ended 31 December 2014 was good, manageable and encouraging. The Board is fortunate to receive high operation, development and R&D allocation from the Federal Government, higher than the previous year by RM17.57 million, that is RM96.34 in 2014 compared to RM78.77 in 2013 to finance Board's daily operation expenditure and to carry out research and development activities for the sustainable development of the forestry industries and conservation of the environment.

Revenue

In the year 2014, total revenue received by the Board was RM117.20 million, increased by RM19.20 million or 19.2% against RM98.00 million in the previous year. The increased was due to the increased in the government allocation for operation activities from RM53.62 million in 2013 to RM57.96 million in 2014. On top of that, government allocation for development and R&D also increased by RM13.23 million, that is RM38.38 million compared to RM25.15 million in 2013. Total revenue received other than the government allocation remain the same of around RM12 million. Analysis of revenue and sources of income for the past five (5) years are as follows.

Sumber pendapatan Sources of income	2010 (RM juta) RM million	2011 (RM juta) RM million	2012 (RM juta) RM million	2013 (RM juta) RM million	2014 (RM juta) RM million
Mengurus/Operation	42.75	50.52	52.47	53.62	57.96
Pembangunan/R&D/Development/R&D	20.85	19.37	15.98	24.13	29.45
Agensi Luar/External Agencies	16.11	7.08	9.19	6.33	8.06
Perkhidmatan/Service	6.35	6.79	9.32	9.67	8.93
Sumber lain/Other income	3.86	3.77	4.36	4.27	12.8

Perbelanjaan

Jumlah perbelanjaan Lembaga pada 2014 ialah RM111.22 juta, menunjukkan peningkatan sebanyak RM13.61 juta atau 13.61% berbanding dengan perbelanjaan pada 2013 iaitu sebanyak RM97.61 juta. Perbelanjaan emolument dan caruman pencen merupakan komponen terbesar, mewakili RM54.57 juta atau hampir 50% daripada keseluruhan jumlah perbelanjaan Lembaga, meningkat sebanyak RM3.08 juta atau hampir 6% berbanding dengan tahun sebelumnya. Perbelanjaan bekalan dan perkhidmatan turut meningkat kepada RM40.25 juta pada 2014 berbanding dengan RM34.54 juta pada tahun 2013 atau 16.5%. Rekod perbelanjaan Lembaga untuk lima tahun terakhir adalah seperti yang berikut:

	2010 (RM juta) RM million	2011 (RM juta) RM million	2012 (RM juta) RM million	2013 (RM juta) RM million	2014 (RM juta) RM million
Emolument/Emolument	38.93	39.39	44.53	46.58	49.23
Perkhidmatan dan Bekalan Supplies and Services	31.51	27.90	31.07	34.54	40.25
Perbelanjaan-perbelanjaan lain Other expenditures	17.60	22.50	19.60	16.48	21.74
Cukai pendapatan/Income tax	(854,143)	496,117	527,796	613,104	728,898
	(.85)	.50	0.53	0.61	0.73

Aliran Tunai dan Pelaburan

Lembaga dijangka tidak mengalami masalah aliran dan kecairan tunai dan dapat menjelaskan semua tanggungjawab kewangan pada masa yang ditetapkan. Ini adalah kerana perbelanjaan Lembaga adalah berdasarkan peruntukan yang diluluskan dan pendapatan yang telah diterima sahaja. Lembaga telah melaburkan tunai yang diterima tetapi masih belum digunakan dalam simpanan tetap di bank-bank tempatan dan instrumen lain yang diluluskan oleh Kementerian Kewangan.

Laporan Ketua Audit Negara

Ketua Audit Negara telah memperakukan penyata kewangan Lembaga tahun 2014 dengan memberi Sijil Bersih Audit dan berpendapat bahawa Penyata Kewangan tersebut telah memberi gambaran yang benar dan saksama mengenai kedudukan kewangan Lembaga pada 31 Disember 2014, hasil operasi dan aliran tunainya untuk tahun tersebut berdasarkan piawaian perakaunan yang diluluskan.

Expenditure

The Board expenditure in 2014 was RM111.22 million, it is an increased of RM13.61 million or 13.61% as compared to the expenditure in 2013 amounting to RM97.61 million. Expenditure for emolument and contribution for pension fund was the biggest component representing RM54.57 million or 50% of the Board's total expenditure, it shows an increased of RM3.08 million or 6% as compared to the previous year. Expenditure for goods and services also increased to RM40.25 million in 2014 against RM34.54 million in 2013 or 16.5%. Analysis of Board's expenditure for the past five years were as follows:

Cash Flow and Investment

The Board did not have any cash flow or liquidity problem and had always been able to fulfill all financial obligations on time. The Board had also invested in the cash still not be used in fixed deposit in local banks and financial institution and other instrument approved by the Ministry of Finance.

Auditors General Report

The Auditor General had certified the Board's Financial Statement for 2014 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 2014, its operation and cash flows for that year in accordance with approved accounting standard.

Lembaran Imbangan

Aset tetap milik Lembaga mempunyai nilai buku sebanyak RM149.41 juta pada 31 Disember 2014 berbanding RM143.48 juta pada tempoh tahun yang sama 2013. Jumlah pelaburan simpanan tetap menurun daripada RM91.06 juta 2013 kepada RM85.18 juta pada tahun 2014. Penurunan tersebut bagi memenuhi obligasi kewangan semasa. Liabiliti Lembaga sehingga 31 Disember 2014 kekal dalam lingkungan RM7 juta. Secara keseluruhannya aset bersih Lembaga meningkat sedikit kepada RM239.61 juta daripada RM237.52 juta atau kira-kira RM2.09 juta iaitu 0.9% daripada baki aset bersih 2013. Nisbah-nisbah kewangan juga menunjukkan kedudukan kewangan Lembaga adalah baik dan memberangsangkan. Nisbah-nisbah kewangan Lembaga untuk lima tahun kebelakang adalah seperti berikut:

Balance Sheet

The Board's fixed asset book value stands at RM149.41 million at 31 December 2014 against RM143.48 million at the same time in 2013. Total investment in fixed deposit decreased from RM91.06 million to RM85.18 million. The decreased was due to cash needed to meet its current financial obligation. Board's liabilities as at 31 December 2014 maintained around RM7 million. Overall Board's net asset had increased slightly to RM239.61 million from RM237.52 million or RM2.09 million, that is 0.9% from the total net asset in 2013. Financial ratio indicated that Board financial position is good and encouraging. Financial ratio for the past five years is as follows:

Nisbah kewangan Financial ratio	2010	2011	2012	2013	2014
Aset semasa/Tanggungán semasa Current Assets/Current liabilities	10.21	25.91	10.3	13.28	11.48
Aset Mudah Cair/Tanggungán semasa Liquid assets/Current liabilities	9.57	24.62	9.59	12.81	11.33
Jumlah hutang/Jumlah aset Total liabilities/Total assets	0.03	0.01	0.03	0.03	0.01
Modal digunakan/Jumlah tanggungan Capital employed/Total liabilities	28.36	69.37	29.16	31.01	28.31
Modal digunakan/Aset tetap Capital employed/Fixed assets	1.44	1.46	1.50	1.66	1.60



SISTEM PENGURUSAN KUALITI QUALITY MANAGEMENT SYSTEM

PERKHIDMATAN PENSIJILAN PRODUK FRIM

Pada 4 Jun, FRIM menyampaikan anugerah pensijilan produk kepada empat buah syarikat perintis (Syarikat Yusia Jaya Sdn Bhd, Mabita Sdn Bhd, Smart Victory Sdn Bhd dan Adunan Komersil Sdn Bhd) yang berjaya dalam skim pensijilan produk yang dimulakan oleh FRIM pada 2013. Pensijilan produk ini bertujuan membantu pihak industri pembuatan hiliran berasaskan kayu dan lignoselulosa memastikan tahap kualiti produk mencapai keperluan standard yang ditetapkan serta memenuhi kehendak pelanggan, selaras dengan keperluan pasaran luar negara. Sebagai permulaan, Perkhidmatan Pensijilan Produk (PCS) FRIM menumpukan pada produk perabot yang dibekalkan kepada sekolah menengah dan sekolah rendah. Kesemua syarikat berjaya dipersijilkan bagi produk kerusi dan meja murid-murid sekolah rendah dan menengah.

FRIM PRODUCT CERTIFICATION SERVICES

FRIM has issued product certification to four pioneer companies (Syarikat Yusia Jaya Sdn Bhd, Mabita Sdn Bhd, Smart Victory Sdn Bhd dan Adunan Komersil Sdn Bhd) for their successful compliance to the product certification scheme initiated by FRIM in 2013. The aim of the product certification scheme is to assist the local downstream lignocellulosic- and wood-based manufacturing industry in ensuring their products meet the standard requirements and needs of consumers, in line with international market demands. For starters, FRIM Product Certification Services (PCS) focuses on furniture products supplied to primary and secondary schools. All the companies have obtained certification for their primary and secondary school chairs and desks.



MS ISO 9001:2008 & QE/5S

FRIM mengekalkan pensijilan MS ISO 9001:2008 melalui Audit Pemantauan yang diadakan pada 14 dan 15 Oktober. Sejak 2007, FRIM memperoleh Pensijilan MS ISO 9001:2008 bagi skop pengurusan penyelidikan dan pembangunan (R&D) serta khidmat sokongan bagi pembangunan sektor perhutanan. Melalui sistem baharu yang diperkenalkan, FRIM memperoleh Penanda Aras Terbaik bagi Sistem Pengurusan manakala sistem lain dikategorikan sebagai “matang”. Audit Pemantauan ini dilaksanakan oleh juruaudit dari Intertek International Sdn Bhd, iaitu En. Mohd Nazib Marwan (ketua) dan En. Lim Eng Leng. Mereka menyampaikan pemerhatian dan penemuan setelah melaksanakan audit ke atas 20 cawangan, unit, makmal, bengkel dan stesen untuk penambahbaikan. Sebelum itu, FRIM melaksanakan Audit Dalaman MS ISO 9001:2008 pada Februari hingga Mei 2014. Seramai 93 orang juruaudit dalaman terlibat dan 98 cawangan, unit, makmal, bengkel dan stesen penyelidikan telah diaudit.

MS ISO 9001:2008 & QE/5S

Forest Research Institute Malaysia (FRIM) has successfully retained its MS ISO 9001:2008 certification through Audit Monitoring conducted on 14-15 October 2014. Since 2007, FRIM has obtained the MS ISO 9001:2008 certification for the management scope of research and development (R&D) and support services for the forestry sector development. FRIM has managed to obtain the Best Benchmark for Management Commitment, while other systems were categorised as “mature”. The Surveillance Audit was carried out by auditors from Intertek Sdn Bhd, namely Mr Mohd Nazib Marwan and Mr Lim Eng Leng. They presented their observations and suggestions for some improvements to be made after 20 branches, units, laboratories, workshops and stations were audited. Prior to this, MS ISO 9001:2008 Internal auditing was conducted on all 12 Divisions in February to May 2014. A total of 93 internal auditors were involved and 98 branches, units, laboratories, workshops and research stations were audited.



Lim (kiri) dan Nazib (kanan) semasa di mesyuarat audit/Lim (left) and Nazib (right) during the audit meeting



Audit di salah satu cawangan/Audit at one of the branches

MS ISO/IEC 17025

Audit luar MS ISO/IEC 17025 dilaksanakan sebanyak 13 kali pada tahun ini ke atas 12 makmal ujian di FRIM oleh juruaudit daripada Jabatan Standard Malaysia. Tiga makmal baharu berjaya melepasi audit kepatuhan iaitu Makmal Kimia Tanah, Makmal Entomologi Kayu dan Makmal Biologi. Makmal Kimia Tanah berjaya diakreditasi dengan pensijilan ISO/IEC 17025 pada 3 November. Dua lagi makmal masih menunggu penganugerahan sijil tersebut daripada Jabatan Standard Malaysia. Audit Dalam Siri 1/2014 bagi ISO/IEC 17025 juga telah dilaksanakan bersekali dengan audit dalam MS ISO 9001:2008. Sebanyak 14 makmal telah terlibat semasa audit dalam tersebut.

MS ISO/IEC 17025

MS ISO/IEC 17025 external audit was conducted thirteen times this year to twelve testing laboratories in FRIM. Audit has been conducted by the auditors from Department of Standard Malaysia. There were three laboratories (Soil Chemistry Laboratory, Wood Entomology Laboratory and Biology Laboratory) has been successfully gone through compliance audit this year. Soil Chemistry Laboratory has been accredited with ISO/IEC 17025 certification on 3 November 2014. The other two laboratories are still waiting for the approval from Standards Malaysia for the certification accreditation. The Internal Audit has been conducted together with MS ISO 9001:

PENARAFAN BINTANG

Audit Dalam Penarafan Bintang dilaksanakan oleh pegawai PJK pada 1–3 Julai ke atas proses R&D, pembekalan perkhidmatan, kemudahan rekreasi, penjualan bahan, perkhidmatan ujian, latihan, perundingan dan sewaan. FRIM berjaya memperoleh empat bintang dengan markah 88.98%.

QE/5S

FRIM berjaya memperbaharui pensijilan QE/5S pada tahun ini selepas pelaksanaan audit luar pada 17 Oktober oleh juruaudit daripada Perbadanan Produktiviti Malaysia (MPC) iaitu En. Mohammad Omar dan En. Mohd Rizal Ayob. Audit Dalam dilaksanakan pada 3–9 September di 32 zon yang melibatkan 74 orang juruaudit dalaman. Purata markah bagi 32 Zon ialah 84% —berjaya melepasi sasaran pengurusan, tiada lagi zon yang berada dalam kategori 0–50% dan sembilan zon berada dalam kategori cemerlang.

2008 internal audit. A total of 14 laboratories and 23 auditors has been involved during the audit.

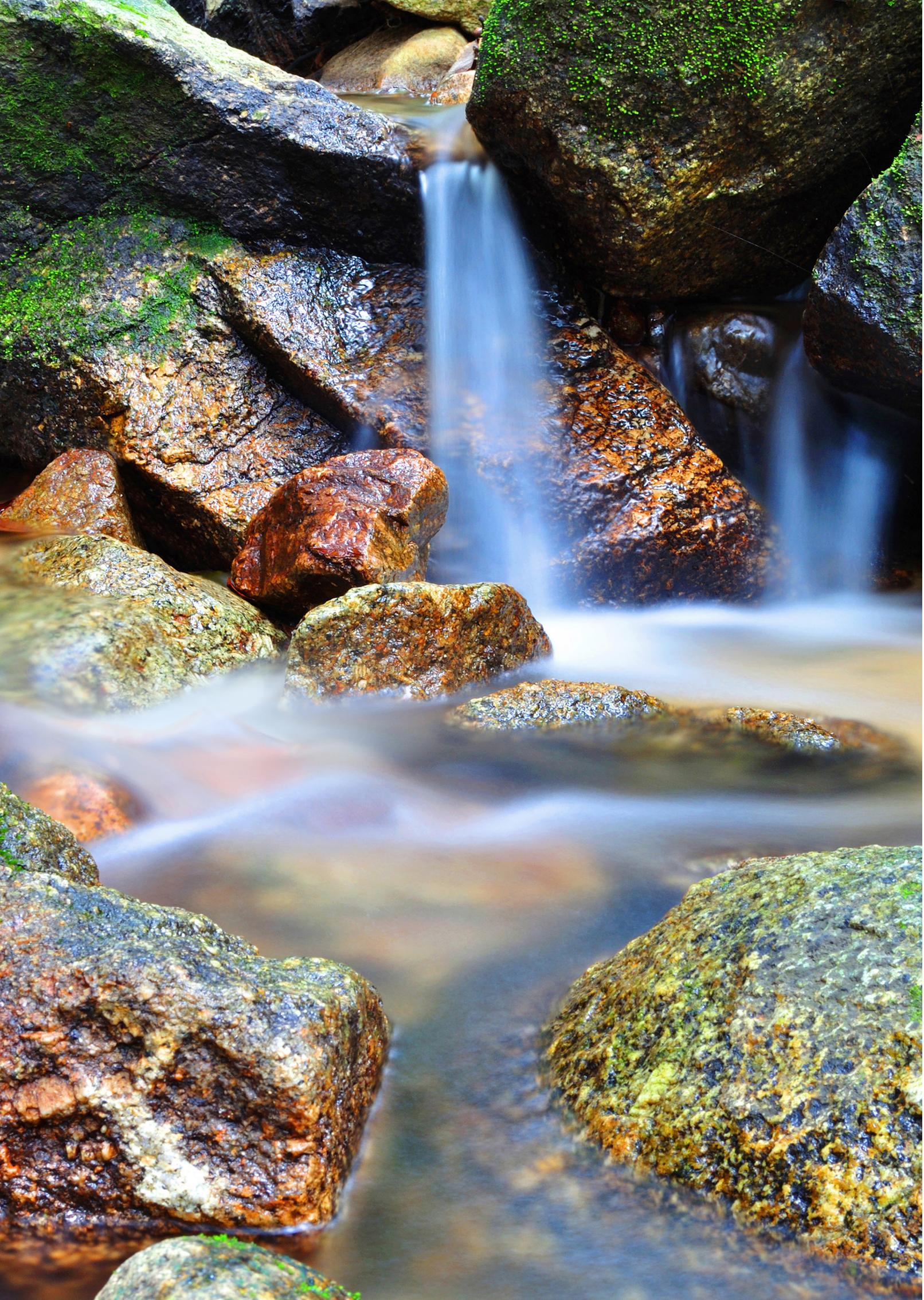
STAR RATING

The Internal Audit for Star Rating was conducted by the Quality Management Unit officers from 1 to 3 July on R&D process, supply of services, recreational facilities, selling matters, testing, training, consultancy and hiring services. FRIM managed to obtain four stars with 88.98% total marks.

QE/5S

FRIM has successfully renewed the Quality Environment (QE/5S) certification, after auditing was conducted on 17 October by auditors, Mr Mohammad Omar and Mr Mohd Rizal Ayob from MPC. The internal auditing was conducted from 3–9 September for 32 zones involving 74 internal auditors. Overall, the implementation was good and some zones showed improvement. The average mark for the 32 zones was 84%, therefore surpassed the management target; no zones obtained 0–50% and nine of the zones were in the excellent category.





SUMBER MANUSIA HUMAN RESOURCE

PERJAWATAN/ESTABLISHMENT

Komposisi Penjawat Awam/Staff Composition	Bil/No
Bilangan penjawat awam/Total number of staff	671 / 244 (k)
Kategori/Categories	
Pegawai (Jawatan Utama Sektor Awam (JUSA) Officers (Public Sector Super Scale)	10
Pegawai penyelidik/Research officers	183 / 71 (k)
Pegawai (selain pegawai penyelidik)/Officers (Other than research officers)	20 / 19 (k)
Penolong pegawai penyelidik/Assistant research officers	38 / 11 (k)
Penolong pegawai (selain penolong pegawai penyelidik)/Assistant officers (Other than Assistant Research Officers)	37 / 2 (k)
Staf (Kump/Pelaksana 2)/staff (Implementor Group 2)	383 / 141 (k)

Nota/Note: K=Kontrak/Contract

PELANTIKAN/APPOINTMENT (TETAP/PERMANENT)

Nama Staf Staff Name	Jawatan/Gred Position/Grade	Bahagian Division	Tarikh Lantik Date
Mohammad Shahfiz Azman	Pegawai Penyelidik/RO Q41	Biodiversiti Hutan For. Biodiv.	5 Februari February
Muhammad Firdaus Rosli	Pemandu Kenderaan/Driver H11	Pentadbiran/Admin	3 Mac March
Muhammad Nur Affzan Muhammad Rozilah	Pembantu Kemahiran Skilled Assistant H17	Pentadbiran/Admin	3 Mac March
Faizal Hasan	Pembantu Tadbir (Kew) Admin. Assistant W17	Kewangan/Finance	17 Mac March
Mohd Hasan Buang	Penolong Pegawai Penyelidik ARO Q27 (PSL)	Taman Botani Kepong Kep. Bot. Gardens	24 Mac March
Muhammad Asri Lias	Penolong Pegawai Penyelidik ARO Q27 (PSL)	Bioteknologi Perhutanan For. Biotech.	24 Mac March
Ahmad Firdaus Zainudin	Penolong Pegawai Penyelidik ARO Q27	Perhutanan & Alam Sekitar For. & Env.	1 April
Mohd Izani Ishak	Penolong Pegawai Penyelidik ARO Q27	Keluaran Hutan/For. Prod.	14 April
Nur Azizi Abdul Rafee	Pembantu Operasi Operational Assistant N11	Bioteknologi Perhutanan For. Biotech.	21 April
Roshamida Ruslan	Pegawai Tadbir/AO N41	Perancangan Penyelidikan Res. Planning	2 Jun June
Nor Haliyan Tan Shilan	Pegawai Tadbir/AO N41	Pengurusan Kualiti Qty Mgmt.	2 Jun June
Zhafri Ab Ghani	Pembantu Penyelidik/RA Q17	Perhutanan & Alam Sekitar For. & Env.	1 Julai July
Norhisyam Ismail	Pembantu Penyelidik/RA Q17	Bioteknologi Perhutanan Forest Biotech.	1 Julai July

Nama Staf Staff Name	Jawatan/Gred Position/Grade	Bahagian Division	Tarikh Lantik Date
Edi Hermi Mahamad Ramli	Pembantu Penyelidik/RA Q17	Komunikasi Korporat Corp. Comm.	1 Julai/July
Muhammad Afizi Osman	Pembantu Awam General Assistant H11	Bioteknologi Perhutanan Forest Biotech.	1 Julai/July
Mohamad Faizal Sharuddin	Pembantu Awam General Assistant H11	Hasilan Semula Jadi Nat. Prod.	1 Julai/July
Mohd Seiful Salehin	Pembantu Awam General Assistant H11	Bahagian Perhutanan & Alam Sekitar/For. & Env.	1 Julai/July
Mohd Nasoha Abdul Wahid	Pembantu Awam General Assistant H11	Pentadbiran/Admin.	1 Julai/July
Sharifudden Samin	Jurutera/Engineer J41	Pentadbiran/Admin.	4 Ogos August
Syed Othman Syed Omar	Pegawai Tadbir/AO N41	Inovasi & Komersialisasi Innov. & Commerc.	4 Ogos August
Zainorasri Yahya	Akauntan/Accountant W41 (PSL)	Kewangan/Finance	6 Ogos August
Toh Ann Nee	Pegawai Tadbir/AO N41	Komunikasi Korporat Corp. Comm	25 Ogos August
Zairul Amin Rabidin	Pegawai Penyelidik/RO Q41	Keluaran Hutan Forest Prod.	13 September
Khairul Azmi Jabar	Pegawai Penyelidik/RO Q41	Keluaran Hutan Forest Prod.	13 September
Ihsan Safwan Kamarazaman	Pegawai Penyelidik/RO Q41	Hasilan Semula Jadi Natural Prod.	13 September

Nota: PSL-Peningkatan Secara Lantikan

PELANTIKAN/APPOINTMENT (KONTRAK/CONTRACT)

Nama Name	Jawatan Post	Bahagian Division	Tarikh Lantik Date of Appointment
Nor Azila Mohamed	Pembantu Penyelidik RA Q17	Inovasi & Komersialisasi Innov. & Commerc.	15 Januari/January
Hafizi Mohd Jaffar	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	15 Januari/January
Sarah Nabilah Rosli	Pembantu Penyelidik RA Q17	Pejabat TKP(O) DDG(O) Office	15 Januari/January
Muhamad Saufi-Aqmal Sulaiman	Pembantu Penyelidik RA Q17	Inovasi & Komersialisasi Innov. & Commerc.	16 Januari/January
Suzaimah Sulaiman	Pembantu Penyelidik RA Q17	Biodiversiti Hutan For. Biodiv.	20 Januari/January
Farah Awatif Khalid	Pembantu Operasi Op. Asst. N11	Perhutanan & Alam Sekitar For. & Env.	23 Januari/January
Nuratikah Arshad	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	23 Januari/January
Kamariah Mihad	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	23 Januari/January
Saharuddin Sabtu	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	23 Januari/January

Nama Name	Jawatan Post	Bahagian Division	Tarikh Lantik Date of Appointment
Ainnur Amira Anuar Musadad	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	23 Januari/January
Siti Fatimah Zaharah Daud	Pembantu Operasi Op. Asst. N11	Perhutanan & Alam Sekitar For. & Env.	23 Januari/January
Nur Hafizah Razali	Pembantu Operasi Op. Asst. N11	Perhutanan & Alam Sekitar For. & Env.	23 Januari/January
Nooredlin Ismail	Arkitek Landskap Landscape Architect J41	Perhutanan & Alam Sekitar For. & Env.	28 Januari/January
Noor Baihaky Che Jamaludin	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	5 Februari/February
Nurul Syuhhada Mohd Asmadi	Pembantu Penyelidik RA Q17	Inovasi & Komersialisasi Innov. & Commerc.	17 Februari February
Yasser Mohamed Ariffin	Pegawai Teknologi Maklumat/Inform. Tech. Officer F41	Biodiversiti Hutan/For. Biodiv.	18 Februari February
Mohd Fadhli Othman	Pembantu Operasi Operational Assistant N11	Pejabat TKP(O)/DDG(O) Office	21 Februari February
Noor Aimie Mohd Khair	Pembantu Operasi Operational Assistant N11	Pejabat TKP(O)/DDG(O) Office	21 Februari February
Nor Lizawati Mat Mokhtar	Pembantu Operasi Operational Assistant N11	Pejabat TKP(O)/DDG(O) Office	21 Februari February
Mastura Zakaria	Pembantu Operasi Operational Assistant N11	Pejabat TKP(O)/DDG(O) Office	21 Februari/February ary
Fatin Nadiyah Sukhairi	Pembantu Operasi Operational Assistant N11	Pejabat TKP(O)/DDG(O) Office	21 Februari February
Nurul Nadiyah Abd Rahim	Pembantu Operasi Operational Assistant N11	Pejabat TKP(O)/DDG(O) Office	21 Februari February
Maziela Mohd Kamis	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	24 Februari February
Suzila Md Noh	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	24 Februari February
Mohamad Nazrin Che Saad	Pen. Peg. Penyelidik ARO Q27	Hasilan Semula Jadi Nat. Prod.	3 Mac/March
Nur Afniza Mohammad Ghazali	Pen. Peg. Penerangan Asst. Inform. Officer S27	Pengurusan Korporat Corp. Comm.	3 Mac/March
Nor Afiedatul Akmal Mohd Yousof	Pembantu Penyelidik RA Q17	Hasilan Semula Jadi Nat. Prod.	10 Mac/March
Nurul Haslinda Makhtar	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O) DDG(O) Office	10 Mac/March
Nurnadiyah Rahim	Pegawai Penyelidik RO Q41	Hasilan Semula Jadi Nat. Prod.	17 Mac/March
Nor Fadilah Wook	Pembantu Penyelidik RA Q17	Bioteknologi Perhutanan For. Biotech.	17 Mac/March
Ajeera Tamin	Pembantu Operasi Operational Asst. N11	Perhutanan & Alam Sekitar For. & Env.	24 Mac/March
Maryam Jamilah Mohamed Amran	Pembantu Operasi Operational Asst. N11	Perhutanan & Alam Sekitar For. & Env.	24 Mac/March

Nama Name	Jawatan Post	Bahagian Division	Tarikh Lantik Date of Appointment
Mohd Soffian Mohd Ali	Pemandu Kenderaan Driver H11	Pentadbiran/Admin.	24 Mac/March
Rosmizi Yusof	Pegawai Tadbir/AO N41	Perhutanan & Alam Sekitar For. & Env.	1 April
Siti Noor Hidayah Abdullah	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	1 April
Muhamad Azmi Nasri	Pembantu Awam General Asst. H11	Perhutanan & Alam Sekitar For. & Env.	1 April
Siti Nadhirah Roszalli	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	1 April
Mohamad Farhan Mohamad Nazri	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	1 April
Wan Aminbaqi Wan Mahmud	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	1 April
Md Azharulzaman Mohamed Said	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	1 April
Muhamad Nazir Rahim	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	1 April
Mohamad Husaini Hashim	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	7 April
Rosma Rohaimi	Pegawai Penyelidik RO Q41	Perhutanan & Alam Sekitar For. & Env.	14 April
Suhaila Sufian	Pembantu Tadbir (Kew) Admin. Asst. (Finance) W17	Kewangan/Finance	15 April
Nurul Faihira Kamaruzaman	Pembantu Penyelidik RA Q17	Keluaran Hutan/For. Prod.	16 April
Nur Nadiah Mazlan	Pembantu Tadbir (Kew) Admin. Asst. (Finance) W17	Inovasi & Komersialisasi Innov. & Commerc.	21 April
Wan Muhammad Hafizi Wan Hassan	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	21 April
Asyraf Ikhmal Zulkifli	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	21 April
Mimi Suzaini Mohamed	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	21 April
Norsainah Said	Pembantu Operasi Operational Asst. N11	Pejabat TKP(O)/DDG(O) Office	21 April
Nur Fasehah Zulkufli	Pembantu Operasi Operational Asst. N11	Perhutanan & Alam Sekitar For. & Env. (UNESCO)	21 April
Nur Farhana Jamaludin	Pen. Pegawai Tadbir AAO N27	Perancangan Penyelidikan Res. Plan.	2 Mei/May
Mohamad Syukri Abdul Wahab	Pemandu Kenderaan/Driver H11 (Mengurus/Mgmt)	Pentadbiran/Admin.	2 Mei/May
Muhamad Zahir Zakwan Mohd Zainal Abidin	Pembantu Operasi Operational Asst. N11 (Mengurus/Mgmt)	Pentadbiran/Admin.	2 Mei/May
Nurkhairun Amrina Ahmad Kamal	Pembantu Tadbir (Kew) Admin. Asst. (Fin) W17	Kewangan/Finance	5 Mei/May

Nama Name	Jawatan Post	Bahagian Division	Tarikh Lantik Date of Appointment
Mohd Solehudden Mohd Ahhari	Pembantu Penyelidik RA Q17	Sumber Manusia/Human Res.	5 Mei/May
Ahmad Fairuz Ali	Pembantu Awam General Asst. H11	Bioteknologi Perhutanan For. Biotech.	2 Jun/June
Mohd Afzanizam Muda	Pegawai Penyelidik RO Q41	Perhutanan & Alam Sekitar For. & Env.	9 Jun/June
Mohamad Azhar Sarip	Pembantu Penyelidik RA Q17	Bioteknologi Perhutanan For. Biotech.	9 Jun/June
Ummu Hani Badron	Pembantu Penyelidik RA Q17	Hasilan Semula Jadi Nat. Prod.	9 Jun/June
Norsuhaina Zakaria	Pegawai Penyelidik RO Q41	Hasilan Semula Jadi Nat. Prod.	16 Jun/June
Nur Fazreen Zainal	Pegawai Penyelidik RO Q41	Perancangan Penyelidikan Res. Plan.	16 Julai/July
Mohd Asraf Ibrahim	Pegawai Penyelidik RO Q41	Perancangan Penyelidikan Res. Plan.	16 Julai/July
Wan Noor Asmira Wan Hussin	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	16 Julai/July
Fakhrul Hisyam Tekoh	Pembantu Penyelidik RA Q17	Keluaran Hutan/For. Prod.	16 Julai/July
Nor Hidayah Muhammad	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	24 Julai/July
Muhamad Izham Muhamad Jamil	Pegawai Penyelidik RO Q41	Perancangan Penyelidikan Res. Plan.	4 Ogos/August
Mohamad Farhan Mohamad Nazri	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Nur Azurah Zainuddin	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Siti Afifah Haziman	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Shaodah Juperi	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Siti Salina Mohd Mansor	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Nurbaiti Abd Wahid	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Mohamad Azwir Ali Usar	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Syazaliyana Samsudin	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Mohd Al Affiz Abdul Shukor	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Fara Syahidha Markum	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Norhamizah Othman	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Noor Nazurah Rosli	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August

Nama Name	Jawatan Post	Bahagian Division	Tarikh Lantik Date of Appointment
Mohd Amirul Iqram Shuhaimi	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Dzurani Mohamed Yusoff	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Zetty Zulikha Hafiz	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Noradirawafa Adnan	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Nursyima Abd karim	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Umi Nurfatin Mohamad Husni	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	6 Ogos/August
Mohamad Hadyan Syamil Che Mustapa	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	8 Ogos/August
Abdul Razak Sahril	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	11 Ogos/August
Mohamad Afiq Akmal Mehrup	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	11 Ogos/August
Norhidayah Abd Rasid	Pembantu Penyelidik RA Q17	Perhutanan & Alam Sekitar For. & Env.	18 Ogos/August
Robiatul Adawiyah Razali	Pembantu Penyelidik RA Q17	Bioteknologi Perhutanan For. Biotech.	18 Ogos/August
Mohd Hafizi Russelan	Pembantu Penyelidik RA Q17	Hasilan Semula Jadi Nat. Prod.	18 Ogos/August
Azreena Amer Khan	Pegawai Penyelidik RO Q41	Perancangan Penyelidikan Res. Plan.	18 Ogos/August
Mohd Nasrul Mohd Nawi	Peg. Undang-Undang Legal Officer L41	Undang-Undang/Legal	2 September
Muhammad Daniel Mohd Yusof	Peg. Undang-Undang Legal Officer L41	Undang-Undang/Legal	3 September
Norsaidatul Aakmal Mohamad	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	18 September
Siti Latifah Abdul Halim	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	18 September
Nurhajar Sidin	Pembantu Tadbir (P/O) Admin Asst. (C/O) N17	Pentadbiran/Admin.	1 Oktober/October
Mariam Zainuddin	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	1 Oktober/October
Nur Syazni Adam	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	1 Oktober/October
Noor Jumaatun Ismail	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan.	1 Oktober/October
Md Azharulzaman Mohamed Said	Pembantu Penyelidik RA Q17 (Lantikan Semula Re-appointment)	Pejabat TKP(O)/DDG(O) Office	1 Oktober/October

Nama Name	Jawatan Post	Bahagian Division	Tarikh Lantik Date of Appointment
Fatin Nadiyah Sukhairi	Pembantu Penyelidik RA Q17 (Lantikan Semula Re-appointment)	Pejabat TKP(O)/DDG(O) Office	1 Oktober/October
Wan Aminbaqi Wan Mahmud	Pembantu Penyelidik RA Q17 (Lantikan Semula Re-appointment)	Pejabat TKP(O)/DDG(O) Office	1 Oktober/October
Noor Aimie Mohd Khair	Pembantu Penyelidik RA Q17 (Lantikan Semula Re-appointment)	Pejabat TKP(O)/DDG(O) Office	1 Oktober/October
Mohd Fadhli Othman	Pembantu Penyelidik RA Q17 (Lantikan Semula Re-appointment)	Pejabat TKP(O)/DDG(O) Office	1 Oktober/October
Madiah Muhamad Nawi	Pembantu Penyelidik RA Q17 (Lantikan Semula Re-appointment)	Pejabat TKP(O)/DDG(O) Office	1 Oktober/October
Noor Suriyanti Mohamed	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan	7 Oktober/October
Muhammad Saufi Mohd Hanafiah	Pembantu Penyelidik RA Q17	Perancangan Penyelidikan Res. Plan	7 Oktober/October
Nur Azani Abdul Rasid	Pegawai Tadbir/AO N41 (Lantikan Semula Re-appointment)	Sumber Manusia/Human. Res.	15 Oktober/October
Mohd Zaini Zainol	Pembantu Penyelidik Gred RA Q17	Bioteknologi Perhutanan For. Biotech.	15 Oktober/October
Nur Nazihah Mohamad	Pembantu Penyelidik Gred RA Q17	Bioteknologi Perhutanan For. Biotech.	15 Oktober/October
Siti Fairus Zakaria	Pegawai Penyelidik RO Q41	Taman Botani Kepong Kepong Bot. Gdn.	3 November
Norzielawatie bt Salleh	Pegawai Penyelidik RO Q41	Biodiversiti Hutan/For. Biodiv.	3 November
Syazwani Azman	Pegawai Penyelidik RO Q41	Biodiversiti Hutan/For. Biodiv.	3 November
Nur Elysa Shakira Othman	Pen. Pegawai Tadbir Asst. Admin Off. N27	Keluaran Hutan/For. Prod.	3 November
Noor Nekkazrul Husain	Pembantu Penyelidik RA Q17	Biodiversiti Hutan/For. Biodiv.	3 November
Nurul Haslinda Makhtar	Pembantu Penyelidik RA Q17	Hasilan Semula Jadi Nat. Prod.	3 November
Nur Munirah Sabki	Pembantu Penyelidik RA Q17	Hasilan Semula Jadi Nat. Prod.	3 November
Mohd Nazri Abdul Latif	Pembantu Penyelidik RA Q17	Komunikasi Korporat Corp. Comm.	17 November
Irny Nabila Nadzri	Pereka/Artist B17 (mengurus/Mgmt.)	Unit Pameran/Exhibition Unit	1 Disember/ December
Amirul Shafik Yusri	Pembantu Penyelidik RA Q17	Biodiversiti Hutan/For. Biodiv.	1 Disember/ December

KENAIKAN PANGKAT/PROMOTION

Nama Name	Jawatan & Gred Post & Grade	Tarikh Date
Dr Rozaini Abd Kadir	Pegawai Penyelidik/RO Q52	1 Ogos/August 2011
Dr Siti Aisah Shamsudin	Pegawai Penyelidik/RO Q52	26 Ogos/August 2011
Dr Lokmal Ngah	Pegawai Penyelidik/RO Q52	29 Ogos/August 2012
Dr Shawn Cheng	Pegawai Penyelidik/RO Q48	23 Februari/February 2012
Dr Sik Huei Shing	Pegawai Penyelidik/RO Q48	22 Jun/June 2013
Dr Lok Eng Hai	Pegawai Penyelidik/RO Q48	10 Ogos/August 2011
Dr Farah Fazwa Md Ariff	Pegawai Penyelidik/RO Q48	14 September 2012
Jumaaton Abu Bakar	Akauntan/Accountant W44	1 Januari/January 2014
Zaiton Mohd Zain	Pembantu Tadbir (P/O)/Admin Asst. N26	1 Januari/January 2014
Rodziah Hashim	Pen. Peg. Penyelidik/ARO Q32 (KUP)	1 Disember/December 2013
Mohd Mohd Sahat	Pen. Peg. Penyelidik/ARO Q32 (KUP)	1 September 2013
Sukinah Jamaludin	Pembantu Tadbir (P/O) /Admin Asst. N22 (KUP)	1 Oktober/October 2013
Siti Sanisah Kamsah	Pembantu Akauntan/Acc. Asst. W22 (KUP)	1 Julai/July 2013

Nama Name	Jawatan & Gred Post & Grade	Tarikh Date
Ismail Mansor	Pembantu Tadbir (Kew)/Admin. Asst. (Fin) W22 (KUP)	1 Julai/July 2013
Roziah Ayoub	Pembantu Tadbir (Kew)/Admin. Asst. (Fin) W22 (KUP)	1 Oktober/October 2013
Kamarul Hizam Hamsan	Pembantu Penyelidik/RA Q22 (KUP)	1 September 2013
Zainun Othman	Pembantu Penyelidik/RA Q22 (KUP)	1 September 2013
Suhaimi Husain	Pembantu Penyelidik/RA Q22 (KUP)	1 September 2013
Tanjong Abdullah	Pembantu Penyelidik/RA Q22 (KUP)	1 September 2013
Saripah Talib	Pembantu Penyelidik/RA Q22 (KUP)	1 September 2013
Nik Yasmin Nik Yahya	Pembantu Penyelidik/RA Q22 (KUP)	1 September 2013
Abdul Rahim Omar	Pengawas Hutan/Ranger G14 (KUP)	1 Oktober/October 2013
Mohd Yamin Yusof	Tukang/K2 R22 (KUP)	1 Ogos/August 2013
Mohd Nizal Salehin	Pembantu Am Pejabat/Off. General Asst. N4 (KUP)	1 September 2013
Khairuddin Kamaruddin	Pen. Peg. Penyelidik/ARO Q36	15 Oktober/October 2014
Abd Majid Jalil	Pen. Peg. Penyelidik/ARO Q32	1 Oktober/October 2014
Nuziah Hashim	Pen. Peg. Penyelidik/ARO Q32	1 Disember/December 2014
Mohd Rizal Mohd Kassim	Pen. Peg. Penyelidik/ARO Q32 (KUP)	24 Julai/July 2014
Mohd Azhar Ishak @ Asahak	Pen. Peg. Penyelidik/ARO Q32 (KUP)	18 Ogos/August 2014
Norbaite Saharuddin	Penolong Akauntan/Account. Asst. W32 (KUP)	30 Januari/January 2014
Mohamad Akhir Abdul Rahman	Penolong Pegawai Tadbir/AAO N32	15 Oktober/October 2014
Mohd Rozmi Mohamed Ariff	Penolong Juruaudit/Asst Auditor W32 (KUP)	2 Julai/July 2014
Ab Jalil Muhammad	Pembantu Penyelidik/RA Q26	1 April 2014

Nama Name	Jawatan & Gred Post & Grade	Tarikh Date
Rashidah Hasnim@ Hashim	Pembantu Penyelidik/RA Q22	1 Jun/June 2014
Saharudin Musa	Pembantu Penyelidik/RA Q22	1 Oktober/October 2014
Rabiatun Adawiyah Abu Bakar	Pembantu Penyelidik/RA Q22	1 Oktober/October 2014
Nurol Hasni Abdul Razak	Pembantu Tadbir (P/O)/Admin Asst. (C/O) N22	1 Jun/June 2014
Jura Din	Pembantu Tadbir (P/O)/Admin Asst. (C/O) N22 (KUP)	2 Mei/May 2014
Abdul Ghani Mohamad	Pembantu Kemahiran/Skilled Assistant H22	1 Jun/June 2014
Rosidi Sulaiman	Pembantu Kemahiran/Skilled Assistant H22	1 Jun/June 2014
Abd Rahim Hj Yunus	Pengawas Hutan/Ranger G14 (KUP)	1 April 2014
Khaironl Ishak	Tukang K2 R22 (KUP)	24 Julai/July 2014
Mohd Nizam Mustapa	Pekerja Awam/General Worker R3 (KUP)	1 Mac/March 2014
Mohd Rosle A Rahman	Pekerja Awam/General Worker R3 (KUP)	1 Mac/March 2014
Sukeri Don	Pekerja Awam/General Worker R3 (KUP)	1 Mac/March 2014

PEMANGKUAN JAWATAN/ACTING APPOINTMENT

Nama Name	Jawatan Pemangku & Gred Acting Post & Grade	Tarikh Date
Dr Ahmad Zuhaidi Yahya	Pegawai Penyelidik Gred Utama/RO (Public Sector Super Scale) 'C' VU7	1 Ogos/August 2014–31 Julai/July 2016
Pn Rohana Abd Rahman	Pegawai Tadbir/AO N44	3 Jun/June 2014
Wahayu Abdul Wahab	Pegawai Penerangan/IO S44	1 Julai/July 2014–31 Disember/December 2014

LATIHAN AKADEMIK/ACADEMIC TRAINING

Bil./No.	Nama/Name	Ijazah/Degree (PhD/MSc)	Universiti/University
1	Dr Norhayati Abdullah	PhD	Universiti Malaya
2	Dr Mazura Pizar		University of Glasgow, UK
3	Dr Sam Yen Yen		Universiti Malaya
4	Nur Fairuz Mat Yassin	MSc	Universiti Teknologi MARA
5	Mohd Jamil Abd Wahab		Universiti Malaya
6	Nurul Hilal Ahmad Tarmidzi		Universiti Kebangsaan Malaysia
7	Lim Chung Lu		Universiti Malaya
8	Hema a/p Thopla Govender		Universiti Malaya

Skim Bantuan Penyelidikan/Research Assistantship

1	Nurul Farhanah Zakaria	MSc	Universiti Kebangsaan Malaysia
2	Ahmad Fitri Zohari		Universiti Kebangsaan Malaysia
3	Yanti Abd Kadir		Universiti Teknologi MARA

PINGAT KEBESARAN/HONORARY MEDALS

BIL/NO	NAMA/NAME	TARIKH/DATE	PINGAT/MEDAL
1	Dr Ismail Harun	8 Mei/May	Ahli Mangku Negara (A.M.N)
2	Dr Nor Azah Mohamad Ali	8 Mei/May	Ahli Mangku Negara (A.M.N)
3	Dr Gan Kee Seng	8 Mei/May	Ahli Mangku Negara (A.M.N)
4	Mohd Afendi Hussin	23 September	Pingat Pangkuan Negara (P.P.N)



Dr Ismail Harun menerima pingat AMN daripada
SPB Yang di-Pertuan Agong, Tuanku Abdul Halim Mu'adzam Shah
Dr Ismail Harun receiving the AMN medal from
SPB Yang di-Pertuan Agong, Tuanku Abdul Halim Mu'adzam Shah

Nota/Notes:

Administrative Officer—AO
Assistant Research Officer—ARO
Deputy Director General (Operational)—DDG(O)
Research Assistant—RA
Research Officer—RO
Administration—Admin.
Assistant—Asst.
Corporate Communication—Corp. Comm.
Forest Biodiversity—For. Biodiv.

Forestry Biotechnology—For. Biotech.
Forestry and Environment—For. & Env.
Forest Products—For. Prod.
Human Resource—Human Res.
Innovation and Commercialisation—Innov. & Commerc.
Kepong Botanical Gardens—Kep. Bot. Gdn.
Natural Products—Nat. Prod.
Research Planning—Res. plan.
Quality Management—Qty. Mgmt.

PEGAWAI OFFICERS

Senarai pegawai FRIM Gred 27 dan ke atas (kelulusan tertinggi)
List of FRIM officers Grade 27 and above (highest educational background):

PEJABAT KETUA PENGARAH/DIRECTOR GENERAL'S OFFICE

Ketua Pengarah (KP)/Director General

Dato' Dr Abd Latif Mohmod, (DIMP, JSM, KMN, AMN)
PhD Non-Wood Forest Product (UPM)

Timbalan Ketua Pengarah (Penyelidikan & Pembangunan)

Deputy Director General (Research & Development)

Dr Mohamed Nor Mohd Yusoff, (KMN) PhD Paper Chemistry (Manchester)

Timbalan Ketua Pengarah (Operasi)

Deputy Director General (Operations)

Dr Norini Haron, PhD (Aberystwyth, Wales)

Pegawai Penyelidik/Research Officer

Praveena a/p Balai Kerishnan, BSc Forestry (UMS)

Pegawai Penerangan/Information Officer

Wahayu Abdul Wahab, B Comm (UPM)

Pegawai Penyelidik/Research Officer

Noor Atizza Mansor, MSc IT (UKM)

Pereka Grafik/Graphic Artist

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

Setiausaha Pejabat/Administrative Secretary

Ketua Pengarah/Director General

Amrah Toha, Dip Sec. Sc. (UiTM)

Setiausaha Pejabat/Administrative Secretary

Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)

Deputy Director General (Research and Development)

Zariza Mohamed Yusuf, Dip Sec. Sc. (UiTM)

Unit Undang-Undang/Legal Unit

Ketua/Head

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

Pegawai Undang-Undang/Legal Officer

Muhammad Daniel Mohd Yusof, LLM (Islamic Banking & Finance Law) (UIA)

Pegawai Undang-Undang/Legal Officer

Mohd Nasrul Mohd Naw, LLB (Hons) (UIA)

Penolong Pegawai Tadbir/Assistant Administrative Officer

Nurli Shazlin Zulkiffeli, B Admin. Science (Hons) (UiTM)

Audit Dalam/Internal Audit

Juruaudit/Auditor

Ilyani Mazlan, B Acc (Hons) (UiTM)

Penolong Juruaudit/Assistant Auditor

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

Unit Pengurusan Kualiti/Quality Management Unit

Ketua/Head

Salamah Selamat, BSc Analytical Chem (Hons)(UKM)

Pegawai Penyelidik/Research Officers

Suhana Rafidah Md. Yusof, MSc Qty & Product. Improv. (UKM)

Suharti Samod, BSc Forestry (UPM)

Pegawai Tadbir/Administration Officer

Nor Haliyan Tan Shilan, MSc IT (UiTM)

Unit Komunikasi Korporat/Corporate Communication Unit

Ketua/Head

Norhayati Nordin, MSc Tech. & Innov. Mgmt (Sussex)

Pegawai Media/Media Officer

Toh An Nee, B Mass Comm. (USM)

Pegawai Perhubungan Awam/Public Relations Officer

Maria Arlene Jackan Anak Siba, BSc Int. Trop. Forestry (UMS)

Pegawai Pelatih Mobiliti/Mobility Trainee Officer

MSc Forestry (UPM)

Penolong Pegawai Penerangan/Assistant Information Officer

Nur Afniza Mohammad Ghazali, B Corp. Admin. (UiTM)

Unit Integriti/Integrity Unit

Mohd Asmawee Ismail, MBA (UPM)

Unit Perkhidmatan Pensijilan Produk/Product Certification Services Unit

Pengarah Urusan/Managing Director

Mohd Zamshari Abd Rahman, MBA (UIAM)

Pengurus Operasi/Operation Manager

Azharizan Mohd Norizan, MSc Forest Prod. & Marketing (UiTM)

Pegawai Pemasaran/Marketing Officer

Mazdiana Mohd Zain, B Corp. Admin. (Hons) (UiTM)

Pengurus Pensijilan/Certification Manager

Salamah Selamat, BSc Analytical Chem. (Hons) (UKM)

Timbalan Pengurus Pensijilan/Deputy Certification Manager

Nor Haliyan Tan Shilan, MSc IT (UiTM)

Pengurus Kualiti/Quality Manager

Suhana Rafidah Md. Yusof, MSc Qty & Product. Improve. (UKM)

Pengurus Dokumen/Document Manager

Suharti Samod, BSc Forestry (UPM)

Penolong Pegawai Tadbir dan Kewangan/Assistant Administrative & Finance Officer

Mohd Hafiz Musa, MSc Furniture Des. & Eng. (UiTM)

Penolong Pegawai Pemasaran/Assistant Marketing Officer

Nur Elysa Shakira Othman, Dip Marketing (PTSB)

BAHAGIAN PERANCANGAN PENYELIDIKAN/RESEARCH PLANNING DIVISION

Pengarah/Director

Dato' Dr Hj Marzalina Hj Mansor, (KMN), PhD (UKM)

Cawangan Dasar dan Perancangan Penyelidikan/Policy and Research Planning Branch

Ketua/Head

Dr Hj Nur Supardi Md Noor, (AMK), PhD Ecology (Reading)

Pegawai Penyelidik/Research Officers

Dr Mohd Rosli Haron, PhD Molecular Bio. & Genetic Eng. (UPM) (Mulai Jun/From June)

Nik Zanariah Nik Mahmood, MSc Corp. Comm. (UPM)

Pegawai Tadbir/Administrative Officer

Roshamida Ruslan, MSc IT (UiTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Ariff Fahmi Abu Bakar, BSc For. (Hons) (UMS)

Muhamad Izham Muhamad Jamil, MSc Health Toxic. (USM)

Pegawai Teknologi Maklumat (Kontrak)/Inform. Technology Officer (Contract)

Rosniza Rawi, MSc IT (UiTM)

Pen. Pegawai Tadbir (Kontrak)/Assistant Admin. Officer (Contract)

Nur Farhana Jamaludin, Dip Marketing (Politek. Sultan Salahuddin Abdul Aziz Shah)

Program Ekonomi dan Analisis Strategik/Economic and Strategic Analysis Programme

Ketua/Head

Dr Ismariah Hj. Ahmad, PhD Forest Res. Econs. (Washington)

Pegawai Penyelidik/Research Officers

Mohd. Parid Mamat, MSc Forest Econs. (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Norliyana Adnan, M. Eng. Env (UTM)

Juliana Ahmad, BSc Agribusiness (UPM)

Azreena Amer Khan, MSc Plant. Mgmt. (UPM)

Pegawai Hal Ehwal Ekonomi (Kontrak)/Economist (Contract)

Noor Hazmira Merous, MSc Natural Res. & Environ. Econs. (UPM)

Program Perhutanan Sosial/Social Forestry Programme

Ketua/Head

Dr Lim Hin Fui, PhD Soc. Anthropology (UM)

Pegawai Penyelidik/Research Officers

Huda Farhana Muslim, MSc Tourism Mgmt (UiTM)

Pegawai Tadbir/Admin. Officer

Rohana Abd. Rahman, MSc Marketing (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Mohd Asraf Ibrahim, B Sc. Microbiology (Hons) (UKM)
Nur Fazreen Zainal, B Sc. Horticulture (Hons) (UPM)

Pegawai Penyelidik Sosial (Kontrak)/Social Research Officers (Contract)

Norshakila A/P Yusof, B Soc. Sc (Hons) (UKM) (Sehingga/Until 30 September)
Intan Nurulhani Baharuddin, B Soc. Sc. (Hons) (UKM)

BAHAGIAN PERHUTANAN DAN ALAM SEKITAR/FORESTRY AND ENVIRONMENT DIVISION

Pengarah/Director

Dr Ismail Harun, PhD Forest Mgmt. (UPM)

Setiausaha Pejabat/Administrative Secretary

Zanariah Nassaruddin, Dip Sec. Sc. (UiTM)

Program Hutan Asli/Natural Forest Programme

Ketua/Head

Dr Samsudin Musa, PhD Botany (UKM)

Setiausaha Pejabat/Administrative Secretary

Nor Shahidah Hussin, Dip Sec. Science
(Politeknik Tuanku Syed Sirajuddin)

Pegawai Penyelidik/Research Officers

Dr Raja Barizan Raja Sulaiman, PhD Biological & Molecular Sci. – Plant Eco.(Stirling)
Dr Ismail Parlan, PhD Botany (UKM)
Dr Wan Mohd Shukri Wan Ahmad, PhD Environ. Sci. (UKM)
Mohd Nasir Husin, MSc Environ. Mgmt (UKM)
Dr Serafina Christine Fletcher, PhD Zoology (UKM)
Nur Hajar Zamah Shari, MSc Tropical Forest Mgmt (UPM)
Salleh Mat, MSc Forest Economics (UPM)
Tariq Mubarak Husin, BSc Forestry (UPM)
Azharizan Mohd Norizan, MSc Forest Prod. & Marketing (UiTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Farah Shahanim Mohamed Mohidin, MSc Conserv. Biology (UKM)
Musalmah Nasardin, BSc Biology (Plant) (UPM)
Mohamad Faizul Kamarudin, BSc Geomatic Science (UiTM)
Nur Zati Akma Mustafa, MSc Zoologi (UKM)
Noraishah Safee, MSc Environ. Monitoring & Assess. (UKM)
Norsheilla Mohd Johan Chuah, MSc Science Remote Sensing (UTM)
Mohd Izwan Ramlan, BSc Agricultural Sc. (UPM)
Mohamad Danial Md Sabri, BSc Bio-Composite Technology (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Sadali Sahat
Harfendy Osman, Dip Comp. Sc. (UPM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officers (Contract)

Muhammad Safuan Sulaiman, Dip Eng. in Building Services
(Politeknik Sultan Azlan Shah)

Program Ekopelancongan dan Hutan Bandar/Ecotourism and Urban Forestry Programme

Ketua/Head

Dr Noor Azlin Yahya, PhD Forest Recreation Mgt. (UPM)

Pegawai Penyelidik/Research Officers

Ahmad Azaruddin Mohd. Noor, MSc Landscape Studies (UPM)
 Ahmad Nazarudin Mohd. Roseli, MSc Plant Eco-physiology (UPM)
 Sreetheran Maruthaveeran, MSc Trop. Forest Resource Mgmt. (UPM)
 Nik Azyyati Abdul Kadir, BSc Forestry (UPM)
 Nik Adlin Nik Mohamed Sukri, BSc Landscape Arch. (UTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Nazimatul Azma Nazeri, BSc Forestry (UPM)
 Sharmillah Saleh, B Forestry Sc. (UMS)

Penolong Pegawai Penyelidik/Assistant Research Officers

Mohd. Afendi Hussin, Dip Agric. (UPM)
 Azahari Hj. Mohd. Yusoff, Dip Landscape Design (UiTM)
 Naimah Che Long, BSc Forestry (UPM)
 Wan Mohd Nafizul Hal Alim Wan Ahmad, BSc Electric. Eng. (UiTM)

**Program Geoinformasi/Geoinformation Programme
 Ketua/Head**

Dr Abd Rahman Kassim, PhD Forest Resources (Oregon State)

Pegawai Penyelidik/Research Officers

Muhammad Farid Abdul Rashid, M For. (Oregon State)
 Tan Sek Aun, MSc Forestry (UPM)
 Hamdan Omar, MSc Remote Sensing (UTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Mohd Azahari Faidi, MSc Remote Sensing (UTM)
 Mohd Rizuwan Mamat, B Eng., Mech. (UiTM)
 Muhamad Afizzul Misman, MSc Spatial Eng. (UPM)
 Siti Yasmin Yaakub, BSc Remote Sensing (UTM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Rodziah Hashim, Dip Sc Geoinform. (UiTM)
 Abdul Azhan Shah Idris, Dip Forestry (UPM)

Setiausaha Pejabat/Administrative Secretary

Azrinawati Samsuri, Dip. Exec. Secretary (UiTM)

**Program Perubahan Iklim dan Perhutanan/Climate Change and Forestry Programme
 Ketua/Head**

Dr Elizabeth Philip, PhD Plant Physiology (UM)

Pegawai Penyelidik/Research Officers

Azian Mohti, MSc App. Remote Sensing/GIS (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Rosma Rohaimi, M Eng. Environ. Engineering (UPM)
 Mohd Afzanizam Muda, BSc Science & Environ. Mgmt (UM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Nazaruddin Ramli, Dip Agric. (UPM)
 Mohd Rizal Mohd Kassim, Dip Plantation Mgmt (UiTM)

**Program Ekohidrologi/Ecohydrology Programme
 Ketua/Head**

Dr Siti Aisah Shamsuddin, PhD Hydro. & Water Resource Mgmt (UTM)

Pegawai Penyelidik/Research Officers

Mohd. Ghazali Hasan, M Agric. Sc. (UPM)
Dr Saiful Iskandar Khalit, PhD Geotech. & Geological Eng. (UPM)
Marryanna Lion, MSc Env. Pelan. & Mgmt.(UPM)

Penolong Pegawai Penyelidik/Assistant Research Officers

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

**Taman Botani Kepong/Kepong Botanic Garden
Ketua/Head**

Hj. Adnan Mohammad, MSc (London)

Pegawai Penyelidik/Research Officers

Norsham Suhaina Yaakob, MSc (UKM)

Pegawai Penyelidik Sosial/Social Research Officer

Nur Suriani Salleh, BSc. (UiTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Nur Farhana Mohamad Fakhri, BSc Hort. Sc. (UPM)
Siti Fairus Zakaria, BSc Hort. Sc. (UPM)

Arkitek Landskap (Kontrak)/Landscape Architect (Contract)

Muhammad Ammar Hamzah, BSc LA (UIAM)
Noor Edlin Ismail, BSc LA (UIAM)

Penolong Pegawai Perancang Bandar & Desa/Assistant Town Planner

Azrina Yahaya, BSc Town & Reg. Plan (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officer

Mohd. Shis Ibrahim, Dip Comp. Sc. (UPM)
Khairuddin Kamaruddin, International Dip Herbarium Tech.(Royal Bot. Gardens,UK)
Ahmad Firdaus Zainuddin, BSc. Forestry (UPM)
Mohd Hasan Buang (IPSM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)

Mohd Hafizul Rashid, Dip Mech. Agric. Eng.(Politeknik Kota Bharu)

FRIM-WHS Sekretariat/Secretariat FRIM-WHS

Pegawai Penyelidik/Research Officers

Noorsiha Ayop, BSc Botany (UM)

BAHAGIAN KELUARAN HUTAN/FOREST PRODUCTS DIVISION

Pengarah/Director

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

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

Ketua/Head

Dr Zaihan Jalaludin, PhD Wood Sci. (Edinburgh)

Pegawai Penyelidik/Research Officers

Salamah Selamat, BSc Chemistry (Hons) (UKM)
 Dr Salmiah Ujang, PhD Wood Mycology (Portsmouth)
 Hashim W. Samsi, MSc Wood Technology (UPM)
 Dr Roszaini Kadir, PhD Wood Sci. (Bangor)
 Dr Suffian Misran, PhD Wood Sci. (Bangor)
 Dr Rafeadah Rusli, PhD Material Sci. (Manchester)
 Dr Mohamad Nasir Mat Arip, PhD Chemistry (UKM)
 Dr Mohd Khairun Anwar Uyup, PhD Wood Sci. & Tech. (UPM)
 Tumirah Khadiran, MSc Chemistry (UKM)
 Shahlinney Lipeh, MSc Entomology (UKM)
 Mohd Yusouf Abdul Latif, MSc Bio Env. Eng (UIAM) (sehingga/until 14 Okt/Oct)
 Khairul Azmi Jabar, MSc Building Tech. (USM) (mulai/from 13 Okt/Oct)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Siti Nor Ain Tamiran, BSc Furniture Tech. (UiTM) (sehingga/until 28 Feb)
 Noor Azrieda Abd. Rashid, MSc Wood Sci. (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Habibah Mohamad (PPN), Dip Ind. Chem. (UiTM) (sehingga/until 29 Aug)
 Nor Azian Mohd Kasby, Dip Civil Eng. (UTM)
 Baharudin Kamaruddin, BSc Forest Indust. (UPM)
 Rozaida Latip, Dip Wood Tech. (UiTM)
 Siti Rafidah Mahmud, Dip Wood Tech. (UiTM)

Setiausaha Pejabat/Administrative Secretary

Azlina Ahmad, Dip Sec. Sci. (UiTM)

Program Pemprosesan Termaju dan Reka Bentuk

Advanced Processing and Design Programme

Ketua/Head

Dr Tan Yu Eng, PhD Wood Engineering (Brighton)

Pegawai Penyelidik/Research Officers

Dr Mohamad Omar Mohamad Khaidzir, PhD Automatic Control and Syst. Eng. (Sheffield)
 Mohd. Arshad Saru, B Eng. Mech. (Sunderland)(until/sehingga 25 Sep)
 Dr Abdul Hamid Saleh, PhD Material, Design & Tech. (USM)
 Ong Chee Beng, MSc Wood Sci. (UPM)
 Dr Khairul Awang, PhD Wood Sci. & Tech. (USM)
 How Seok Sean, MSc Inform. Tech. (UPM)
 Siti Zaliha Ali, B Eng. Manufact. (UIAM)
 Zairul Amin Rabidin, MSc Wood Sci. & Tech. (UPM) (dari/from 13 Okt/Oct)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Mohd. Jamil Abdul Wahab, B Eng. Mech. (UM)
 Izran Kamal, MSc Wood Sci. & Tech. (UPM)(sehingga/until 30 Nov)
 Yanti Abdul Kadir, BSc Forestry (UPM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Zaitun Said, Dip Wood Tech. (UiTM)
 Zawawi Kassim, Dip Applied Science (UiTM)
 Roszalli Mohd. STPM

Penolong Jurutera/Assistant Engineer

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

Setiausaha Pejabat/Administrative Secretary

Nor Azlina Zakaria, Dip Sec. Sc. (UiTM) (sehingga/until 31 Mei/May)

Program Pulpa dan Kertas/Pulp and Paper Programme

Ketua/Head

Mahmudin Saleh, MSc Mech. Eng. (UiTM)

Pegawai Penyelidik/Research Officers

Dr Rushdan Ibrahim, PhD Paper Sci. (Manchester)

Dr Sharmiza Adnan, PhD Chem. Eng. (Monash)

Latifah Jasmani, MSc Material Sci. (UKM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Azizi Abd. Jalil, Dip Wood Tech. (UiTM)

Program Biotenaga/Bioenergy Programme

Ketua/Head

Dr Wan Asma Ibrahim, PhD Soil Chemistry (UPM)

Pegawai Penyelidik/Research Officers

Puad Elham, MSc Wood Indust. (UPM)

Shaharuddin Hashim, BSc Analytical Chem. (USM)

Rafidah Jalil, MSc Chem. & Process Eng. (UKM)

Mahanim Sarif @ Mohd. Ali, MSc Chem. Eng. (USM)

Setiausaha Pejabat/Administrative Secretary

Nor Azlina Zakaria, Dip Sec. Sc. (UiTM) (dari/from 1 Jun/June)

Program Teknologi Mesra Alam/Green Technology Programme

Ketua/Head

Dr Gan Kee Seng (AMN), PhD Mech. Eng. (Strathclyde)

Pegawai Penyelidik/Research Officer

Dr Sik Huei Shing, PhD Material Sci. (UKM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Khairul Maseat, BSc Furniture Tech. (UiTM)

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

Ketua/Head

Dr Mohd. Tamizi Mustafa, PhD Bioresource (USM)

Pegawai Penyelidik/Research Officers

Dr Hamdan Husain, PhD Wood Sci. (Wales)

Dr Wan Tarmeze Wan Ariffin, PhD Civil Eng. (Birmingham)

Nordahlia Abdullah Siam, MSc Wood Sci. & Tech. (UPM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer

Mohd Izani Ishak, Dip Mech. Eng. (Politek. Sultan Salahuddin Abdul Aziz Shah) (dari/from 1 Apr)

BAHAGIAN BIOTEKNOLOGI PERHUTANAN / FORESTRY BIOTECHNOLOGY DIVISION

Pengarah/Director

Dr Norwati Muhammad, PhD Forest Genetic (Reading) (Hingga Ogos/Until August)
 Dr Hj Ahmad Zuhaidi Yahya (AMN), PhD Growth & Yield Model. (Irish U. Dublin) (Mulai September/From September)

Setiausaha Pejabat/Administrative Secretary

Nur Wahida Tajudin, Dip Sec. Sc. (Politeknik Sultan Hj Ahmad Shah) (Hingga Ogos/Until August)
 Nor Fazhani Hashim, Dip Office Mgt & Tech (UiTM) (Mulai September/From September)

Program Bioteknologi/Biotechnology Programme

Ketua/Head

Dr Norwati Muhammad, PhD Forest Genetic (Reading)

Pegawai Penyelidik/Research Officers

Dr Lee Soon Leong, PhD Plant Genetic (UKM)
 Dr Lee Chai Ting, PhD Genetic Resources (UPM)
 Dr Nor Hasnida Hassan, PhD Botany (UKM)
 Dr Kevin Ng Kit Siong, PhD Pop. Genetics (UM)
 Dr Norwati Adnan, PhD Plant Genetic (UKM)
 Dr Norlia Basherudin, PhD Molecular Biology & Genetic Eng. (UPM)
 Nashatul Zaimah Noor Azman, MSc Applied Plant Sci. (London)
 Haliza Ismail, MSc Micropropagation (UPM)
 Dr Ng Chin Hong, PhD Genetics (UKM)
 Dr Shawn Cheng, PhD Molec. Biology & Genetic Eng. (UPM)
 Dr Tnah Lee Hong, PhD Phylogeography & Evolution (UM)
 Nor Asmah Hassan, MSc Botany (UKM)
 Nadiah Salmi Nadzri, BSc (Hons) Genetics (UKM)
 Noraliza Alias, BSc (Hons) Biotech. (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Siti Suhaila A. Rahman, MSc Plant Biotech. (UPM)
 Nurul Farhanah Zakaria, MSc Plant Biotech. (UPM)
 Nazirah Abdullah, BSc Biotech. (UPM)
 Dinaiz Thinagaran, BSc (Hons.) Genetics & Molec. Biology (UM) (Hingga Mei/until May)
 Muhammad Fuad Yahya, B Biochem. Eng. (UIA)
 Zahidah Zafhian, BSc (Hons.) Biomolec. Sci. (UiTM)

Setiausaha Pejabat/Administrative Secretary

Nur Wahida Tajudin, Dip Sec. Sc. (Politeknik Sultan Hj Ahmad Shah)

Program Hutan Ladang/Forest Plantation Programme

Ketua/Head

Dr Hj Ahmad Zuhaidi Yahya (AMN), PhD Growth & Yield Modelling (Irish U. Dublin)

Pegawai Penyelidik/Research Officers

Dr Ang Lai Hoe, PhD Plant & Soil Physiol. (Aberdeen)
 Dr Wan Rasidah Wan Abdul Kadir, PhD Soil Chem. (Ghent)
 Tuan Hj. Abd. Razak Othman, MSc Botany (UKM)
 Rosdi Koter, MSc Forest Meteor. (UPM)
 Dr Lok Eng Hai, PhD Silv. & Plant Nutrition (Murdoch Uni., Perth)
 Dr Ho Wai Mun, PhD Silv. & Restor. Ecology (SNU, Seoul)
 V. Jeyanny Vijayanathan, MSc Soil Fertility & Mgmt (UPM)
 Rozita Ahmad, BSc (Hons) Industrial Chem. (USM)
 Mohamad Fakhri Ishak, BSc Forestry (UPM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Suhaimi Wan Chik, Dip Agriculture (UPM)
Amir Saaifuddin Kassim, MSc Forestry (UPM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)

Tang Lai Kuen, BSc Chem. & Biology (TARC)

Setiausaha Pejabat/Administrative Secretary

Nor Fazhani Hashim, Dip Office Mgt. & Tech. (UiTM)

Program Membaik Biak Tumbuhan/Plant Improvement Programme

Ketua/Head

Dr Mohd Zaki Abdullah, PhD Genetics (UKM)

Pegawai Penyelidik/Research Officers

Dr Mohamad Lokmal Ngah, PhD Forest Breeding (UniSZA)
Ahmad Fauzi Mohd. Shariff, BSc Agric. (UPM)
Dr Siti Salwana Hj. Hashim, PhD Genetics (UKM)
Dr Farah Fazwa Md Ariff, PhD Genetics (UKM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Faridah Ahmad Azam, MSc Env. & Dev. (UKM)
Syafiqah Nabilah Samsul Bahari, BSc Biotech. (UIA)
Norhayati Saffie, BSc Agric. Biotech. (UniSZA)
Khairul Azwa Taharin, BSc Forestry (UMS)

Penolong Pegawai Penyelidik/Assistant Research Officers

Muhammad Asri Lias (Mulai Mac/From March)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)

Muhammad Farhan Zolkifle, Dip Elect. Eng.(Politeknik Shah Alam)

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 FASc, PhD (Reading)

Program Biodiversiti Flora/Flora Biodiversity Programme

Ketua/Head

Dr Richard Chung Cheng Kong FLS, PhD (UM)

Pegawai Penyelidik/Research Officers

Dr Sam Yen Yen, PhD (UM)
Chew Ming Yee, BSc For. (UPM)
Nor Ezzawanis Abdullah Thani, MSc (UKM)
Ummul Nazrah Abdul Rahman, MSc (UKM)
Syahida Emiza Suhaimi, MSc (UM)
Avelinah Julius, MSc (UMS) (cuti belajar sehingga 2018/study leave until 2018)
Siti Munirah Mat Yunoh, MSc (UKM)
(Pembantu Penyelidik Kehormat UK sehingga 2016/
Honorary Research Assistant UK until 2016)
Syazwani Azeman, Bsc Biology (Botany) (USM)
(Mulai 1 November/From 1 November)
Norzielawati Salleh, BSc (Plant Biology) (USM) (Mulai 1 November/From 1 November)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Dr E. Soepadmo, PhD (Cambridge)
 Dr Ruth Kiew, PhD (Cambridge)
 Rafidah Abdul Rahman, MSc (UM)
 Nadiah Idris, BSc (Hons) (UKM)
 Yao Tze Leong, MSc (UM)
 Lim Chung Lu, MSc (UM)
 Joanne Tan Pei Chih, BSc Hort. (UPM)
 Ong Poh Teck, BSc Hort. (UPM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Kamarudin Saleh
 Kamarul Hisham Mustafa, Dip Agric. Sc. (UPM)

Program Biodiversiti Fauna/Fauna Biodiversity Programme

Ketua/Head

Dr Laurence G Kirton, PhD (London)
 (Bersara pilihan pada September/Optional retirement as of September)

Pegawai Penyelidik/Research Officers

Nada Badruddin, MSc (UM) (cuti belajar UK sehingga 2017/study leave UK until 2017)
 Mohammad Shahfiz Azman, BSc (Hons) (UNIMAS)

Pegawai Penyelidik Kontrak/Contract Research Officers

Phon Chooi Khim, MSc (USM)
 Veronica Khoo Swee Imm, BSc (Hons) (USM)
 Ong Su Ping, BSc (Hons) (USM)
 Kaviarasu A/L Munian, BSc (Hons) (UPM)

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) (dipinjamkan ke NRE/seconded to NRE)
 Dr Mohd. Farid Ahmad, PhD (USM)
 Patahayah Mansor, MSc (UPM)
 Hamidah Mamat, MSc (Geoinformatics) (UTM)
 Lau Kah Hoo, MSc (UKM)
 Thi Bee Kin, MSc (UKM) (cuti tanpa gaji sehingga 2017/on unpaid leave until 2017)
 Suhaida Mustafa, BSc For. (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Chan Yoke Mui, MSc (UM)
 Wendy Yong Sze Yee, MSc (UPM)
 Yaser Mohamed Arifin, Bac. Comp. Sc. (UM)
 Wan Muhammad Azrul Wan Azhar, BSc (UiTM)
 Mohd. Salleh Sanusi, Bsc (UiTM)

Setiausaha Pejabat/Administrative Secretary

Syuriani Mohd. Zaki, Dip Sec. Sc. (UiTM)

BAHAGIAN HASILAN SEMULA JADI/NATURAL PRODUCTS DIVISION

Pengarah/Director

Dr Rasadah Mat Ali (AMP), PhD Natural Prod. Chem. (London)

Setiausaha Pejabat/Administrative Secretary

Jesmini Mat Ali, Dip Sec. Science (UiTM)

Program Sumber Biologi/Bioresources Programme

Ketua/Head

Zamree Md. Shah, MSc Food Chem. & Biochem. (UPM) sehingga/until 1 April
Dr Fadzureena Jamaludin (mulai/from 1 Nov)

Pegawai Penyelidik/Research Officers

Hada Masayu Ismail @ Dahlan, B Process & Food Eng. (Hons.) (UPM)
Tan Ai Lee, MSc Plant Systematics (UKM)
Ihsan Safwan Kamarazaman, MSc Physiology (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Nurnida Mohd Kamal, MSc Botany (UKM) (sehingga Ogos/Until August)
Ummu Hani Badron, Msc of Botany (UKM)
Mohd Sharul Nizam Usof, BSc Applied Sc. (UiTM)
Khairul Kamilah Abd Kadir, MSc Physiology (UPM)
Nur Fairuz Mat Yasin, MSc Information Mgmt (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officer

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

Program Fitokimia/Phytochemistry Programme

Ketua/Head

Dr Ling Sui Kiong, PhD Natural Prod. Chem. (Nagasaki)

Pegawai Penyelidik/Research Officers

Fauziah Abdullah, MSc Natural Prod. Chem. (UKM)
Dr Zunoliza Abdullah, PhD Natural Prod. Chem. (USM)
Abdul Rashid Li, MSc Natural Prod. Chem. (UiTM)
Aadiana Mohd Adib, MSc Synthetic Chem. (UTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Dr Tan Hooi Poay, PhD Natural Prod. Chem. (UM) (sehingga 9 Mac/Until 9 March)
Nur Zalikha Mohd Taza, BSc Applied Chem. (UiTM)
Nurnadiah Rahim, BSc Ind. Chem. (UiTM)
Norsuhaina Zakaria, BSc Ind. Biotech. (UniS)
Muhammad Haffiz Jauri, MSc Synthetic Chem. (UTM)
Muhammad Syamil Azahar, MSc Synthetic Chem. (UTM)

Penolong Pegawai Penyelidik/Assistant Research Officers

Mohd Radzi Ahmad, Dip MLT (UKM)
Nuziah Hashim, Dip Industrial Chem. (UiTM)
Salbiah Man, Dip Industrial Chem. (UiTM)
Abdull Rashih Ahmad (bersara mulai 4 Jun/Retire from 4 June)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officers (Contract)

Nor Azlianie Ablah, BSc Applied Chem. (UiTM)
Syazwani Dzolin, MSc Chem. (UiTM)

Program Bioaktiviti/Bioactivity Programme

Ketua/Head

Dr Nik Musa'adah Mustapha, PhD Biomedic. Sci. (London)
Dr Mastura Mohtar, PhD Biomedic. Sci.(UKM) (mulai/from 15 Jan)

Pegawai Penyelidik/Research Officers

Dr Mastura Mohtar, PhD Biomed. Sci.(UKM)
Dr Vimala Subramaniam, PhD Biotech. (UM)
Dr Fadzureena Jamaludin, PhD Medic. Chem. (UPM) (sehingga/until 1 Nov)
Dr Mary Khoo Gaik Hong, PhD Biomedical Sci. (Univ. of Surrey)
Dr Mazura Pizar, PhD Neuroscience (Glasgow Univ.)
Zaridah Mohd. Zaki, M Health Sc. (UKM)
Chee Beng Jin, MSc Animal & Plant Physio. (UPM)
Saiful Azmi Johari, MSc Genetic Eng. & Molec. Bio. (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Mohd Kamal Nik Hasan, MSc Physio. (UPM)
Mohamad Jemain Mohamad Ridhwan, MSc Natural Prod. (UiTM) (sehingga Julai/until July)
Shalini Markandan, B Biomedical Sci. (Hons.) (MSU)
Dionysia Modingin, BSc (Hons.) Forestry (UMS)

Pegawai Sains (Kontrak)/Science Officer (Contract)

Siti Nur Aisyah Mohd Hashim, BSc (Hons.) Biomedical Sci. (UKM)

Penolong Pegawai Penyelidik/Assistant Research Officers

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

Makmal Penyelidikan Biomolekul/Biomolecules Research Laboratory

Pegawai Penyelidik/Research Officers

Dr Getha Krishnasamy, PhD Microbial Biotech.(UM)
Dr Asiah Osman, PhD Biological Sci. (Griffith Univ.)
Dr Nurhanan Murni Yunos, PhD Medicine (Univ. of Sydney)
Lili Sahira Husin, MSc Health Biotech. (USM)
Siti Syarifah Mohd Mutalip, BSc (Hons) Microbiology (UPM)
Norhayati Ismail, BSc (Hons) Microbiology (UPM)
Nor Datiakma Mat Amin, MSc Biotech. (UIAM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Anee Suryani Sued, MSc Pharmacy (UKM)
Roshan Jahn Mohd Salim, MSc Biotech. Eng. (UIAM)
Hema Thopla Govender, MSc Microbial Biotech. (UM)
Alia Aina Hj Anuar, BSc (Hons), Biomedical Sc. (UIAM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)

Mohamad Nazrin Che Saad. Dip Microbiology (UiTM)

Program Pembangunan Produk Herba/Herbal Products Development Programme

Ketua/Head

Dr Nor Azah Mohamad Ali, PhD Natural Prod. Chem. (UPM)

Pegawai Penyelidik/Research Officers

Mailina Jamil, MSc Pharmacy (UKM)
Saidatul Husni Saidin, MSc Sistematic Bio. (UPM)
Norulaiman Yusoff, MSc Microbio.(UPM)
Ong Boo Kean, MSc Biotech.(UPM)

Noor Rasyila Mohamed Noor, MSc Genetic Eng. & Molec. Bio. (UPM)
Dr Nor Hayati Abdullah, PhD Natural Prod. Chem. (UM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Siti Humeirah Ab Ghani, MSc Biotech. & Biomolec. Sci.(UPM)
Sahrim Lias, BSc Electrical Eng. (UiTM)

Pegawai Sains (Kontrak)/Science Officers (Contract)

Muhd Hafizi Zainal, BSc Chem.(UKM)
Nurhazwani Mohd Hirmizi, BSc (Hons.) Materials Tech. (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officer

Abdul Majid Jalil, Dip Chemical Eng (UTM)
(Cuti belajar sehingga/Study leave until 2015)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)

Azrina Aziz, BSc Industrial Chem. (UiTM)

BAHAGIAN PENTADBIRAN/ADMINISTRATION DIVISION

Pengarah/Director

Abdul Jabbar Hj Sabli, MBA (UKM)

Cawangan Pentadbiran Am/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)

Penolong Akauntan/Assistant Accountant

Norbaite Saharudin, Dip Bus. Stud. (UiTM)

Cawangan Pembangunan & Penyelenggaraan/Development & Maintenance Branch

Ketua/Head

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)

Setiausaha Pejabat/Administrative Secretary

Suzrina Shamsuddin, Dip Sec. Sc. (UiTM)

BAHAGIAN KEWANGAN/FINANCE DIVISION

Pengarah/Director

Mohd Zamshari Hj Abd Rahman, MBA (UIAM)

Akauntan/Accountants

Jumaaton Abu Bakar, B Acc. (Hons) (UiTM)
Zainorasri Yahya, B Acc. (Hons) (UiTM)
Saizatul Maheran Ramle, B Acc.(Hons) (UiTM)

Penolong Akauntan/Assistant Accountants

Emylia Ayoub, Dip in Banking (UiTM)

Setiausaha Pejabat/Administrative Secretary

Sarina Hussin, Dip Sec. Sc. (UiTM)

BAHAGIAN SUMBER MANUSIA/HUMAN RESOURCE DIVISION

Pengarah/Director

Norhara Hussein, BSc Hon, USM
(Bersara Oktober/Retire October 2014)

Cawangan Perjawatan/Establishment Branch

Ketua/Head

Mohd. Asmawee Ismail, MBA (Human Res. Mgmt) (UPM)

Pegawai Tadbir/Administration Officer

Nur Azani Abdul Rasid, B HRM (Hons) (UUM)

Cawangan Perkhidmatan/Services Branch

Ketua/Head

Azuarni Abdul Adzis, B (Hons.) Malay Lang. & Linguist. (UPM)

Penolong Pegawai Tadbir/Assistant Administration Officer

Mohd Akhir Abd Rahman, STPM

Cawangan Latihan/Training Branch

Ketua/Head

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

Penolong Pegawai Penyelidik/Assistant Research Officer

Ruziah Ripin, B HRM (UMP)

BAHAGIAN PERKHIDMATAN TEKNIKAL/TECHNICAL SERVICES DIVISION

Pengarah/Director

Dr Khali Aziz Hamzah, PhD (Reading)

Cawangan Penerbitan/Publications Branch

Ketua/Head

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

Pegawai Penyelidik/Research Officers

Ho Yuen Foon, MSc (UM)
Sarifah Kunju Ahmad, M Biotech. (UM)

Pegawai Penyelidik (Kontrak)/Research Officer (Contract)

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

Cawangan Teknologi Maklumat/Information Technology Branch

Ketua/Head

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

Pegawai Penyelidik/Research Officers

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

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)/Information Technology Officer (Contract)

Intan Dalina Rafidah Othman, B Multimedia (Hons) (UUM)

Penolong Pegawai Teknologi Maklumat/Assistant Information Technology Officers

Siti Zaleha Abdul Goni, Dip Interact. 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 Branch

Ketua/Head

Mastura Buang, M Lib. Sc. (UIA)

Setiausaha Pejabat/Administrative Secretary

Yang Nazli Yahya, Dip Sec. Sc. (UiTM)

**BAHAGIAN KOMERSIALISASI DAN INOVASI
COMMERCIALISATION AND INNOVATION DIVISION**

Pengarah/Director

Dr Woon Weng Chuen, PhD (Wales)

**Cawangan Pengurusan Harta Intelekt dan Inovasi
Intellectual Property Management and Innovation Branch**

Ketua/Head

Dr Woon Weng Chuen, PhD (Wales)

Pegawai Tadbir/Administrative Officer

Syed Othman Syed Omar, M Intellec. Prop. (UKM)

Cawangan Komersialisasi & Inkubasi/Commercialisation & Incubation Branch

Ketua/Head

Dr Woon Weng Chuen, PhD (Wales)

Pegawai Penyelidik/Research Officer

Dr Mohd Noor Mahat, PhD (UPM)

Felo/Fellow

Choo Kheng Ten

Pegawai Penyelidik Kontrak/Contract Research Officer

Izanudin Zakaria, M Biotek. (UM), MBA (IIUM)

Pusat Perkhidmatan Setempat (PPS)/One Stop Centre

Ketua/Head

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

Cawangan Perundingan & Promosi/Consultancy & Promotion Branch

Ketua/Head

Nor Azman Hussein, MSc (West Virginia University)

Akauntan (Kontrak)/Accountant (Contract)

Izan Nor Farahni Ahmad, B. Acc. (Hons) (UiTM)

Pegawai Tadbir (Kontrak)/Administrative Officer (Contract)

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

Pusat Teknologi Herba/Herbal Technology Center

Ketua/Head

Zamree Md Shah, MSc (UPM)

Pegawai Penyelidik/Research Officer

Dr Pin Kar Yong, PhD (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)

Adib Zubaidi Rashid, B. Eng. (UniMAP)

Daryl Jesus Arapoc, MSc (UPM)

Pusat Teknologi FRIM/MTDC/FRIM/MTDC Technology Center

Ketua/Head

Mohd Shahidan Mohd Arshad, BSc (Hons) (UM)

Pegawai Penyelidik (Kontrak)/Research Officer(Contract)

Munirah Mohd Fauzi, BSc (UiTM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer(Contract)

Mohd Faizal Arshad, Diploma Kejuruteraan Mekanikal (PSA)

FMBioSis/FMBioSis

Ketua Pegawai Eksekutif/Chief Executive Officer

Dr Fadhilah Zainuddin, PhD (Birmingham)

Akauntan (Kontrak)/Accountant (Contract)

Faizah Sahran, B Acc. (UPM)



PENERBITAN PUBLICATIONS



Sejumlah 34 judul diterbitkan pada tahun 2014. Bilangan ini tidak termasuk empat judul yang diulang cetak disebabkan permintaan yang menggalakkan. Penerbitan berkala iaitu *Journal of Tropical Forest Science* dan *FRIM in Focus* diterbitkan empat kali setahun. Faktor impak *Journal of Tropical Forest Science* meningkat daripada 0.537 kepada 0.667. Tiga buku mewah dan dua buku autoritatif iaitu *Tropical Forest Fruits, Seeds, Seedlings & Trees* serta *Tree Flora of Sabah and Sarawak Volume 8* diterbitkan. Sebanyak lima prosiding diterbitkan pada 2014. Pada bulan Ogos 2014, Kedai Buku FRIM menyambut ulang tahunnya yang ke-12. Sempena menyambut bulan kemerdekaan Malaysia dan ulang tahun kedai buku, sebanyak 1553 penerbitan diberi secara percuma kepada pengunjung kedai buku sepanjang bulan Ogos.

A total of 34 titles were published in 2014. This number does not include the four titles which were reprinted due to overwhelming demand. Periodic publications, namely, the *Journal of Tropical Forest Science* and *FRIM in Focus* were published quarterly. The impact factor for the *Journal of Tropical Forest Science* increased from 0.537 to 0.667. Three coffee-table books were published in 2014. Two authoritative books were published, namely, *Tropical Forest Fruits, Seeds, Seedlings & Trees* and *Tree Flora of Sabah and Sarawak Volume 8*. A total of five proceedings were produced in 2014. In the month of August 2014, FRIM Bookstore celebrated its 12th Anniversary. In conjunction with the celebration of the independence of Malaysia and the anniversary of the bookstore, a total of 1553 publications were given free of charge to visitors of the bookstore throughout the month of August.

Jenis penerbitan Types of publications	Judul Title	Bil. No.
Journal of Tropical Forest Science	JTFS26(1-4)	4
Malayan Forest Records	Tropical Forest Fruits, Seeds, Seedlings & Trees	1
FRIM in Focus	March, June, September, December	4
FRIM Reports	Prestasi Journal of Tropical Forest Science	1
FRIM Technical Information	Heortia vitessoides, an Agarwood (Karas) Defoliator	3
	Destructive Leaf Cutter (Tiger Moth) of <i>Eurycoma longifolia</i>	
	The <i>Khaya ivorensis</i> bark borer, <i>Cossus chloratus</i>	
Timber Technology Bulletin	Focus on Forest Products	2
	Wood Properties of Selected Plantation Species: <i>Tectona grandis</i> (Teak), <i>Neolamarckia cadamba</i> (Kelempayan/Laran), <i>Octomeles sumatrana</i> (Binuang) and <i>Paraserianthes falcataria</i> (Batai)	
FRIM Special Publications	FRIM: A Year of Colours/Setahun Dalam Warna	4
	Tokoh dan Jejak Pewaris Generasi FRIM Jilid 2	
	Pembuatan Kapal Kayu Tradisional Melayu	
	Kenali 114 Spesies Buah-buahan Liar	
Proceedings	Melestari Legasi Pengetahuan Tradisi: Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 23-24 Mei 2014	5
	Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) Bagi Hutan Pesisiran Pantai Di Malaysia: Hala Tuju R&D dan Pelaksanaannya 7-8 Jun 2011	
	Proceedings of the Urban Forestry Conference 2012: Forest and Parks: Communicating Message for Sustainability 2-6 October 2012, Kuching, Sarawak	
	Prosiding Simposium Teknologi Penghasilan Reka Bentuk Inovatif Secara Bersepadu 2013, 3-6 Disember 2013, Terengganu	
	Proceedings of the Conference on Forestry and Forest Products Research 2013: Forestry R&D: Meeting National and Global Needs, 12-13 November 2013, Kuala Lumpur	
Annual Report	Annual Report 2013	1
Tree Flora of Sabah and Sarawak	Tree Flora of Sabah and Sarawak Volume 8	1

Jenis penerbitan Types of publications	Judul Title	Bil. No.
Other Publications	Manual Penilaian Biodiversiti Manual Peraturan Keselamatan Makmal, Bengkel, Lapangan dan Pejabat. Edisi Ke-3 Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan dan Beraroma Orang Asli Semai Assessment of Aboveground Carbon Stock Changes in Pilot Site of the ASEAN Peatland Forests Project (APFP), Selangor, Malaysia Chain-of-Custody Certification Module (Trading) An Annotated Bibliography on REDD+ in Southeast Asia Panduan Pengecaman Tiga Varieti Kacip Fatimah Melalui Ciri Morfologi Luaran Pengukuhan Tebing Sungai Chini: Kajian Teknikal Usaha Sama NRE-JPSM-FRIM	8
	JUMLAH/TOTAL	34
Reprint	Pocket Check List of Timber Trees Structure and Identification of Malayan Woods Tapping the Wealth from Karas (<i>Aquilaria malaccensis</i>) Tree A Manual for Forest Plantation Establishment in Malaysia	4

ARTIKEL JURNAL/JOURNAL ARTICLES

1. ABBOT, O.O., OTTO, M., VICTOR, I.O., GRACE, A.E., MOHD FARID, A., ROMINA, G., FRED, O.A. Molecular phylogeny of *Rigidoporus microporus* isolates associated with white rot disease of rubber trees (*Hevea brasiliensis*). *Fungal Biology* : 1–12.
2. ADIANA, M.A., FADZUREENA, J., LING, S.K., NUZIAH, H., ZUNOLIZA, A. Two-dimensional correlation infrared spectroscopy applied to analyzing and identifying the extracts of *Baeckea frutescens* medicinal materials. *Journal of Pharmaceutical and Biomedical Analysis* 96: 104–110.
3. AHMAD NAZARUDIN, M.R., TSAN, F.Y. & MOHD FAUZI, R. Paclobutrazol effects on growth performance and public preference on potted *Syzygium myrtifolium* (Roxb.) Walp. *Journal of Agrobiotechnology* 5: 17–29.
4. AHMAD NAZARUDIN, M.R., TSAN, F.Y., NORMANIZA, O. & ADZMI, Y. Growth performance and flowering occurrence of *Xanthostemon chrysanthus* in two selected urban sites in Kuala Lumpur, Malaysia. *Journal of Tropical Forest Science* 26(3): 428–434.
5. AIRUL, A., MOHD SUKERI, M.Y., MOHD SUZEREN, J., AMINAH, A., SITI FAIRUS, M.Y., MOHAMAD NASIR, M.A. & AZWAN, M.L. Physicochemical characterization of starch extracted from Malaysian wild yam (*Dioscorea hispida* Dennst.) *Emirates Journal of Food Agriculture* 26(8): 652–658.
6. AISYAH HARTINI, J., MEGAT SYAHIRUL AMIN, M.A., MOHD NASIR, T., NOORITA, M.T., IHSAN, M.Y. & SAHRIM, L. Classification of intelligence quotient via brainwave sub-band power ratio features and artificial neural network. *Computer Methods and Programs in Biomedicine* 114: 50–59.
7. AMEL, B.A., PARIDAH, M.T., RAHIM, S., OSMAN, Z., ZAKIAH, A. & AHMAD, S.H. Effects of kenaf base fibres on hydration behaviour of cement. *Journal of Tropical Forest Science* 26(3): 340–346.
8. ANG, A.F., ZAIDON, A., BAKAR, E.S., MOHD HAMAMI, S., ANWAR, U.M.K. & JAWAID, M. Possibility of improving the properties of mahang wood (*Macaranga* sp.) through phenolic compreg technique. *Sains Malaysiana* 43(2): 219–225.
9. ANNERSTEDT, M., KONIJNENDIJK, C., BUSSE NIELSEN, A. & SREETHERAN, M. The public health effects of urban parks—results from a systematic review. *European Journal of Public Health* 23: 95–96.
10. ANOKYE, R., REGINA, M.K., EDI SUHAIMI, B., JEGATHEWARAN, R., MOHAMAD, J. & KHAIRUL, A. Variations in moisture content and its effect on the shrinkage of *Gigantochloa scortechinii* and *Bambusa vulgaris* at different height of bamboo culm. *Bioresources* 9(4): 7484–7493.
11. AZHARIZAN, M.N., MOHD IZWAN, R., HUDA FARHANA, M.M. & TARIQ MUBARAK, H. Consumer's perception towards certified wood product and "Green Premium" in Klang Valley area. *International Journal of Research in Social Sciences* 4(3): 202–215.
12. CHAN, Y.M., LEE, C.T., TNAH, L.H. Novel microsatellite markers for *Begonia maxwelliana* and transferability to 23 *Begonia* species of Peninsular Malaysia. *Biochemical Systematics & Ecology* 57: 159–163.
13. CHEAN, H.N., KAMAL, R., MOHD FADHLIZIL FASHIHI, M.A., FARIDAH, A., KOK, W.L., INTAN SAFINAR, I., RADHAKRISHNAN, N., FADZUREENA, J. & KHOZIRAH, S. Synthesis and docking studies of 2,4,6-trihydroxy-3-geranylacetophenone analogues as potential lipoygenase inhibitor. *Molecules* 19(8): 11645–11659. doi: 10.3390/molecules190811645.
14. CHEW, M.Y., HYMEIR, K., NOSRAT, R. & SHAHFIZ, M.A. Relation between grasses and large herbivores at Ulu Muda salt licks, Peninsular Malaysia. *Journal of Tropical Forest Science* 26 (4): 554–559.
15. CHISHOLM, R.A., ABD. RAHMAN, K., BAKER, P.J., BUNYAVEJCHEWIN, S., CHEN, Y.Y., CHUYONG, G., DATTARAJA, H.S., DAVIES, S., EWANGO, C.E.N., GUNATILLEKE, C.V.S., GUNATILLEKE, I.A.U.N., HUBBELL, S., KENFACK, D., KIRATIPRAYOON, S., LIN, Y., MAKANA, J.-R., PONGPATTANANURAK, N., PULLA, S., PUNCHI-MANAGE, R., SUKUMAR, R., SU, S.-H., SUN, I.-F., SURESH, H.S., TAN, S., THOMAS, D. & YAP, S.K. Temporal variability of forest communities: empirical estimates of population change in 4000 tree species. *Ecology Letters* 17(7): 855–865.
16. CHIUAN, Y.L., CHARLEN, W., ASIAH, O., LYNDEL, M., ANNE, S. & BRIAN, J.S., ROBIN, B.G., MALCOLM, K.J. & ANDREAS, H. Crystal structure and immunological properties of the first annexin from *Schistosoma mansoni*: insights into the structural integrity of the schistosomal tegument. *FEBS Journal* 281: 1209–1225.
17. CHUA, K.O., CHAI, L.C. & ONG, B.K. Antibacterial property of ethanolic extracts of *Syzygium grande* towards multi-drug resistant bacteria and food-borne pathogens. *International Food Research Journal* 21(6): 3319–3323.
18. CHUNG, K.F., LEONG, W.C., RUBITE, R.R., REPIN, R., KIEW, R., LIU, Y. & PENG, C.I. Phylogenetic analyses of *Begonia* sect. *coelocentrum* and allied limestone species of China shed light on the evolution of Sino-Vietnamese karst flora. *Botanical Studies* 55: 1–15.
19. DOLL, H.M., ELIZABETH, B., HARRISON, R.D., FLETCHER, C., ABD. RAHMAN, K., SHAMSUDIN, I. & POTTS, M.D. Environmental and geographic factors driving dung beetle (*Coleoptera*: Scarabaeidae: Scarabaeinae) diversity in the dipterocarp forests of Peninsular Malaysia. *Raffles Bulletin of Zoology* 62: 549–560.
20. FARAH FAZWA, M.A. & AMINAH, H. The sustainable supply of *Labisia pumila* in Malaysia: Production of planting materials, cultivation and agronomy practices. *The International Journal of Environmental Sustainability* 9 (4): 17–29.
21. FAZLENA, H., MAHANIM, S., FARAH NUR, Z.Z., NUR HAMIZAH, I., SHAREENA FAIRUZ, A.M., ANI, I., WAN ASMA, I. & JAGANNATHAN, K. Microwave-alkali activation on the morphology and structure of bamboo activated carbon. *Journal of Applied Mechanics and Materials* 575: 154–159.
22. HALIZA, I., AHMAD FAUZI, M.S., SITI SUHAILA, A.R., NOR HASNIDA, H., NAZIRAH, A. & MUHD FUAD, Y. *In vitro* propagation of *Khaya ivorensis* from coppiced shoots. *Journal of Tropical Forest Science* 26(2): 298–301.
23. HAMDAN, O., KHALI AZIZ, H. & MOHD HASMADI, I. L-Band ALOS PALSAR for biomass estimation of Matang Mangroves, Malaysia. *Remote Sensing of Environment* 155: 69–78. doi:10.1016/j.rse.2014.04.029.
24. HAMDAN, O., MOHD HASMADI, I. & ISMAIL, H. Advance and challenge of remote sensing in assessing tropical forest biomass of Malaysia. *The International Forestry Review* 16(5): 217.
25. HAMDAN, O., MOHD HASMADI, I. & KHALI AZIZ, H. Combination of SPOT-5 and ALOS PALSAR images in estimating aboveground biomass of lowland Dipterocarp forest. *IOP Conf. Series: Earth and Environmental Science* 18: doi: 10.1088/1755-1315/18/1/012016
26. HAMDAN, O., MOHD HASMADI, I., KHALI AZIZ, H., HELMI ZULHAIDI, M.S. & NORIZAH, K. Forest biomass assessment with special reference to L-Band ALOS PALSAR data. *The Malaysian Forester* 77(1): 1–18.
27. HAMDAN, O., NORIZAH, K. & MOHD HASMADI, I. Factors affecting L-Band ALOS PALSAR backscatter on tropical forest biomass. *Global Journal of Frontier Science Research* 14 (3): 50–63.
28. HEMA, T.G., GETHA, K., TAN, G.Y.A., LILI SAHIRA, H., MUHD SYAMIL, A., & NUR FAIRUZ, M.Y. Actinobacteria isolates from tin tailings and forest soil for bioremediation of heavy metals. *Journal of Tropical Forest Science* 26(1): 153–162.
29. HOSAKA, T., NIINO, M., KON, M., OCHI, T., YAMADA, T., FLETCHER, C. & OKUDA, T. Effects of logging road networks on the ecological functions of dung beetles in Peninsular Malaysia. *Forest Ecology & Management* 326: 18–24.
30. HOW, S.S., C.J. WILLIAMSON, D. CARRADINE, Y.E. TAN, J. CAMBRIDGE, S. PANG. Predicting the Young's modulus of defect free radiata pine shooks in finger-jointing using resonance frequency. *Madras, Cienc. Technol.* 16(4): <http://dx.doi.org/10.4067/S0718-221X2014005000035>.
31. IZRAN, K., YANTI, A.K., GUENT, MOHAMAD JANI, S., NOOR AZRIEDA, A.R., KHAIRUL, M. & MOHD ZHARIF, T. Kenaf biocomposite: An overview. *Journal of Science and Technology* 6(2): 41–66.
32. JALONEN, R., THONG, H.L., LEE, S.L., LOO, J. & SNOOK, L. Integrating genetic factors into management of tropical Asian production forests: A review of current knowledge. *Forest Ecology and Management* 315: 191–201.

33. JEFFREY, R.V., RICHARD, T.C., J R, D., KURT, A.S., ISMARIAH, A., SIEW, K.C., YII, T.C. & MATTHEW, D.P. Tropical countries may be willing to pay more to protect their forests. *Proceedings of the National Academy of Sciences*. doi: 10.1073/pnas.1312246111.
34. JEYANNY, V., HUSNI, M.H.A., WAN RASIDAH, K., B SIVA, K., ARIFIN, A. & KAMARUL HISHAM, M. Carbon stocks in different carbon pools of a tropical lowland forest and a montane forest with a varying topography. *Journal of Tropical Forest Science* 26(4): 560–571.
35. JEYANNY, V., WAN RASIDAH, K., LEE, S.S., GHAZALI, M.H. & FAUZI, M.S. Preliminary assessment of exponential nutrient loading and arbuscular mycorrhizal inoculation on the physical growth of *Acacia mangium* and *Khaya senegalensis* seedlings in tropical forest nursery. *Journal of Tropical Plant Physiology* 5: 10–21.
36. JIE-SHENG, T.S., NORLIYANA, A., ISMARIAH, A., SUBHRENDU, K.P. & JEFFREY, R.V. Econometric evidence on forest ecosystem services: Deforestation and flooding in Malaysia. *Environmental Resource Economics. The Official Journal of the European Association of Environmental and Resource Economists* 59(2): doi 10.1007/s10640-014-9834-4.
37. JULIA, S. & KIEW, R. Diversity of *Begonia* (Begoniaceae) in Borneo—How many species are there? *Reinwardtia* 14(1): 233–236.
38. JULIANA, A.H., PARIDAH, M.T., RAHIM, S., NOR AZOWA, I. & ANWAR, U.M.K. Affect of adhesion and properties of kenaf (*Hibiscus cannabinus* L.) stem in particleboard performance. *Journal of Adhesion Science and Technology* 28(6): 546–560.
39. JULIUS, A. *Buxus holttumiana* of Peninsular Malaysia and Thailand is a variety of *B. cochinchinensis* (Buxaceae). *Phytotaxa* 167(2): 201–204.
40. KIEW, R. Checklist of vascular plants from Batu Caves, Selangor. *Check List* 10(6): 1420–1429.
41. KIEW, R. Two new species and one new subspecies of *Ridleyandra* (Gesneriaceae) from Peninsular Malaysia. *Gardens' Bulletin Singapore* 66(2): 125–135.
42. KIEW, R. Two new white-flowered *Codonoboea* species (Gesneriaceae) from Peninsular Malaysia. *Gardens' Bulletin Singapore* 66(2): 137–143.
43. KIEW, R., TAN, J.P.C., KAMARUDIN, S., YONG, K.T. & IMIN, K. An uncertain future for the plants of Gunung Kanthan, Perak, Malaysia. *Cave and Karst Science* 41(3): 120–128.
44. LAM, T.Y., ABD. RAHMAN, K., SHAMSUDIN, I. & POTTS, M. Evaluating design unbiasedness of the pre-felling inventory in Peninsular Malaysia. *Journal of Tropical Forest Science* 26(3): 347–354.
45. LAM, T.Y., CHRISTINE, F., RAMAGE, B.S., DOLL, H.M., JOANN, C.L., NUR ZATI, A. M., ELIZABETH, B., ABD. RAHMAN, K., HARRISON, R.D. & POTTS, M.D. Using habitat characteristics to predict faunal diversity in tropical production forests. *Biotropica* 46(1): 50–57.
46. LAU, K.H. The conservation of Peninsular Malaysian *Geostachys* (Zingiberaceae). *Gardens' Bulletin Singapore* 66(1): 3–14.
47. LEE, C.T., LEE, S.L., TNAH, L.H., NG, K.K.S, NG, C.H., SHAWN, C. & NAOKI, T. Isolation and characterization of 16 microsatellite markers in *Intsia palembanica*, a high-value tropical hardwood species. *Conservation Genetics Resources* 6(2): 389–391.
48. LEE, S.S. Lamenting the state of mycology and forest pathology in Malaysia. *Journal of Tropical Forest Science* 26 (4): 443–445.
49. LEHO, T., MOHAMMAD, B., SERGEI, P., URMAS, K., NOUROU, S.Y., RAVI, W., LUIS, V.R., AIDA, M.V.-P., THU, P.Q., AVE, S., MATTHEW, E.S., CATHY, S., ERKI, S., ALESSANDRO, S., MIQUEL, R., TAAVI, R., DAVID, R., KARIN, P., KADRI, P., EVELI, O., EDUANDRO, N., ANDRE, L.N., R. HENRIK, N., LUIS, N.M., JORDAN, M., TOM, W.M., LUIZA, M., D. JEAN, L., LEE, S.S., KARL-HENRIK, L., PETR, K., KENTARO, H., INDREK, H., TERRY, W., H., HELERY, H., GUO, L.D, ALINA, G., GWEN, G., JOZSEF, G., GENEVIEVE, G., WILLIAM, D., CHRIS, D., REIN, DRENKHAN, JOHN, D., ANDRE, D.K., TAN, D., XIN, C., FRANZ, B., FRANCIS, Q.B., GREGORY, B., STEN, A., SANDRA, A. & KESSY, A. Global diversity and geography of soil fungi. *Science* 346 (6213): doi: 10.1126/science.1256688.
50. LOUBSER, C.P., NOOR AZLIN, Y., DREYER, J. & NIK AZYYATI, A.K. The effectiveness of environmental education workshops for teachers, learners and schools in Malaysia. *Journal of Environment, Development and Sustainability*. 16: 1163–1176.
51. MAZURA, P., CAROLINE, M.F., OMARI, S.K., KARA, M., MARIA, C.J.V., SUSANA, Q., LINDA, G.D. & TREVOR, W.S. Modified neocortical and cerebellar protein expression and morphology in adult rats following prenatal inhibition of the kynurenine pathway. *Brain Research* 1576: 1–17.
52. MCGUIRE, K.L., D'ANGELO, H.F., BREARLEY, Q., GEDALLOVICH, S.M., BABAR, N., YANG, N., GILLIKIN, C.M., GRADOVILLE, R., BATEMAN, C., TURNER, B.L., PATAHAYAH, M., LEFF, J.W. & FIERER, N. Responses of soil fungi to logging and oil palm agriculture in Southeast Asian tropical forests. *Journal of Microbial Ecology*:doi: 10.1007/s00248-014-0468-4.
53. MIYAMOTO, M., MOHD PARID, M., NOOR AINI, Z. & MICHINAKA, T. Proximate and underlying causes of forest cover change in Peninsular Malaysia. *Journal of Forest Policy and Economics*, 44: 18–25.
54. MOHAMAD JANI, S. & RUSHDAN, I. Effect of bleaching on coir fibre pulp and paper properties. *Journal of Tropical Agricultural and Food Science* 42(1):51–61.
55. MOHD AMINUDDIN, C.H., SUHAIMI, M. & ABDUL HAMID, S. Strength performance and dimensional stability of peeled bamboo. *Journal of Tropical Resources and Sustainable Science* 2: 16–22.
56. MOHD JAMIL, A.W. & MOHD ZAMIN, J. Investigation of linearity between mechanical properties of wood using graphical method. *Sains Malaysiana* 43(2): 211–218.
57. MOHD JAMIL, A.W., MOHD ZAMIN, J. & MOHD OMAR, M.K. Mechanical properties relationship between structural size and small clear specimens of timber. *Journal of Tropical Forest Science* 25(1): 12–21.
58. MOHD KAMAL, N.H., RASADAH, M.A., ZULHAIRI, H.A., SHAHIDAN, M.A., ZAMREE, M.S., KHAIRUL KAMILAH, A.K., IHSAN SAFWAN, K. Kesan Aipigenin, Berberin dan Rutin terhadap metabolisme kolesterol pada sel kanser Hep G2, *Sains Malayana* 43(4): 559–566.
59. MOHD NOOR, M., MOHD ADI FAIZ, M.F., FARIDAH, A.A. & MOHD FARHAN, Z., Growth and biomass accumulation of 5 years old *Hopea odorata* plantation in three different soil series of ultisols. *E3 Journal of Agricultural Research and Development* Vol. 4(1): 001–006.
60. MOHD SHARIZAN, M.S., NOOR AZIAN, M., NOR AZAH, M.A., YASMIN ANUM, M.Y. & MOHD AZIZI, C.Y. The kinetics of extraction of the medicinal ginger bioactive compounds using hot compressed air. *Separation and Purification Technology* Vol. 24:141–147.
61. MOHD ZULKHAIRI, A., MOHD ASPOLLAH, M.S., NG, R.C. & NOR AZAH, A. Comparison between conventional and microwave-assisted hydrodistillation methods towards extraction of essential oils from *Murayya koenigii* (curry leaves). *Research Journal of Chemistry and Environment* 18(10): 17–21.
62. NAZIRAH, A., NOR HASNIDA, H., SITI SUHAILA, A.R., HALIZA, I., ROZIDAH, K. & MUHAMMAD FUAD, Y. In vitro propagation of *Phaleria macrocarpa*, God's crown. *E3 Journal of Biotechnology & Pharmaceutical Research* Vol. 5(2): 18–23.
63. NIELSEN, A.B., VAN DEN BOSCH, M., SREETHERAN, M. & VAN DEN BOSCH, C.K. Species richness in urban parks and its drivers: A review of empirical evidence. *Urban Ecosystems* 17: 305–327.
64. NOOR AINI, Z., NOOR HAZMIRA, M. & ISMARIAH, A. Assessment of rubberwood value-added in Malaysia's wooden furniture industry. *International Journal of Economics and Management* 8(1): 1–9.
65. NOR AZAH, M.A., MAILINA, J., SAIDATUL HUSNI, S., MASTURA, M., SITI HUMEIRIAH, A.G., AZRINA, A., MUHD HAFIZI, Z., MOHD FARIDZ, Z. & SAHRIM, L. Malaysian aromatic plants as herbal health care and personal care ingredients. *Natural Volatiles and Essential Oils*. Vol. 1 Special issue 2014. Pp. 205.
66. NOR AZAH, M.A., NURLAILA, I., MAILINA, J., TAIN, M.N., RAHIMAN, M.H.F. & MUHD HAFIZI, Z. Chemometric study of selected agarwood oils by gas chromatography-mass spectrometry. *Journal of Tropical Forest Science* 26(3): 382–388.
67. NOR AZAH, M.A., SAHRIM, L., MAILINA, J., SAIDATUL HUSNI, S., MUHD HAFIZI, Z., ABD MAJID, J. & MOHAMAD NASIR M.A. Classification of agarwood quality by electronic nose technology. *The International Forestry Review* Vol. 16(5): 309.
68. NOR HAYATI, A., LING, S.K. & IBRAHIM, A.N. QSAR study of flavonoids as platelet-activating factor (PAF)_n receptor binding antagonist. *Advances in Environmental Biology* 8(3): 797–802.

69. NORDAHLIA, A.S., ANWAR, U.M.K., HAMDAN, H., ZAIDON, A. & MOHAMAD OMAR, M.K. Mechanical properties of 10-year-old sentang (*Azadirachta excelsa*) grown from vegetative propagation. *Journal of Tropical Forest Science* 26(2): 240–248.
70. NORMAZLAN, M., ROSNITA, A.T., RUSHDAN, I., RUSSLY, A.R. & AINUN ZURIYATI, M. Sustainability of coir fibers as pulp and paper. *Agriculture and Agricultural Science Procedia* 2: 304–311.
71. NUMATA, S., YASUDA, M., SUZUKI, R.O., HOSAKA, T., NUR SUPARDI, M.N., FLETCHER, C.D., MAZLAN, H. Geographical pattern and environmental correlates of regional-scale general flowering in Peninsular Malaysia. *PLOS One* 8(11): e79095.
72. NUR AIMI, M.N., HAZLEEN, A., MAIZIRWAN, M., RASHIDI, O., NURHAFIZAH, S.M., AHMAD FITRIES, M.I. & ANWAR, U.M.K. Study of chemical and thermal properties of kenaf biomass-based polylactic acid (PLA). *Advances in Environmental Biology* 8(3): 633–638.
73. NURHANIM, M.N., NORAINI, T., CHUNG, R.C.K., NURUL AINI, C.A.C. & RUZI, A.R. Nilai taksonomi ciri anatomi daun genus *Schoutenia* Korth. (*Malvacea* subfam. *Brownlowioideae*). *Sains Malaysiana* 43(3): 331–338.
74. NURLAILA, I., NOR AZAH, M.A., MAILINA, J., MOHD HAZERI, FAZALUL, R., SAIFUL NIZAM, T. & MOHD NASIR, T. A review study of agarwood oil and its quality analysis. *Jurnal Teknologi* 68(1): 37–42. doi: <http://dx.doi.org/10.11113/jt.v68.2419>.
75. NURUL HUSNA, M.H., SUHAIMI, M. & RUSHDAN, I. Properties of *Gigantochloa scortechinii* paper enhancement by beating revolution. *Journal of Tropical Resources and Sustainable Science* 2: 59–67.
76. O'BYRNE, P. & ONG, P.T. Five new species of *Bulbophyllum* from Peninsular Malaysia. *Malesian Orchid Journal* 13: 15–36.
77. OMARI, S.K., MAZURA, P., CAROLINE, M.F., MARIA, C.J.V., LINDA, G.D. & TREVOR, W.S. Prenatal inhibition of the kynurenine pathway leads to structural changes in the hippocampus of adult rat offspring. *European Journal of Neuroscience* 39: 1558–1571.
78. ONG, P.T. & O'BYRNE, P. *Grosourdya minutissima*, a new species from Peninsular Malaysia. *Malayan Orchid Review* 48:67–71.
79. ONG, P.T., ZAHARIL, D. & KURZWEIL, H. *Calanthe zollingeri*, a new orchid record for Peninsular Malaysia. *Malayan Orchid Review* 48: 43–45.
80. OTA, Y., HATTORI, T., NAKAMURA, H., TERASHIMA, Y. & LEE, S.S. Taxonomy and phylogenetic position of *Fomitiporia torreyae*, a causal agent of trunk rot on sanbu-sugi, a cultivar of Japanese cedar in Japan. *Mycologia* 106: 66–76.
81. PLINIO, S., ERVAN, R., MARIELOS, P.-C., ALEXANDER, S., BRUNO, H., LILIAN, B., CHRISTOPHER, B., FIDELE, B., FABRICE, B., KATIA EMIDIO, D.S. LAURENT, D., JOICE, N.F., SYLVIE, G.-F., MARCELINO, C.G., ISMAIL, H., RIINA, J., MILTON, K., HARUNI, K., MRIGESH, K., PHILIPPA, L., LUCAS, M., VONCENT, M., ROBERT, N., MARCUS VINICIUS, N.D'O., LUIS, C. D'O., NICOLAS, P., STEPHAN, P., MICHELLE, P., HARI, P., FRANCIS, E.P., KEN, R., VIVIEN, R., ANAND, R., ADEMIR ROBERTO, R., NUR HAJAR ZAMAH, S., CINTIA RODRIGUES, D.S.FARIDA HENRY, S., ELENEIDE, D.S., MARISOL, T., EDSON, V., THALES, A.P.W., VERGINIA, W. & TOSHIHIRO, Y. The tropical managed forests observatory: a research network addressing the future of tropical logged forests. *Applied Vegetation Science* 18(1): doi: 10.1111/avsc.12125.
82. RAES, N., CANNON, C.H., HIJMANS, R.J., PIESSENS, T., SAW, L.G., van WELZEN, P.C. & SLIK, J.W.F. Historical distribution of Sundaland's Dipterocarp rainforests at quaternary glacial maxima. *Proceedings of the National Academy of Sciences* 111 (47): 16790–5. doi: 10.1073/pnas.1403053111
83. RAZAK, W., MOHD TAMIZI, M., MAHMUD, S., MOHAMMED, A.S., SHAFIQR, R., AMINUDDIN, M. & NIK AINUR AULI, N.Y. Analysis on thermal degradation and chemical contents of *Gigantochloa brang*. *Research Journal of Pharmaceutical, Biological and Chemical Sciences* 5(5): 500–506.
84. RAZAK, W., OTHMAN, S., AMINUDDIN, M., MOHAMMAD, A.S., SHAFIQR, R., MOHD SUKHAIRI, M.R & HASHIM, W.S. Mappings of chemicals distribution in preservatives treated tropical bamboo *Gigantochloa sortechnii*. *Research Journal of Pharmaceuticals, Biological and Chemicals* 5(3): 1505–1513.
85. RÉJOU-MÉCHAIN, M., MULLER-LANDAU, H.C., DETTO, M., THOMAS, S.C., LE TOAN, T., SAATCHI, S.S., BARRETO-SILVA, J.S., BOURG, N.A., BUNYAVEJCHEWIN, S., BUTT, N., BROCKELMAN, W.Y., CAO, M., CÁRDENAS, D., CHIANG, J.-M., CHUYONG, G.B., CLAY, K., CONDIT, R., DATTARAJA, H.S., DAVIES, S.J., DUQUE, A., ESUFALI, S., EWANGO, C., FERNANDO, R.H.S., FLETCHER, C.D., GUNATILLEKE, I.A.U.N., HAO, Z., HARMS, K.E., HART, T.B., HÉRAULT, B., HOWE, R.W., HUBBELL, S.P., JOHNSON, D.J., KENFACK, D., LARSON, A.J., LIN, L., LIN, Y., LUTZ, J.A., MAKANA, J.-R., MALHI, Y., MARTHEWS, T.R. MCEWAN, R.W., MCMAHON, S.M., MCSHEA, W.J., MUSCARELLA, R., NATHALANG, A., NOOR, N.S.M., NYTCH, C.J., OLIVEIRA, A.A., PHILLIPS, R.P., PONGPATTANANURAK, N., PUNCHI-MANAGE, R., SALIM, R., SCHURMAN, J., SUKUMAR, R., SURESH, H.S., SUWANVECHO, U., THOMAS, D.W., THOMPSON, J., URÍARTE, M., VALENCIA, R., VICENTINI, A., WOLF, A.T., YAP, S., YUAN, Z., ZARTMAN, C.E., ZIMMERMAN, J.K. & CHAVE, J. Local spatial structure of forest biomass and its consequences for remote sensing of carbon stocks. *Biogeosciences Discussions* 11: 5711–5742 .
86. ROSZAINI, K., NOR AZAH, M.A., ZAINI, S. & ZAITIHAIZA, K. Anti-termitic potential of heartwood and bark extract and chemical compounds isolated from *Madhuca utilis* Rodl. H.J. Lam and *Neobalanocarpus heimii* King P.S. Ashton. *Holzforschung* 68(6): doi: 10.1515/hf-2013-0101.
87. ROZIHAWATI, Z., NORMALA, H., SAJAP, A.S, MOHD FARID, A. & MOHAMAD ROSLAN, M. Bioantifungal activity of selected medicinal plant extracts against root rot of fungal disease. *Journal of Plant Sciences* 2(1): 31–36.
88. RUMAIS, N., MOHAMAD NASIR, M.A., SITI AISHAH, H., NURUL HUDA, A.K. & AZWAN, M.L. Metallo- and ionochromic study of spiropyran as a multiresponsive sensor in liquid and solid state. *International Journal of ChemTech Research* 6(7): 3816–3821.
89. SAHRIM, L., NOR AZAH, M.A., MAILINA, J., MUHD HAFIZI, Z., ABD. MAJID, J. & NURLAILA, I. Classification of agarwood oils using K-NN K-Fold. *Sensor Letters* 12: 1038–1040.
90. SELAMAT, N.S.S., MAT TAHIR, M.F., ZULKIFLI, R., MOHD NOR, M.J., MOHD SABRI, M.A., ELWALEED, A.K., SITI MUNIRAH, M.Y. Development of semi-active panel design for sound absorption. *Applied Mechanics and Materials* Vol. 663: 421–425.
91. SHAWN, C., DINAIZ, T., SEYEDEH ZEINAB, M.M. & NOR ANISAH, M.N. Haplotype-habitat associations of *Coptotermes gestroi* (Termitoidea: Rhinotermitidae) from mitochondrial DNA sequences. *Environmental Entomology* 43(4). doi: 10.1603/EN13318.
92. SHINTA, O., NAOKI, O., AMIR AFFAN, A.A., SOMKID, S., TEERA, V., AHMAD ZUHAI, Y. & TADASHI, N. Vessel feature changes as a tool for detecting annual rings in tropical forests. *Trees* 28(1): 137–149.
93. SITI NORSYARAH, C.K., SANDRA, U., NADZEERAH, I., INTAN SUHADA, A., MUHAMMAD SYAFIQ, J., RAFIDAH, J., WAN SITI ATIQA, W.O., TENGGU ELIDA, T.Z.M., NOR SHALIZA, M.S. & AMIZON, A. Imidazolium-based ionic liquid dissolution influence on crystallinity of oil palm frond, oil palm trunk and elephant grass lignocellulosic biomass. *Advanced Materials Research* Vol. 911: 307–313.
94. SITI SUHAILA, A.R., NORIHAN, M.S., NORWATI, M., MAHANI, M.C., NOR AZAH, M.A., PARAMESWARY, N., KODI ISPARAN, K., MAILINA, J., MAILINA, J., AZRINA, A., NOR HASNIDA, H., HALIZA, I., NAZIRAH, A. & MUHD FUAD, Y. Enhancement of phytochemical production through in vitro polyploidization of agarwood-producing species, *Aquilaria malaccensis*. *International Journal of Biotechnology Research* Vol. 2(3): 037–043.
95. SITI SYARIFAH, M.M., NURHANAN MURNI, Y., PUTERI SHAFINAZ AKMAR, A.R., MUHAMMAD HAFIZ, J., ASIAH, O. & MOHD ILHAM, A. Mechanisms of action of 17 BH-neriifolin on its anticancer effect in SKOV-3 ovarian cancer cell line. *Anticancer Research* 34: 4141–4152.
96. SREETHERAN, M. & VAN DEN BOSCH, C.C.K. A socio-ecological exploration of fear of crime in urban green spaces—a systematic review. *Urban Forestry & Urban Greening* 13(1): 1–18.
97. SYAFIQA NABILAH, S.B., FARAH FAZWA, M.A., NORHAYATI, S., MOHD ZAKI, A. & MOHAMAD, O. Propagation of five high yielding clones of *Labisia pumila* var. *alata* and evaluation of their growth performances at nursery stage. *International Journal of Agriculture Sciences Research* 3(7): 121–125.

98. TAN, J.P.C., KIEW, R., SAW, L.G. & UMMUL NAZRAH, A.R. Three new species from Gunung Kanthan, a limestone tower karst in Perak, Malaysia. *Phytotaxa* 177 (3): 146–154.
99. TATSURO, N., YOSHIKO, K., SATORU, T., KAORU, N., SHOJI, N., MAKOTO, T., HIROYUKI, O., ABDUL RAHIM, N. & ABD. RAHMAN, K. Estimation of light-use efficiency through a combinational use of the photochemical reflectance index and vapor pressure deficit in an evergreen tropical rainforest at Pasoh, Peninsular Malaysia. *Journal of Remote Sensing of Environment* 150: 82–92.
100. TIMOTHY, M.A., UTTERIDGE, JULIUS, A. & SUZANA, S. *Ardisia silamensis*, a new ultramafic species from Borneo; studies in Malaysian Myrsinaceae II. *Kew Bulletin* 36: 1–5.
101. TNAH, L.H., LEE, C.T., LEE, S.L., NG, C.H. & NG, K.K.S. Development and characterization of microsatellites of an important medicinal plant *Orthosiphon stamineus* (misai kucing). *Biochemical Systematics and Ecology* 55: 317–321.
102. TNAH, L.H., LEE, C.T., LEE, S.L., NG, C.H. & NG, K.K.S. Development of microsatellites in *Labisia pumila* (Myrsinaceae), an economically important Malaysian herb. *Applications in Plant Sciences* 2(6): 1400019; doi: 10.3732/apps.1400019.
103. TUMIRAH, K., HUSSEIN, M.Z., ZULKARNAIN, Z. & RAFAEDAH, R. Nanoencapsulated organic phase change material based on copolymer nanocomposites for thermal energy storage. *Energy* 66: 881–890.
104. TUMIRAH, K., HUSSEIN, M.Z., ZULKARNAIN, Z. & RAFAEDAH, R. Textural and chemical properties of activated carbon prepared from tropical peat soil by chemical activation method. *BioResources* 10(1): 986–1007.
105. WADEY, J., FLETCHER, C. & CAMPOS-ARCEIZ, A. First photographic evidence of flat-headed cats (*Prionailurus planiceps*) in Pasoh Forest Reserve, Peninsular Malaysia. *Tropical Conservation Science* Vol.7 (2): 171–177.
106. WAN RASIDAH, K., ROSAZLIN, A. & ROZITA, A. Application of organic residues for yield improvement of *Orthosiphon stamineus* on contrasting soils. *Acta Biologica Indica* 2(1): 277–283.
107. WONG, S.K., LIM, Y.Y., LING, S.K. & WEI, E.C.C. Antiproliferative activity of *Vallis glabra* Kutz. (Apocynaceae). *Pharmacognosy Magazine* 10: 232–239.
108. WONG, S.K., LIM, Y.Y., LING, S.K. & WEI, E.C.C. Caffeoylquinic acids in leaves of selected Apocynaceae species: Their isolation and content. *Pharmacognosy Research* 6: 67–72.
109. YANTI, A.K., ABDUL HAMIS, S., HAMDAN, S., IZRAN, K. & KHAIRUL, M. Physical and mechanical properties of engineered coconut trunk (ECTV) for interior products. *International Journal on Coconut R&D CORD* 29(1).
110. YOSHIKO, I., LOURENS, P., FRANK, S., ABD. RAHMAN, K., MATTHEW, D.P., TAKUYA, K. & TAKASHI S.K. Linking size-dependent growth and mortality with architectural traits across 145 co-occurring tropical tree species. *Ecology* 95(2): 353–363.
111. ZAINUL, A.Z., TAVAMANI, B., VELAN, S., SYAHIDA, A. & FADZUREENA, J. Mechanism(s) of action involved in the gastroprotective activity of *Muntingia calabura*. *Journal of Ethnopharmacology* 151: 1184–1193.
112. ZURIATI, Z., NOR AKMALAZURA, J., AZIMAH, A., MOHD NAFFIDI, A.L., MOHAMED ISA, A.M. & MOHD ILHAM, A. Bioassay-guided isolation of a sesquiterpene lactone of deoxyelephantopin from *Elephantopus scaber* Linn. active on Trypanosome *brucei rhodesiense*. *Phytomedicine* 21: 282–285.

BUKU/BOOKS

1. ABD. LATIF, M., NIK ZANARIAH, N.M., ZAWIAH, N. & OTHMAN, H. Kenali 114 Spesies Buah-Buahan Liar. Institut Penyelidikan Perhutanan Malaysia, Kepong. 257 pp.
2. ABD. LATIF, M., NOOR AZLIN, Y., NORHAYATI, N., NIK ZANARIAH, N.M., NORSHAM, Y., NUR SUPARDI, M.N., NAIMAH, C.L. & NOR AZLIN, M.F. FRIM A Year of Colours/FRIM Setahun Dalam Warna. Institut Penyelidikan Perhutanan Malaysia, Kepong. 127 pp.
3. ABD. RAHMAN, K., MOHD GHAZALI, H., RABA BARIZAN, R.S., SAIFUL ISKANDAR, K., HAMDAN, O., AHMAD FIRDAUS, Z. & MOHD NASIR, A.H. Pengukuhan Tebing Sungai Chini, Kajian Teknikal Usaha Sama NRE-JPSM-FRIM. Institut Penyelidikan Perhutanan Malaysia, Kepong. 101 pp.
4. ABDUL HAMID, S., NASARUDDIN, M., ARIFF, J.M., ABD. LATIF, M., RAHIM, S. & YANTI, A.K. Pembuatan Kapal Melayu Tradisional Melayu. Institut Penyelidikan Perhutanan Malaysia, Kepong. 144 pp.
5. AZHARIZAN, M.N. & SAMSUDIN, M. Chain-of-Custody Certification Module (Trading), Forest Research Institute Malaysia, Kepong. 136 pp.
6. AZIAN, M., MARRYANNA, L., TARIQ MUBARAK, H., WAN RASIDAH, K. (Eds.) Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia: Hala Tuju R&D dan Pelaksanaannya, 7–8 Jun 2011, Selangor. 248 pp.
7. CHUNG, R.C.K., SAW, L.G., SOEPADMO, E. & KIEW, R. (Eds.). Tree Flora of Sabah and Sarawak Volume 8. Forest Research Institute Malaysia, Kepong. 248 pp.
8. FARAH FAZWA, M.A. & SYAHIDA EMIZA, S. Panduan Pengecaman Tiga Varieti Kacip Fatimah Melalui Ciri Morfologi Luaran. Institut Penyelidikan Perhutanan Malaysia, Kepong. 24 pp.
9. FLETCHER, C., NUR ZATI, A.M., JOANN, C.L., MOHAMAD ZAKI, M.I. & SHAMSUDIN, I. Manual Penilaian Biodiversiti. Forest Research Institute Malaysia, Kepong, Selangor. 66 pp.
10. IDA SURAINI, A.S. (Eds.) Focus on Forest Products. Forest Research Institute Malaysia, Kepong. 162 pp.
11. ISMAIL, P. & HAMDAN, N. (Eds.). Assessment of Aboveground Carbon Stock Changes in Pilot Site of the Asean Peatland Forests Project (APFP). Forest Research Institute Malaysia, Kepong. 42 pp.
12. KIEW, R. Henderson's Malaysian Wild Flowers Dicotyledons. Malaysian Nature Society, Kuala Lumpur. 391 pp.
13. KIEW, R., CHUNG, R.C.K., SAW, L.G. & SOEPADMO, E. (Eds.) Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants. Vol. 4. Forest Research Institute Malaysia, Kepong. 405 pp.
14. KIRTON, L.G. A Naturalist's Guide to the Butterflies of Peninsular Malaysia, Singapore and Thailand. John Beaufoy Publishing, Oxford in association with the Forest Research Institute Malaysia, Kepong. 176 pp.
15. MASTURA, M., CHEE, B.J., TAN, A.L., NOR AZAH, M.A., ROHANA, A.R. & NOORHAZMIRA, M. (Eds.) Prosiding Seminar Pemuliharaan dan Pemerkasaan Pengetahuan Tradisi, 23–24 Mei 2014, Kuala Lumpur. 179 pp.
16. MOHAMAD DANIAL, M.S., ISMAIL, P., SAMSUDIN, M., NORAISHAH, S., NORSHEILLA, M.J.C., ABDUL KHALIM, A.S., MUHAMMAD SAFUAN, S., NADIA, C.I. & JULIAN, B. An Annotated Bibliography on REDD+ in Southeast Asia. Forest Research Institute Malaysia, Kepong. 61 pp.
17. MOHAMAD FAIZUL, K., SAMSUDIN, M., ZAHARI, O., SHAMSUDIN, I., WAN MOHD SHUKRI, W.A. Manual Perisian Sistem Silvikultur Pemilihan Pokok (STSS). Institut Penyelidikan Perhutanan Malaysia, Kepong. 35 pp.
18. NG, F.S.P. Tropical Forest Fruits, Seeds, Seedlings & Trees. Malayan Forest Records No. 52. Forest Research Institute Malaysia, Kepong. 429 pp.
19. NIK ZANARIAH, N.M. & NORINI, H. Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan dan Beraroma Orang Asli Semai. Institut Penyelidikan Perhutanan Malaysia, Kepong. 69 pp.
20. NIK ZANARIAH, N.M., ABD. LATIF, M. & KHAIRUDIN, K. Tokoh dan Jejak Pewaris Generasi FRIM Jilid 2. Institut Penyelidikan Perhutanan Malaysia, Kepong. 243 pp.
21. NOOR AZLIN, Y., AHMAD AZARUDDIN, M.N. & SHARMILLAH, S. (Eds.) Proceedings of the Urban Forestry Conference 2012. Forests and Parks: Communicating Messages for Sustainability, 2–6 October 2012, Kuching. 104 pp.

22. ROSHAMIDA, R. & HO, Y.F. (Eds.) Highlights of FRIM's R&D Projects 2013. Forest Research Institute Malaysia, Kepong. CD.
23. SAMSUDIN, M., AZEYLA, A., MOHAMAD FAIZUL, K., RODZIAH, H., ABD. RAHMAN, K. & SHAMSUDIN, I. Sistem Silvikultur Pemilihan Pokok (STSS). Institut Penyelidikan Perhutanan Malaysia, Kepong. 55 pp.
24. SARIFAH, K.A. & HO, Y.F. (Eds.) Journal of Tropical Forest Science, Jilid 26 (1). Forest Research Institute Malaysia, Kepong. 162 pp.
25. SARIFAH, K.A. & HO, Y.F. (Eds.) Journal of Tropical Forest Science, Jilid 26 (2). Forest Research Institute Malaysia, Kepong. 304 pp.
26. SARIFAH, K.A. & HO, Y.F. (Eds.) Journal of Tropical Forest Science, Jilid 26 (3). Forest Research Institute Malaysia, Kepong.
27. SARIFAH, K.A. & HO, Y.F. (Eds.) Journal of Tropical Forest Science, Jilid 26 (3). Forest Research Institute Malaysia, Kepong. 608 pp.
28. SARIFAH, K.A. Prestasi Journal of Tropical Forest Science. Institut Penyelidikan Perhutanan Malaysia, Kepong. 23 pp.
29. TAN, Y.E., SITI ZALIHA, A. & ZAITUN, S. Technical Services and Research and Development Forest Products Division. Forest Research Institute Malaysia, Kepong. 29 pp.
30. ZAIHAN, J., RAHIM, S., MOHAMAD NASIR, M.A., PUAD, E., AZAHARI, M.Y., MOHD RADZI, A., MAIZURA, I., ROHANA, S., WAN SHUKRI, W.A. & MOHD, M.S. Manual Peraturan Keselamatan Makmal Bengkel Lapangan dan Pejabat Edisi Ketiga 2014. Institut Penyelidikan Perhutanan Malaysia, Kepong. 83 pp.

PENERBITAN LUAR/EXTERNAL PUBLICATIONS

1. AHMAD NAZARUDIN, M.R., NORMANIZA, O., TSAN, F.Y., OTHMAN, R., NASHRIYAH, M., DING, P., PUTERI EDAROYATI, M.W., SARWAR, J. & ABD. JAMIL, Z. Transactions of the Malaysian Society of Plant Physiology 22. 281 pp.
2. JALONEN, R. & LEE, S.L. Sustaining Tropical Timber Trees in Production Forest of Asia-ensuring Their Genetic Viability. Bioersity Factsheet. 2 pp.
3. JEYANNY, V., ROSAZLIN, A. & MOHD RIZAL, A. (Eds.) MSSS Newsletter. Issue 2, August 2014. Malaysian Society of Soil Science. 6 pp.
4. MOHD FADZIL, M.I., WAN ASMA, I., ZULKAFLI, H., SAIDATUL SHIMA, J. & RAFIDAH, J. (Eds.) Proceedings of the International Conference on Biomass for Biofuels and Value Added Products 2012. Biomass for Biofuels and Value Added Products. 23–24 Oktober 2012, Kuala Lumpur. 529 p.
5. ROSAZLIN, A., RADZIAH, O., MOHAMAD BOYIE, J., MOHAMAD FAKHRI, I., VIJAYANDRAN JUVA, R. & WAN RASIDAH, K. (Eds.) Proceedings of Soil Science Conference of Malaysia 2014. Soil Management and Environment. 8–10 April 2014, Kangar. 332 pp.

TESIS/THESES

1. HEMA THOPLA, G. Heavy metal tolerance and antibiotic resistance of actinomycetes isolated from tin tailings and forest soil. MSc. Thesis, Universiti Malaya, Kuala Lumpur.
2. LILI SAHIRA, H. Antitrypanosomal secondary metabolites from soil actinomycetes isolated from Penang National Park. MSc. Thesis, Universiti Sains Malaysia, Pulau Pinang.
3. LIM, C.H. Revision of Codonoboea Sect. Boeopsis and Sect. Salicini (Gesneriaceae) in Peninsular Malaysia. MSc. Thesis, Universiti Malaya, Kuala Lumpur.
4. MAZURA, M.P. The role of kynurenine metabolism in the development of the central nervous system. PhD. Thesis, University of Glasgow, United Kingdom.
5. NOR HAYATI, A. Chemical constituents of *Prismatomeris malayana* Ridley and quantitative structure activity relationship study on anti-inflammatory agents and their analogues. PhD. Thesis, Universiti Malaya, Kuala Lumpur.
6. NURDALILA, Z. Kesan fraksi kaya polisakarida *Morinda citrifolia* (mengkudu) terhadap kecederaan hepar aruhan parasetamol. MSc. Thesis, Universiti Kebangsaan Malaysia, Selangor.
7. NURUL FARHANAH, Z. Population genetics study of *Gonystylus bancanus* (ramin melawis) using microsatellite markers. MSc. Thesis, Universiti Kebangsaan Malaysia, Selangor.
8. NURUL HILAL, A.T. Transmission of multimedia data over wired and wireless networks: A case study in Forest Research Institute Malaysia (FRIM). MSc. Thesis, Universiti Kebangsaan Malaysia, Selangor.
9. SAM, Y.Y. Taxonomic revision, phylogeny and conservation status of *Scaphochlamys* (Zingiberaceae). PhD. Thesis, Universiti Malaya, Kuala Lumpur.
10. WAN MOHD SHUKRI, W.A. Penilaian ke atas Sistem Pengurusan Memilih (SMS) dalam mencapai hutan pusingan kedua yang mapan: Satu kajian kes di Negeri Terengganu. PhD Thesis, Universiti Kebangsaan Malaysia, Selangor.

BAB DALAM BUKU/CHAPTER IN A BOOK

1. ABD. RAZAK, O., AMIR SAAIFFUDDIN, K. & NORHISYAM, I. Penanaman buluh. Pp. 64–74 in Abd. Rahman, K., Mohd. Ghazali, H., Raja Barizan, R.S., Saiful Iskandar, K., Hamdan, O., Ahmad Firdaus, Z. & Mohd. Nasir, A.H. (Eds.) Pengukuhan Tebing Sungai Chini – *Kajian Teknikal Usahasama NRE-JPSM- FRIM*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
2. AHMAD AZARUDDIN, M.N. *Andira inermis*: Blooming sky-pointing flowers. Pp. 10–11 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F.(Eds.) *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
3. AHMAD AZARUDDIN, M.N. *Samanea saman*: The umbrella-like rain tree. Pp. 70–11 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F.(Eds.) *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
4. AHMAD AZARUDDIN, M.N. Yellow carpet of angšana. Pp. 36–37 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F.(Eds.) *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
5. AHMAD FIRDAUS, Z., CHEW, M.Y., YAO, T.L., ABU HUSIN, H., NOORSIHA, A., MOHD GHAZALI, H., NUR SURIANI, S., SAIFUL ISKANDAR, K. & IBRAHIM, H. Survei dan konservasi ex-situ tumbuhan akuatik. Pp. 110–133 in Abd Rahman, K., Mohd Ghazali, H., Raja Barizan, R.S., Saiful Iskandar, K., Hamdan, O., Ahmad Firdaus, Z. & Mohd Nasir, A.M. (Eds.) *Pengukuhan Tebing Sungai Chini: Kajian Teknikal Usaha Sama NRE-JPSM-FRIM*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
6. ARNIZA, G.M., YUNITA MEGASARI, D., MOHD RIDZUAN HAFIZ, M.Z., RUSHDAN, I. & SALMI, G. EFB nano fibrous cells for paper smoothing and improved printability. Pp. 537–542 in Mohamad Hafiz, M., Zuraida, K., Suriani, A.B., Asiah, M.N., Tetsuo, S. & Mohamad Rusop, M. (Eds.) *Nanoscience, Nanotechnology and Nanoengineering*. Trans Tech Publications Inc. Durnten-Zurich, Switzerland.
7. ARNIZA, G., MOHD RIDZUAN HAFIZ, M.Z., YUNITA MEGASARI, D., NURUL HASANAH, K., RUSHDAN, I., WAN ROSLI, W.D., BAHARIN, A. & ISSAM AHMED, M. Nanofibre network rooted from the alkaline peroxide treatment of oil palm empty fruit bunches. Pp. 500–505 in Mohamad Hafiz, M., Zuraida, K., Suriani, A.B., Asiah, M.N., Tetsuo, S. & Mohamad Rusop, M. (Eds.) *Nanoscience, Nanotechnology and Nanoengineering*. Trans Tech Publications Inc. Durnten-Zurich, Switzerland.
8. ARNIZA, G., MOHD RIDZUAN HAFIZ, M.Z., WAN ROSLI, W.D., BAHARIN, A., RUSHDAN, I., ISSAM AHMED, M., TANWEER, A. & ZIYA, A.K. Augmentation of EFB fiber web by nano-scale fibrous elements. Pp. 494–499 in Mohamad Hafiz, M., Zuraida, K., Suriani, A.B., Asiah, M.N., Tetsuo, S. & Mohamad Rusop, M. (Eds.) *Nanoscience, Nanotechnology and Nanoengineering*. Trans Tech Publications Inc. Durnten-Zurich, Switzerland.

9. AZIAN, M., ISMAIL, P. & HAMDAN, O. Research and development activities towards sustainable management of mangroves in Peninsular Malaysia. Pp. 373–390 in Faridah Hanum, I. et al. (Eds.) *Mangrove Ecosystems of Asia*, doi: 10.1007/978-1-4614-8582-7_17© Springer Science Business Media, New York.
10. CHEW, M.Y. & CHUNG, R.C.K. Chengal. Pp. 84–85. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
11. CHEW, M.Y. & CHUNG, R.C.K. Wild and luscious. Pp. 96–97. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
12. CHEW, M.Y. & SITI MUNIRAH, M.Y. Rafflesia: The world's biggest flower. Pp. 92–93. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
13. CHEW, M.Y. & THI, B.K. Forest food. Pp. 94–95. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
14. CHEW, M.Y. *Bayabusa clarkei*: A little star at FRIM grounds. Pp. 126–127 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. (Eds.) *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
15. CHEW, M.Y. *Dryobalanops aromatica*: Jigsaw puzzles in the sky. Pp. 88–91 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. (Eds.) *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
16. CHEW, M.Y. *Peltophorum pterocarpum*: Burst of yellow flames. Pp. 96–97 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
17. Chew, M.Y. Pond of golden flowers, quite a sight to behold. Pp. 110–111 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
18. CHEW, M.Y. The rare sight of fruiting tongkat ali. Pp. 42–43 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. (Eds.) *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
19. CHUNG, R.C.K. Amazing flora in the Malaysian Rainforest. Pp. 80–81 in *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
20. DAS, I., NORSHAM, Y., SUKUMARAN, J. & LEONG, T.M. *Conservation status of the amphibians of Malaysia and Singapore*. Pp. 281–299 in Harordi, E. & Idraneil, D. (Eds.) *Conservation Biology of Amphibians of Asia. Status of Conservation and Decline of Amphibians: Eastern Hemisphere*. Natural History Publications (Borneo), Kota Kinabalu.
21. HAMDAN, O. & SAIFUL ISKANDAR, K. Ciri-ciri fizikal Tasik Chini. Pp. 8–16 in Abd. Rahman, K., Mohd Ghazali, H., Raja Barizan, R.S., Saiful Iskandar, K., Hamdan, O., Ahmad Firdaus, Z. & Mohd Nasir, A.H. (Eds.) *Pengkukuhan Tebing Sungai Chini: Kajian Teknikal Usaha Sama NRE-JPSM-FRIM*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
22. INTAN NURULHANI, B. NORSHAKILA, Y. & LIM, H.F. Rapid Rural Appraisal (RRA), Bengkel kesedaran pengetahuan tradisi dan keizinan komuniti. Pp. 20–27 in Nik Zanariah, N.M. & Norini, H. (Eds.) *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan & Beraroma Orang Asli Semai*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
23. JAMAN, R., ROZUAN, I., IMIN, K., DAMANHURI, A., MAIDEEN, H. & LATIFF, A. The diversity of lycophytes and monilophytes in Gunung Chamah and its vicinity, Kelantan. Pp. 107–115 in Shashiah, A.K. et al. (Eds.) *Gunung Chamah, Kelantan Pengurusan Hutan, Persekitaran Fizikal, Kepelbagaian Biologi dan Pelancongan Ekologi*. Jabatan Perhutanan Negeri Kelantan, Kelantan.
24. JULIUS, A. Buxaceae. Pp. 201–205 in Soepadmo, E., Saw, L.G., Chung, R.C.K. & Kiew, R. (Eds.) *Tree Flora of Sabah and Sarawak Volume 8*. Forest Research Institute Malaysia, Kepong.
25. JULIUS, A. Kacip fatimah. Pp. 82–83. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
26. JULIUS, A. Tongkat ali. Pp. 86–87. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
27. L.S.L. CHUA. Conservation. Pp. 1–2 in R. Kiew, R.C.K. Chung, L.G. Saw & E. Soepadmo. (Eds.) *Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants*, Volume 4. Forest Research Institute Malaysia, Kepong.
28. LIM, H.F., NORSHAKILA, Y., & INTAN NURULHANI, B. Bab 2: Pendekatan kajian. Pp. 7–19 in Nik Zanariah, N.M. & Norini, H. (Eds.) *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan & Beraroma Orang Asli Semai*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
29. MASTURA, M., NIK MUSAADAH, M., FADZUREENA, J. & NUZIAH, H. Merungkai misteri, meneroka potensi: sains di sebalik tumbuhan ubatan warisan semai. Pp. 50–66 in Nik Zanariah, N.M. & Norini, H. (Eds.) *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan & Beraroma Orang Asli Semai*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
30. MOHAMAD DANIAL, M.S. & MOHD NAZIP, S. Ecotourism activities and their influences on the stand structure of protected forests of Taman Negara Pahang. In Mohd Nazip, S. (Eds.) *Beyond Biodiversity Conservation*, Research Management Institute Publication Series: Biodiversity. Universiti Teknologi MARA, Shah Alam.
31. MOHAMAD DANIAL, M.S., MOHD NAZIP, S., ABD. RAHMAN, K., SHAMSUL, K. & MOHD SALLEH, D. Influence of ecotourism activities on the forest structure and light intensity in forests of Taman Negara Pahang. In Mohd Nazip, S. (Eds.) *Beyond Biodiversity Conservation*, Research Management Institute Publication Series: Biodiversity. Universiti Teknologi MARA, Shah Alam.
32. MOHD GHAZALI, H., JAMALUDIN, M., AHMAD FIRDAUS, Z., MASKOM, P. & ABU BAKAR, R. Penanaman semula teratai. Pp. 134–140 in Abd. Rahman, K., Mohd Ghazali, H., Raja Barizan, R.S., Saiful Iskandar, K., Hamdan, O., Ahmad Firdaus, Z. & Mohd Nasir, A.H. (Eds.) *Pengkukuhan Tebing Sungai Chini: Kajian Teknikal Usaha Sama NRE-JPSM-FRIM*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
33. NAIMAH, C.L. Sengkuang: The Pacific walnut tree. Pp. 56–57 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
34. NAIMAH, C.L. The luscious terengganu cherry. Pp. 52–53 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
35. NAIMAH, C.L. *Arytera littoralis*: The garden ornament. Pp. 124–125 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
36. NAIMAH, C.L. Kasai: Pretty to the eyes, tasty to the palate. Pp. 74–75 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
37. NAIMAH, C.L. Powder puffs and handkerchiefs from enam-enam. Pp. 20–21 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
38. NAIMAH, C.L. Sentul: A nearly forgotten but nutritious fruit. Pp. 76–77 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
39. NAIMAH, C.L. *Shorea sumatrana*: An endangered timber tree. Pp. 82–83 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
40. NASHATUL ZAIMAH, N.A. & AZAHARI, M.Y. Jelutong: The local latex tree. Pp. 66–67 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
41. NOOR AZLIN, Y. Engkabang: butter from the forest. Pp. 68–69 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
42. NOOR AZLIN, Y. "Cannon-ball" all fired up with flowers. Pp. 46–47 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
43. NOOR AZLIN, Y. *Barringtonia asiatica*: The sea faring putat. Pp. 122 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
44. NOOR AZLIN, Y. *Firmiana malayana*: Bare but for burst of orange flowers. Pp. 5 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
45. NOOR AZLIN, Y. Flushing perah. Pp. 4 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.

46. NOOR AZLIN, Y. Gapis: flowering bright and fragrant. Pp. 8–9 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
47. NOOR AZLIN, Y. *Mesua ferrea*: The useful, graceful tree. Pp. 24–27 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
48. NOOR AZLIN, Y. Pink blossom of *Tabebuia pentaphylla*. Pp. 58–59 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
49. NOOR AZLIN, Y. Queen of flowering trees. Pp. 116–117 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
50. NOOR AZLIN, Y. Red flushes of terengganu ebony. Pp. 34–35 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
51. NOOR AZLIN, Y. *Switenia macrophylla*: Big leaf mahogany. Pp. 22–23 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
52. NOOR AZLIN, Y. *Tabebuia*'s yellow trumpet. Pp. 2–3 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
53. NOOR AZLIN, Y. The legendary melaka tree. Pp. 54–56 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
54. NOR AZLIN, M.F. Asian Philippine glossy starling. Pp. 100–102 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
55. NOR AZLIN, M.F. Blooms of fungi: Colours after rains. Pp. 94–95 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
56. NOR AZLIN, M.F. Crested serpent eagle: The snake hunter. Pp. 84–85 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
57. NOR AZLIN, M.F. *Dendrocalamus giganteus*: The giant bamboo bearing rare flowers. Pp. 114 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
58. NOR AZLIN, M.F. Forest fireworks after the storm. Pp. 98–99 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
59. NOR AZLIN, M.F. Spiderhunter, the nectar lover. Pp. 38 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
60. NOR AZLIN, M.F. *Syzygium zeylanicum*: Beacon to necta lovers. Pp. 86–87 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *B70*. Forest Research Institute Malaysia, Kepong.
61. NOR AZLIN, M.F. The vibrant coloured rufous-collared kingfisher. Pp. 79 in Abd Latif, M., Noor Azlin, Y., Norhayati, N., Nik Zanariah, N.M., Norsham, Y., Nur Supardi, M.N., Naimah, C.L. & Nor Azlin, M.F. *FRIM A Year of Colours*. Forest Research Institute Malaysia, Kepong.
62. NORSHAKILA, Y., INTAN NURULHANI, B. LIM, H.F. & AMELIA, B. Bab 7: Pangkalan data tumbuhan ubatan & beraroma Orang Asli Semai. Pp. 67–69 in Nik Zanariah, N.M. & Norini, H. (Eds.) *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan & Beraroma Orang Asli Semai*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
63. NORSHAKILA, Y., LIM, H.F. & INTAN NURULHANI, B. Bab 4: Survei sosioekonomi isi rumah. Pp. 28–39 in Nik Zanariah, N.M. & Norini, H. (Eds.) *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubatan & Beraroma Orang Asli Semai*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
64. ONG, P.T. The weird and wacky orchids. Pp. 82–8 in *Pusaka Akar*. Landskap Malaysia.
65. QAYYUM NADIA, W.A., SITI MUNIRAH, M.Y., ZULHAZMAN, H., LATIFF, A., NOR AZILAH, A.W. & NIK NADIRA FARHANA, N.A. Notes on *Rafflesia* in Gunung Chamah, Kelantan. Pp. 120–124 in Shashiah, A.K. et al. (Eds.) *Gunung Chamah, Kelantan Pengurusan Hutan, Persekitaran Fizikal, Kepelbagaian Biologi dan Pelancongan Ekologi*. Jabatan Perhutanan Negeri Kelantan, Kelantan.
66. RAFIDAH, A.R. Actinidiaceae. Pp. 5–24 in Kiew, R., Chung, R.C.K., Saw, L.G. & Soepadmo, E. (Eds.) *Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants, Vol. 4*. Forest Research Institute Malaysia, Kepong.
67. RAFIDAH, A.R. Crypteroniaceae. Pp. 31–39 in Kiew, R., Chung, R.C.K., Saw, L.G. & Soepadmo, E. (Ed.) *Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants, Vol. 4*. Forest Research Institute Malaysia, Kepong.
68. RAFIDAH, A.R. Goodeniaceae. Pp. 41–45 in Kiew, R., Chung, R.C.K., Saw, L.G. & Soepadmo, E. (Eds.) *Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants, Vol. 4*. Forest Research Institute Malaysia, Kepong.
69. RAJA BARIZAN, R.S., FARAH SHAHANIM, M.M., ZAMRI, M.Z., MOHD AFENDI, A.G., HAMIDUL MUHSI, M.S., HAHAZEMI, T. & ABU BAKAR, M.R. Pengukuhan tebing Sungai Chini menggunakan teknik coir-log. Pp. 91–109 in Abd. Rahman, K., Mohd Ghazali, H., Raja Barizan, R.S., Saiful Iskandar, K., Hamdan, O., Ahmad Firdaus, Z. & Mohd Nasir, A.H. (Eds.) *Pengukuhan Tebing Sungai Chini: Kajian Teknikal Usaha Sama NRE-JPSM-FRIM*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
70. SAIDATUL HUSNI, S., NOR AZAH, M.A., MAILINA, J., MOHD FARID Z. & PIN, K.Y. Supercritical carbon dioxide (SC-CO₂) extraction of essential oils from *Citrus hystrix*. Pp. 25–31 in Fasihuddin, A., Zaini, A., Laily, D. & Ibrahim, J. (Eds.) *Integrated Research In Natural Products Chemistry*. Universiti Malaysia Sarawak, Kuching.
71. SAIFUL ISKANDAR, K., AHMAD FIRDAUS, Z., MOHD GHAZALI, H., HAMDAN, O., SHAHRUL ZAMAN, I., IBHARIM, H. & MOHAMAD ROZAIMI, M.N. Kajian hakisian tebing Tasik Chini. Pp. 50–63 in Abd. Rahman, K., Mohd Ghazali, H., Raja Barizan, R.S., Saiful Iskandar, K., Hamdan, O., Ahmad Firdaus, Z. & Mohd Nasir, A.H. (Eds.) *Pengukuhan Tebing Sungai Chini: Kajian Teknikal Usaha Sama NRE-JPSM-FRIM*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
72. SALLEH, M. & ABD. RAZAK, O. Financial analysis of *Gigantochloa albociliata* (buluh madu) plantation for shoot production: A case of Perlis. *Agrobiodiversity in Asia*. MARDI, Serdang.
73. SAM, Y.Y. The Rajah's *Begonia*. Pp. 82–83. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
74. SAM, Y.Y. The wild ginger. Pp. 82–83. *Pusaka Akar*. Landskap Malaysia, Kuala Lumpur.
75. SITI MUNIRAH, M.Y. & MOHD. NAZRI, A. Notes on the flora of Gunung Chamah. Pp. 140–152 in Shashiah, A.K. et al. (Eds.) *Gunung Chamah, Kelantan Pengurusan Hutan, Persekitaran Fizikal, Kepelbagaian Biologi dan Pelancongan Ekologi*. Jabatan Perhutanan Negeri Kelantan, Kelantan.
76. SITI MUNIRAH, M.Y. Cabombaceae. Pp. 25–29 in Kiew, R., Chung, R.C.K., Saw, L.G. & Soepadmo, E. (Ed.) *Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants, Vol. 4*. Forest Research Institute Malaysia, Kepong.
77. SYAHIDA EMIZA, S. Opiliaceae. Pp. 207–219 in Soepadmo, E., Saw, L.G., Chung, R.C.K. & Kiew, R. (Eds.) *Tree Flora of Sabah and Sarawak Volume 8*. Forest Research Institute Malaysia, Kepong.
78. SYAHIDA EMIZA, S. Opiliaceae. Pp. 325–337 in Kiew, R., Chung, R.C.K., Saw, L.G. & Soepadmo, E. (Eds.) *Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants, Vol. 4*. Forest Research Institute Malaysia, Kepong.
79. SYAHIDA EMIZA, S. Pandaceae. Pp. 339–351 in Kiew, R., Chung, R.C.K., Saw, L.G. & Soepadmo, E. (Eds.) *Flora of Peninsular Malaysia. Malayan Forest Records No. 49. Series II: Seed Plants, Vol. 4*. Forest Research Institute Malaysia, Kepong.

80. TAN, A.L. & NURUL HUSNA, Z. Bengkel teknik pengutipan dan pendokumentasian tumbuhan ubatan dan beraroma. Pp. 40–49 in Nik Zanariah, N.M. & Norini, H. (Eds.) *Memartabatkan Pengetahuan Tradisi Tumbuhan Ubat & Beraroma Orang Asli Semai*. Institut Penyelidikan Perhutanan Malaysia, Kepong.
81. WAN RASIDAH, K., MOHAMAD FAKHRI, I., SUHAIMI, W.C. & ROZITA, A. Survei Tanah. Pp. 19–32 in Abd. Rahman, K., Mohd Ghazali, H., Raja Barizan, R.S., Saiful Iskandar, K., Hamdan, O., Ahmad Firdaus, Z. & Mohd Nasir, A.H. (Eds.) *Pengukuhan Tebing Sungai Chini: Kajian Teknikal Usaha Sama NRE-JPSM-FRIM*. Institut Penyelidikan Perhutanan Malaysia, Kepong.

ARTIKEL PROSIDING/ARTICLES IN PROCEEDINGS

1. ABD. HAMID, S., YANTI, A.K., TUAN ANIS NADIA, T.M.S., IZRAN, K., HAMDAN, H. & KHAIRUL, M. Development of hybrid moulded laminated chair from bamboo and wood veneer. Pp. 141–146 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
2. ABD. RAZAK, O., SALLEH, M., MOHD LOKMAL, N. & ROSDI, K. Harvesting evaluation of *Dendrocalamus asper* (buluh betung) on shoot productivity. Pp. 10–12 in Ahmad Nazarudin, M.R. et al. (Eds.). *Transactions of the Malaysian Society of Plant Physiology 22: innovative plant productivity and quality*, 27–29 August 2013, Terengganu.
3. ADIANA, M.A., NUZIAH, H., ROHANA, S., NIK MUSAADAH, M., FADZUREENA, J. & TAN, A.L. Penilaian kandungan fitokimia dan aktiviti sitotoksiti spesies terpilih tumbuhan ubatan berasaskan pengetahuan tradisional. Pp. 142–145 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
4. AHMAD NAZARUDIN, M.R., TSAN, F.Y., NORMANIZA, O., ROSFARIZAL, K. & ADZMI, Y. Phenolic content of *Xanthostemon chrysanthus* after treatment with paclobutrazol and potassium nitrate. Pp. 161–164 in Ahmad Nazarudin, M.R. et al. (Eds.). *Transactions of the Malaysian Society of Plant Physiology 22: Innovative Plant Productivity and Quality*, 27–29 August 2013, Terengganu.
5. AHMAD ZUHAI, Y., HASHIM, M.N. & LOK, E.H. Model rehabilitation of ex-mining lands through afforestation with forest species. Pp. 132–138 in Nazwin, A. (Ed.) *The Symposium Mineral 2013 (SIMPOMIN 2013)*, 12–13 November 2013, Ipoh.
6. AMIR SAAIFUDDIN, K., ABD. RAZAK, O., AHMAD ZUHAI, Y. & EMLLEE, M.T. Clump density and fertilizers application effects on the culms productivity of buluh semantan (*Gigantochloa scortechinii*) at Jeli Kelantan, Malaysia – A preliminary assessment. Pp. 128–132 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
7. ANEE SURYANI, S., NURHANAN MURNI, Y., MUHD HAFIZ, J., ABDULL RASHIH, A., ASIAH, O., ALIA AINA, A., NOR DATIAKMA, M.A., SITI SYARIFAH, M.M., MOHD HAFIDZ HADI, A., LING, S.K. & NOR HASNIDA, H. Acute toxicity evaluation of *Eurycoma longifolia* botanical extracts. Pp. 264–268 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
8. ANI, S., HAMDAN, H., MOHD NASIR, H. & NIK ADLIN, N.K. Struktur anatomi spesies hutan paya laut terpilih. Pp. 152–155 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
9. ANIS NAZLI, M.Y., HAMDAN, H., AMIRA MARIATUL, I. & AZIAN, M. Sifat mekanikal Bakau Kurap. Pp. 141–144 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
10. ANWAR, U.M.K., SARAH, W.S., ZUNOLIZA, A., HAMDAN, H. & MOHD NAZRI, W.A.R. Characteristics of polyols from three different biomass resources. Pp. 151–154 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
11. ATIRAH, A.S.A., MOHD ZAKI, A., NORWATI, M. & WICKNESWARI, R. Early growth performance of full-sib *Acacia auriculiformis* x *Acacia mangium* F1 hybrid progenies at three different sites. <http://dx.doi.org/10.1063/1.4895299>. *AIP Conference Proceedings 1614,769* (2014), 9–11 April 2014, Selangor.
12. AZIAN, M., MARRYANNA, L. & SAIFUL ISKANDAR, K. Analisis kuantitatif menggunakan *multiple regression model* bagi menilai hubungkait antara parameter kualiti air di petak kajian di Tanjung Piai, Johor. Pp. 214–219 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
13. AZYYATI, A.K., NOOR AZLIN, Y., SHARMILLAH, S., NOOR HAZLIZA, H., AZAHARI, M.Y. Urban Green space for nature education from the perspective of school students. Pp. 83–89 in Noor Azlin, Y., Ahmad Azaruddin, MN. & Sharmillah, S. (Eds.) *Proceedings of the Urban Forestry Conference 2012. Forests & Parks: Communicating Messages for Sustainability*. Forest Research Institute Malaysia, Kepong.
14. CHEW, M.Y., SAW, L.G., ONG, P.T., SITI MUNIRAH, M.Y., KAMARUL HISHAM, M., IMIN, K. & MOHD HAIRUL, M.A. Pulau Tioman, a lush tropical paradise revisited. Pp. 3–7 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
15. DASRUL ISKANDAR, D., ROSDI, K. & MOHAMAD AZANI, A. Growth of *Eurycoma longifolia* on two different series of BRIS soil. Pp. 322–325 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
16. FADZUREENA, J., MAZURA, M.P., ADIANA, M.A., HANI IDAYU, B. An investigation into the inhibitory effects of *Senna alata* L. leaf extract as well as its isolated compound on xanthine oxidase assay. Pp. 269–271 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
17. FARAH SHAHNIM, M.M., RAJA BARIZAN, R.S., NASRULHAQ, B.A. & NORMANIZA, O. Growth performance & physiology parameters on chengal seedlings under different light and fertiliser treatments in the nursery. Pp. 365–368 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
18. GAN, K.S. & ZAIRUL AMIN, R. Pengerangan batang bakau. Pp. 97–103 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
19. GETHA, K., HATSU, M., NUR FAIRUZ, M.Y., HEMA THOPLA, G., LILI SAHIRA, H. & MUHD SYAMIL, A. Biosynthetic potential of phylogenetically and biochemically unique actinobacteria from Malaysian soil. Pp. 162–168 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
20. HAMDAN, H., ANWAR, U.M.K., NORDAHLIA, A.S., ANI, S., NIK ADLIN, N.S. & GAN, K.S. Sifat bakau dan produk daripada bakau kurap. Pp. 104–108 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.

21. HAMDAN, H., NORSHEILA, M.J.C., ABDUL KHALIM, A.S., ISMAIL, P. & SAMSUDIN, M. Identifying drivers of deforestation in Pahang by using multi temporal satellite images. *Proceeding 13th International Symposium and Exhibition on Geoinformation (ISG2014)*, 14–15 October 2014, Kuala Lumpur.
22. HAMDAN, O., MOHD HASMADI, I. & MOHD HAKIMI, A.H. Optimal plot sizes for sampling biomass in natural and logged tropical forests. Pp. 33–37 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
23. HAMDAN, O., NORSHEILA, M.J.C., ABDUL KHALIM, A.S., ISMAIL, P. & SAMSUDIN, M. Assessing rate of deforestation and changes of carbon stock on mangroves in Pahang, Malaysia. *Proceeding International Conference on Mangroves of Asia-Pacific in View of Climate Change (MAPCVCC–2014)*, 11–13 November 2014, Kuala Lumpur.
24. HAMDAN, O., NORSHEILA, M.J.C., ISMAIL, P., ABDUL KHALIM, A.S. & SAMSUDIN, M. Assessing carbon pools in Dipterocarp forests of Peninsular Malaysia. *Proceeding Conference on Tropical Resources and Sustainable Sciences 2014*, 17–19 October 2014, Kota Bharu.
25. HAMIDAH, M., YONG, W.S.Y., CHUA, L.S.L. & LAU, K.H. Towards the identification of hotspot areas in Perak. Pp. 410–412 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceedings of the Conference on Forestry and Forest Products Research 2013: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
26. HEMA THOPLA, G. & GETHA, K. Screening of heavy metal tolerance in actinobacteria isolated from Bidor tin-tailings and Pasoh forest soil. Pp. 281–284 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
27. HO, W.M., TANG, L.K. & ANG, L.H. Effects of soil amendment on growth of tree species grown in an ex-tin mine site. Pp. 327–330 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
28. HUDA FARHANA, M.M., LIM, H.F. & ISMARIAH, A. Public servants' awareness and understanding of forest management issues in Malaysia. *Proceedings of the First Asia Pacific Conference on Global Business, Economics, Finance and Social Sciences (AP14SINGAPORE Conference)*, 1–3 August 2014, Singapore.
29. HUDA FARHANA, M.M., LIM, H.F., MOHD PARID, M. & TARIQ MUBARAK, H. Kepentingan sosioekonomi kawasan bakau delta Kelantan kepada masyarakat tempatan. Pp. 300–307 in Yap, Y.H. et al. *Prosiding Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara 2013: Pemeliharaan dan Pemulihan Hutan Pesisiran Pantai untuk Kesejahteraan Masyarakat*, 11–13 Jun 2013, Kuala Terengganu.
30. HUDA FARHANA, M.M., LIM, H.F., NIK AZYATI, A.K. & MOHD PARID, M. Happiness index among FRIM's joggers. Pp. 319–321 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
31. INTAN NURULHANI, B., NORSHAKILA, Y., LIM, H.F., TAN, A.L., NURUL HUSNA, Z. & NIK MUSAADAH, M. Pengetahuan tradisi berkaitan tumbuhan ubatan Orang Asli: Proses dokumentasi di kalangan kumpulan Melayu Proto. Pp. 65–69 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
32. ISMAIL, H., RAJA BARIZAN, R.S., AZIAN, M. & TARIQ MUBARAK, H. Hasil dan impak penyelidikan yang telah dijalankan oleh Jawatankuasa Penyelidikan dan Pembangunan (JTRD) sepanjang tempoh Rancangan Malaysia Ke-9 dan Ke-10. Pp. 63–68 in Yap, Y.H. et al. *Prosiding Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara 2013: Pemeliharaan dan Pemulihan Hutan Pesisiran Pantai untuk Kesejahteraan Masyarakat*, 11–13 Jun 2013, Kuala Terengganu.
33. ISMAIL, P., SAMSUDIN, M., ZAHARI, I., ABDUL KHALIM, A.S., NORHAIDI, Y., HAMDAN, O., AZIAN, M., NUR HAJAR, Z.M., FLETCHER, C.D. & NADIA, C.I. Utilizing sustainable forest management (SFM) practices in Peninsular Malaysia under the REDD+ mechanism in mitigating climate change. Pp. 78–82 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
34. ISMAIL, P., TARIQ MUBARAK, H. & AZIAN, M. Isi kandungan dan struktur dirian Hutan Paya Laut di Renj, Sungai Kerang, Matang, Perak. Pp. 156–160 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
35. ISMARIAH, A. & JEFFREY, R.V. Valuing recreation of tropical forest parks: improving the design and management. Pp. 223–228 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
36. IYLIA, Z., SHAHFIZ, M., SHAKINA, N.M.T., KAVIARASU, M., SHAIFUL, M.A.R., & SHAMSIR, M.S. Development of iZOO: FRIM's fauna database. Pp. 17–21 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
37. JEYANNY, V., AHMAD ZUHAI, Y. & MOHAMAD FAKHRI, I. Carbon stocks in various carbon pools of *Acacia mangium* planted forest in Peninsular Malaysia. *Proceedings of the 20th World Congress of Soil Science: Soils embrace life and universe*, 8–13 June 2014, Jeju.
38. JEYANNY, V., HUSNI, M.H.A., WAN RASIDAH, K., BALASUNDRAM, S.K. & ARIFIN, A. Contribution of duff towards C stocks in a tropical montane forest. Pp. 281–284 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
39. JULIANA, A., ISMARIAH, A., NOOR AINI, Z. & NORLIYANA, A. Willingness to pay for conservation of the forest ecosystem in Negeri Sembilan. Pp. 319–321 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
40. KAVIARASU, M., SHAHFIZ, M.A., RIZAL, M.R., JOHN, R.T., NORDIANA, F.M.R. & FAKRUL, I.Q. Addition to the herpetofauna diversity in the Forest Research Institute Malaysia (FRIM) campus, Selangor. Pp. 332–337 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
41. KHAIRUL, A., AZHARIZAN, M.N., TARIQ MUBARAK, H., MOHD RIZUWAN, M. & MOHD TAMIZI, M. 'Pontoon': Produk berpotensi dari kayu bakau (*Rhizophora* Sp). Pp. 180–182 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
42. KHAIRUL, M., IZRAN, K., MOHD NOOR, M., ABD. HAMID, S., MOHAMAD OMAR, M.K., MOHD JAMIL, W., KHAIRUL, A., HAMDAN, H. & YANTI, A.K. Sesenduk clone FRIMsrp001-future timber of the furniture industry. Pp. 93–98 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
43. KHOO, M.G.H., THUMSER, A., THABIT, M. & PLANT, N. Metabolomics approach—a tool for toxicity studies. Pp. 332–337 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
44. LILI SAHIRA HUSIN, GETHA KRISHNASAMY, HEMA THOPLA GOVENDER, NUR FAIRUZ MAT YASIN & MUHAMMAD SYAMIL AZAHAR. Effects of long-term cryopreservation on cell viability, morphology and biochemical properties of actinobacteria isolates. Pp. 212–216 in Kalaivani, N. et al. (Eds.) *Proceedings of the 32nd Symposium of the Malaysian Society for Microbiology*, 6–8 December 2014, Terengganu.

45. LIM, H.F., HUDA FARHANA, M.M., INTAN NURULHANI, B., MOHD PARID, M., TARIQ MUBARAK, H., NORSHAKILA, Y., MOHD. NASIR, H. & AHMAD FAUZI, P. Penanaman bakau dan ru di Semenanjung Malaysia: Masalah sosioekonomi dan langkah penyelesaian. Pp. 82–89 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia, 7–8 Jun 2011*, Institut Penyelidikan Perhutanan Malaysia, Kepong.
46. LIM, H.F., HUDA FARHANA, M.M., MOHD PARID, M., TARIQ MUBARAK, H., INTAN NURUHANI, B., NORSHAKILA, Y. & MOHD NASIR, H. Penanaman bakau dan ru di Semenanjung Malaysia: impak terhadap sosioekonomi penduduk tempatan. Pp. 296–299 in Yap, Y.H. et al. *Prosiding Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara 2013: Pemeliharaan dan Pemulihan Hutan Pesisiran Pantai untuk Kesejahteraan Masyarakat*, 11–13 Jun 2013, Kuala Terengganu.
47. LIM, H.F., NORINI, H., NORSHAKILA, Y., INTAN NURULHANI, B., NIK MUSAADAH, M. & MASTURA, M. Traditional knowledge documentation: from FRIM to the world. Pp. 183–188 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
48. LIM, H.F., NORINI, H., NORSHAKILA, Y., INTAN NURULHANI, B., NIK MUSAADAH, M., TAN, A.L., NURUL HUSNA, Z., FADZUREENA, J. & MASTURA, M. Traditional knowledge documentation: from FRIM to the world. Pp. 173–178 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
49. LOK, E.H. & AHMAD ZUHADI, Y. Farm silvicultural and management of *Aquilaria*: Some silvicultural factors for consideration. Pp. 215–219 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
50. MAHANIM, S.M.A., RAFIDAH, J., PUAD, E., WAN ASMA, I. & SHAHRUDDIN, H. Simultaneous process on the conversion of bamboo biomass to activated carbon. Pp. 393–396 in Mohd Fadzil, M.I. et al. (Eds.) *Proceedings of the International Conference on Biomass for Biofuels and Value Added Products 2012, 23–24 October 2012*, Kuala Lumpur.
51. MARIATUL AMIRA, I., ANIS NAZLI, M.Y., HAMDAN, H. & AZIAN, M. Rawatan terhadap bakau kurap dengan deltamethrin, methyl thiophanate dan tetraconazole. Pp. 138–140 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia, 7–8 Jun 2011*, Institut Penyelidikan Perhutanan Malaysia, Kepong.
52. MARRYANNA, L., SITI AISAH, S., MOHD GHAZALI, H., ABD. RAHMAN, K. & MOHD, M.S. Short term water quality changes after timber harvesting in an Upper Hill Dipterocarp Forest, Malaysia. Pp. 115–117 in *Asia Pacific Workshop on Forest Hydrology, Water and Forests-Beyond Traditional Forest hydrology*, 23–25 September 2013, India.
53. MARZALINA, M., MOHD AFENDI, H., TARIQ MUBARAK, H. & NASHATUL ZAIMAH, I. Kajian fenologi terhadap 25 spesies persisiran pantai negara. Pp. 2–8 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia, 7–8 Jun 2011*, Institut Penyelidikan Perhutanan Malaysia, Kepong.
54. MASTURA, M., SAIFUL AZMI, J., MAZURAH, M.I., MOHD RAMDAN, P. & WAN SABARIAH, S. Inspirasi pengetahuan tradisi dalam misi memerangi makhluk halus. Pp. 57–62 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestarikan Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
55. MOHAMAD FAKHRI, I., WAN RASIDAH, K., SUHAIMI, W.C., JEYANNY, V., ROZITA, A. & AZIAN, M. Kadar pergerakan lumpur kesan daripada penempatan struktur pemecah ombak (geotub) di Sungai Haji Dorani. Pp. 168–172 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia, 7–8 Jun 2011*, Institut Penyelidikan Perhutanan Malaysia, Kepong.
56. MOHD ADI FAIZ, A.F., FAUZIAH, M., NORHAFIZAH, G., MOHD NOOR, M. & MOHAMAD FAKHRI, I. Multivariate linear regression related to accumulated biomass of *Hopea odorata* in three soil series of ultisols. Pp. 307–311 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
57. MOHD AMINUDDIN, C.H., SUHAIMI, M., ABD. HAMID, S., TUAN ANIS NADIA, T.M.S. & MUHAMMAD IQRAM, I. Strength performance of peeled bamboo fiberglass composites (PBFC) from buluh betong. Pp. 137–140 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
58. MOHD AZAHARI, F., MUHAMAD AFIZZUL, M. & KHALI AZIZ, H. Peat swamp forest mapping using remote sensing technique: a classification result of Pekan Forest Reserve. Pp. 44–51 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
59. MOHD FARID, A., WAN MOHD AZRUL, W.A., LEE, S.S., SAJAP, A.H., PATAHAYAH, M. & TOSIAH, S. Pathogenicity assessment of *Metarhizium anisopliae* obtained from natural forest of Peninsular Malaysia against tiger moth larvae (*Atteva sciodoxa Meyrick*). Pp. 394–397 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
60. MOHD JAMIL, A.W., MOHD ZAMIN, J. & MOHAMAD OMAR, M.K. Strength assessment of Malaysian timbers in structural size. Pp. 15–26 in Rohana, H., Marina, Y., Zulhabri, I., Norliyati, M.A. & MOHD ARSHAD, F. *Proceeding of the International Civil and Infrastructure Engineering Conference 2013*. doi: 10.1007/978-981-4585-02-6.
61. MOHD PARID, M., HUDA FARHANA, M.M., NIK AZYYATI, A.K. & LIM, H.F. Economics values of nature tourism in a Malaysia marine park. Pp. 29–39 in Noor Azlin, Y., Ahmad Azaruddin, MN. & Sharmillah, S. (Eds.) *Proceedings of the Urban Forestry Conference 2012. Forests & Parks: Communicating Messages for Sustainability*. Forest Research Institute Malaysia, Kepong.
62. MOHD PARID, M., LIM, H.F., HUDA FARHANA, M.M., MUKRIMAH, A. & TARIQ MUBARAK, H. Assessing the conservation value of mangrove forest ecosystem. Pp. 91–95 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
63. MOHD PARID, M., LIM, H.F., HUDA FARHANA, M.M., MUKRIMAH, A. & TARIQ MUBARAK, H. Assessing the conservation value of the mangrove forest ecosystem. Pp. 84–85 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
64. MOHD PARID, M., LIM, H.F., TARIQ MUBARAK, H., HUDA FARHANA, M.M., TAN, L.L. & AZMEER, M. Penilaian ekonomi pemuliharaan sumber hutan paya bakau delta Kelantan. Pp. 100–112 in Yap, Y.H. et al. *Prosiding Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara 2013: Pemeliharaan dan Pemulihan Hutan Pesisiran Pantai untuk Kesejahteraan Masyarakat*, 11–13 Jun 2013, Kuala Terengganu.
65. MOHD RIZUWAN, M., NAZIMATUL AZMA, N., MOHAD AZAHARI, F. & KHALI AZIZ, H. Urban forestry mapping and correction technique using laser equipment (total station). Pp. 63–68 in Noor Azlin, Y., Ahmad Azaruddin, MN. & Sharmillah, S. (Eds.) *Proceedings of the Urban Forestry Conference 2012. Forests & Parks: Communicating Messages for Sustainability*. Forest Research Institute Malaysia, Kepong.
66. MOHD SALLEH, S., PATAHAYAH, M., LEE, S.S. & ANDI AKBAR, M. Belowground *Ectomycorrhizal* diversity of *Hopea odorata* planted on sandy tailings. Pp. 387–389 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.

67. MOHD ZAKI, A., AB. RASIP, G., MOHD LOKMAL, N, AZRIL DEENOR, M., FARAH FAZWA, M.M. & MOHD NOOR, M. Pemilihan baka nipah (*Nypa fruticans*) untuk penghasilan nira berkualiti. Pp. 90–96 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
68. MOHD ZAKI, A., FARAH FAZWA, M.A. & MOHD LOKMAL, N. Penanaman nipah (*Nypa fruticans*) sebagai zon penampungan. Pp. 185–188 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
69. MOHD ZAKI, A., FARAH FAZWA, M.A., MOHD LOKMAL, N., NORHAYATI, S., SYAFIQAH NABILAH, S.B. & NORFADILAH, W. Production of high quality planting materials of *Eurycoma longifolia* and *Labisia pumila* in FRIM. Pp. 190–199 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
70. MOHD ZOBIR, H., TUMIRAH, K., ZULKARNAIN, Z. & RAFAEDA, R. Nanoencapsulated n-nonadecane into styrene-methylmethacrylate copolymer shell as potential thermal energy storage for building material. Pp. 25–30 in Samsudin, et al. *2nd Proceeding of 2nd International Conference on Innovation and Technology for Sustainable Built Environment 2014 (icitsbe2:2014)*, 27–28 May 2014, Ipoh.
71. MOHD. NASIR, H. & TARIQ MUBARAK, H. Adakah spesies Bakau Minyak dan Bakau Kurap mempunyai keupayaan untuk mengeluarkan tunas dan bercabang? Pp. 71–74 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
72. MOHD. RIZUWAN, M., MOHAMAD OMAR, M.K., MOHD HISBANY, M.H. & TARIQ MUBARAK, H. Fibre hybrid in timber portable bridge. Pp. 236–238 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
73. MUHAMAD AFIZZUL, M., MOHD AZAHARI, F. & KHALI AZIZ, H. Potential use of landsat imagery in discriminating mangrove forest variations. Pp. 52–56 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
74. MUHAMMAD HAFIZ, J., NURHANAN, M.Y., MOHD HAFIDZ HAD, I A., ABDULL RASHIH, A., LING, S.K., SITI SYARIFAH, M.M. & ASIAH, O. Chemical profiles and anticancer activities of different plant parts of *Eurycoma longifolia*. Pp. 289–291 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
75. MUKRIMAH, A., MOHD PARID, M., LIM, H.F., NUR ALWANI, Z. & MOHD FARIT, H. Value of recreational fishing in the delta Kelantan mangrove forest (DKMF) ecosystem. Pp. 333–336 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
76. NABIL, F.L., ZAIDON, A., ANWAR, U.M.K. & BAKAR, S.E. Characterization of low molecular weight phenol formaldehyde resin admixed with nanoclay: effect of sonication time. Pp. 248–250 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
77. NADA, B., MOHD. SALLEH, S. & KHIRUL FAIZAL, O. A survey of fireflies (*Coleoptera: Lampyridae*) in Fraser's Hill, Pahang. Pp. 13–18 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
78. NADIAH SALMI, N., ISMANIZAN I., NASHATUL ZAIMAH, N.A., NOR HASNIDA, N.A., NOR ASMAH, H. & NORALIZA, A. Cryopreservation of *Eurycoma longifolia* (tongkat ali) hairy root cultures for long-term preservation. Pp. 367–370 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
79. NASHATUL ZAIMAH, N.A., NOR ASMAH, H., NORALIZA, A. & NADIAH SALMI, N. Storage technique for difficult-to-store seed: *Shorea leprosula*. Pp. 205–209 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
80. NAZIMATUL AZMA, N., AHMAD AZARUDDIN, M.N. & SAMSOL, B. Tree survey at selected urban areas in Sepang, Selangor. Pp. 79–82 in Noor Azlin, Y., Ahmad Azaruddin, M.N. & Sharmillah, S. *Proceedings of the Urban Forestry Conference 2012. Forests & Parks: Communicating Messages for Sustainability*. Forest Research Institute Malaysia, Kepong.
81. NAZIRAH, A., NOR HASNIDA, H., ABDUL RASHIH, A., SITI SUHALA, A.R., HALIZA, I. & MUHAMMAD FUAD, Y. Effects of different culture media on the growth and production of secondary metabolites in *Eurycoma longifolia* hairy root culture. Pp. 381–384 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
82. NAZRE, A.R., MOHD NASIR, T., ZUNAIRAH, M., ROS SHILAWANI, S.A.K., SAHRIM, L. & NORIZAM, S. Summative EEG alpha classification relates learning style and openness. Pp. 807–810 in *Global Engineering Education Conference (EDUCON)*, 3–5 April 2014, Istanbul.
83. NIK ADLIN, M.S., WAN TARMEZE, W.A. & KHAIRUL, M. Modular furniture for gardens and parks. Pp. 69–73 in Noor Azlin, Y., Ahmad Azaruddin, M.N. & Sharmillah, S. *Proceedings of the Urban Forestry Conference 2012. Forests & Parks: Communicating Messages for Sustainability*. Forest Research Institute Malaysia, Kepong.
84. NIK MUSAADAH, M., FADZUREENA, J., MOHAMAD JEMAIN, M.R., SITI NUR AISYAH, H., VIMALA, S., SHALINI, M., MASTURA, M., CHEE, B.J., ADIANA, M.A., NUZIAH, H., ABDUL RASHIH, A., NURUL HUSNA, Z., TAN, A.L., NADIAH, I., MAILINA, J., AZRINA, A., NOR AZAH, M.A., NOOR RASYILA, M.N., RASADAH, M.A., NORSHAKILA, Y., INTAN NURULHANI, B., LIM, H.F. & NORINI, H. Merealisasikan pembangunan produk berasaskan Pengetahuan Tradisi Orang Asli: sumber kekayaan baharu negara. Pp. 97–100 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerksaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
85. NOOR HAZMIRA, M. & ISMARIAH, A. Socio-economic study of labour in the wood industry sector. Pp. 376–378 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
86. NOORSIHA, A., AINNUR AMIRA, A.M., KAMARIAH, M. & SITI FATIMAH ZAHARAH, D. Dokumentasi spesies etnobotanikal di bawah Program Inventori Flora di Tapak Warisan FRIM. Pp. 47–51 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerksaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
87. NOORSIHA, A., NURATIKAH, A., SAHARUDDIN, S., AINNUR AMIRA, A.M. & KAMARIAH, M. Pembangunan koleksi etnobotani kawasan tanah tinggi di bawah Program Konservasi ex-situ Projek Taman Gunung Cameron Highlands, Tanah Rata, Pahang. Pp. 52–56 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerksaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
88. NOR AZAH, M.A., MAILINA, J., AZRINA, A., TAN, A.L., NIK MUSAADAH, M. & MOHAMMAD FARIDZ, Z. Kajian ke atas minyak pati daripada tumbuhan terpilih di kalangan komuniti Orang Asli di Pahang dan Perak. Pp. 128–131 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerksaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.

89. NOR DATIAKMA, M.A., NURHANAN MURNI, M.Y., SITI SYARIFAH, M.M., ASIAH, O., MUHAMMAD HAFIZ, J., ANEE, S., ALIA AINA, A., LING, S.K., ABDULL RASHIH, A. & NORHASNIDA, H. Two-dimensional gel electrophoresis profiles of anti-proliferative compound from CfPR 138 in A2780 ovarian cancer cells. Pp. 296–298 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
90. NORASHAH, S., ISMAIL, P., SAMSUDIN, M. & JULIAN, B. What is REDD plus? Pp. 337–338 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
91. NORALIZA, A., MARZALINA, M., MOHD AFENDI, H. & TARIQ MUBARAK, H. Teknik pengendalian dan penyimpanan biji benih spesies terpilih pesisiran pantai. Pp. 220–223 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
92. NORALIZA, A., NADIAH SALMI, N., MARZALINA, M., NASHATUL ZAIMAH, N.A., NOR ASMAH, H. & TARIQ MUBARAK, H. Ujian kualiti biji benih *Avicennia officinalis* bagi penyediaan bahan tanaman secara mapan. Pp. 228–233 in Yap, Y.H. et al. *Prosiding Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara 2013: Pemeliharaan dan Pemulihan Hutan Pesisiran Pantai untuk Kesejahteraan Masyarakat*, 11–13 Jun 2013, Kuala Terengganu.
93. NORALIZA, A., NORMAH, M.N., NORWATI, M., MOHD ADI FAIZ, A.F., NOR ASMAH, H., NASHATUL ZAIMAH, H. & NADIAH SALMI, N. Effects of packaging and storage conditions on germination of *Swietenia macrophylla* seeds. Pp. 349–351 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
94. NORHAYATI, S., FARAH FAZWA, M.A., SYAFIQAH NABILA, S.B. & MOHD ZAKI, A. Production of *Labisia pumila* var. *Lanceolata* through stolon for future planting stock. Pp. 268–271 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
95. NORHAYATI, S., FARAH FAZWA, M.A., SYAFIQAH NABILAH, S.B. & MOHD ZAKI, A. Establishment of germplasm on five important herbal species for future breeding activities. Pp. 89–92 in Masni, M.A., Shahrizad, Y., Ramlan, O. et al. (Eds.) *Proceedings of the 13th Symposium of the Malaysian Society of Applied Biology 2014*, 8–10 June 2014, Kuantan.
96. NORHAYATI, S., FARAH FAZWA, M.A., SYAFIQAH NABILAH, S.B., MOHD ZAKI, A. & MOHD RAMLY, M.S. Effects of decayed coco peat on early growth of *Labisia pumila* var. *alata* under teak. Pp. 300–303 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
97. NORINI, H., ABD. LATIF, M., LIM, H.F., NIK MUSAADAH, M. & JK TEKNIKAL MOU FRIM/JAKOA. Pendokumentasian Pengetahuan Tradisi Orang Asli: satu model dunia. Pp. 2 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemeraksanaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
98. NORLIA, B., NOR HASNIDA, H., NORWATI, A., MOHD ROSLI, H. & NORWATI, M. De novo sequencing of tongkat ali root transcriptome to identify genes involved in the biosynthesis of active ingredients. Pp. 401–403 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
99. NORLIYANA, A., ISMARIAH, A. & JEFFREY, R.V. Forest and non-forest land-use impacts on the quality and quantity dimensions of stream flow. Pp. 339–341 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
100. NORSHAKILA, Y., INTAN NURULHANI, B., LIM, H.F. & AMELIA, A. Pengetahuan tahap penggunaan tumbuhan ubatan & beraroma di kalangan komuniti Orang Asli Lanoh di Perak & Mendriq di Kelantan. Pp. 70–76 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemeraksanaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
101. NORSHEILA, M.J.C., HAMDAN, O. & ISMAIL, P. Remote Sensing, GIS and Forestry. Pp. 342–344 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
102. NORYA, A., NORSHAKILA, Y., LIM, H.F. & INTAN NURULHANI, B. Pengalaman komuniti Orang Asli dalam pendokumentasian pengetahuan tradisi: penglibatan dan cabaran. Pp. 161–166 in Mastura, M. et al. (Eds.) *Prosiding Seminar Pemuliharaan & Pemeraksanaan Pengetahuan Tradisi: Melestari Legasi Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
103. NUR FAIRUZ, M.Y., GETHA, K., ZAHARI, O., HEMA THOPLA, G., LILI SAHIRA, H., ROSHAN JAHN, M.S. & MUHAMMAD SYAMIL, A. Development of FRIM actinobacteria culture collection (FACC) database management system. Pp. 221–224 in Kalaivani, N. et al. (Eds.) *Proceedings of the 32nd Symposium of the Malaysian Society for Microbiology*, 6–8 December 2014, Terengganu.
104. NURLAILA, I., MOHD HEZRI, F.R., MOHD NASIR, T., NOR AZAH, M.A., MAILINA, J. & SAIFUL NIZAM, T. Application of ANN in agarwood oil grade classification. Pp. 216–220 in *IEEE 10th International Colloquium on Signal Processing & Its Application (CSPA2014)*, 7–9 Mac 2014, Kuala Lumpur.
105. NURUL FARHANAH, Z., LEE, S.L., NG, K.K.S., TNAH, L.H., LEE, C.T., NAOKI, C.T., DIWAY, B., CHONG, L., KHOO, E. & ISMANIZAN, I. Genetics conservation of a vulnerable peat swamp *Gonystylus bancanus* (Thymelaeaceae). Pp. 99–106 in Masni, M.A., Shahrizad, Y., Ramlan, O. et al. (Eds.) *Proceedings of the 13th Symposium of the Malaysian Society of Applied Biology 2014*, 8–10 June 2014, Kuantan.
106. NUZIAH, H., ADIANA, M.A., SITI NUR AISYAH, M.H., NIK MUSAADAH, M., LING, S.K., NORSHAKILA, Y., TAN, A.L., NURAINI, A.M. HANI IDAYU, B. & AZMAN, M. Profil fitokimia dan aktiviti anti radang tumbuhan ubatan terpilih warisan Orang Asli Semai, Ulu Geroh, Gopeng, Perak. Pp. 123–127 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemeraksanaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
107. ONG, B.K., CHUA, K.O., CHAI, L.C., NORULAIMAN, Y., NUZIAHM H. & NOR AZAH, M.A. Phytochemical screening and anti food-borne bacterial properties of *Syzygium grande* ethanolic extract. Pp. 302–307 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
108. ONG, C.B., KHAIRUL, A. & SIK, H.S. Preliminary evaluation of bonding performance of heat-treated merpauh and rubberwood. Pp. 245–250 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
109. PARVEEN, B., SHAHFIZ, M.A., AMIRAH, N.A., KAVIARASU, M., CHEW, T.H. & SHAMSIR, M.A.R. A mobile application for *Sciuridae* species identification. Pp. 28–34 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
110. PATAHAYAH, M. & MOHD SALLEH, S. Fungi associated with empty fruit bunches (EFB) of oil palm. Pp. 398–402 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
111. PHILIP, E. & ABDUL RAHIM, NIK. Harnessing natural capital for a green economy. Pp. 16–20 in Shaharuddin, M.I. et al. (Eds.) *Proceedings of Green Economy*, Universiti Kebangsaan Malaysia, Bangi.

112. PHILIP, E. Review of IPCC Guidelines for consistent representation of lands for national GHG-inventories. Pp. 20–25 in Marjak, K. (Eds.). *Asia Capacity building Workshop on GHG inventory for AFOLU Sector. SilvaCarbon Proceedings and Report*, 28 September 2014, Bangkok.
113. PUAD, E., NG, S.H., WAN ASMA, I., SHAHARUDDIN, H., MAHANIM, S.M.A & RAFIDAH, J. Arang putih daripada kayu bakau berdiameter kecil. Pp 211–213 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
114. PUAD, E., NG, S.H., WAN ASMA, I., SHAHARUDDIN, H., MAHANIM, S.M.A & RAFIDAH, J. Densification technology in Malaysia: way forward. Pp. 522–529 in Mohd Fadzil, M.I. et al. (Eds.) *Proceedings of the International Conference on Biomass for Biofuels and Value Added Products 2012*, 23–24 October 2012, Kuala Lumpur.
115. RAES, N., CANNON, C.H., HIJMANS, R.J., PIESENS, T., SAW, L.G., van WELZEN, P.C. & SLIK, J.W.F. Historical distribution of Sundaland's Dipterocarp rainforests at Quaternary glacial maxima. Pp xx–xx in xx et al. (Eds.) *Proceedings of the National Academy of Sciences*.
116. RAFIDAH, J., MAHANIM, S.M.A., WAN ASMA, I., PUAD, E. & SHAHARUDDIN, H. Oil palm trunk (OPT) as a potential feedstock for alternative fuel in future. Pp. 87–90 in Mohd Fadzil, M.I. et al. (Eds.) *Proceedings of the International Conference on Biomass for Biofuels and Value Added Products 2012*, 23–24 October 2012, Kuala Lumpur.
117. RAFIDAH, J., PUAS, E., MAHANIM, S.M.A., WAN ASMA, I. & SHAHARUDDIN, I. Energy properties of tissue cultured jelutong biomass for charcoal production. Pp. 401–403 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
118. RAJA BARIZAN, R.S. Potensi teknik comp-mat dan teknik comp-pillow untuk penanaman bakau di pesisiran pantai. Pp. 8–20 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
119. ROHANA, A.R., INTAN NURULHANI, B., MOHD ASRAF, I. & LIM, H.F. Penggunaan herba di Semenanjung Malaysia: tradisi atau kontemporari? Pp. 32–35 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
120. ROHANA, A.R., LIM, H.F. & ISMARIAH, A. Socio-economic backgrounds and income generation of herbal cultivators in Peninsular Malaysia. Pp. 179–185 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
121. ROHANA, A.R., LIM, H.F. & ISMARIAH, A. Socio-economic backgrounds and income generation of herbal cultivators in Peninsular Malaysia. Pp. 179–185 Pp. 223–228 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
122. ROSAZLIN, A., CHE FAUZIAH, I., WAN RASIDAH, K. & ROSENANI, A.B. Characterization of raw and composted recycled paper mill sludge by ¹³C NMR spectroscopy. Pp. 317–321 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
123. ROSDI, K., HASHIM, M.N., ABD. RAZAK, O., DASRUL ISKANDAR, D. & AHMAD ZUHAI, Y. Agroforestry: prospect and viability in Malaysia. Pp. 582–586. *IUFRO 3.08 & 6.08 Joint Conference Future Directions of Small-scale and Community-based Forestry Proceedings*, 8–13 September 2013, Japan.
124. ROSDI, K., NASHATUL ZAIMAH, N.A., MOHD ZAKI, H. & WAN RASIDAH, A.K. Seed quality testing of *Macaranga* spp. from various locations. Pp. 260–263 Pp. 260–263 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
125. ROSHAN JAHN, M.S., GETHA, K., NORHAYATI, I., MUHAMMAD HAFIZ, J., MOHD ILHAM, A. & AMYRA, A.S. Screening of selected Malaysian plants for anti-leishmania activity using extracellular model. Pp. 285–288 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
126. ROSZAINI, K., KHAIRUL, A., ZAITIHAIZA, K. & ZAINI, S. Toxicity of natural occurring compounds of *Calophyllum inophyllum* to Asian subterranean termite. Pp. 386–390 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
127. ROZITA, A., WAN RASIDAH, K. & MOHAMAD FAKHRI, I. Evaluation of heavy metal translocation in two medicinal plants grown on four different soils. Pp. 266–269 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
128. ROZITA, A., WAN RASIDAH, K., MOHAMAD FAKHRI, I., JEYANNY, V. & SUHAIMI, W.C. Ciri-ciri tanah sesai di Hutan Paya Laut Tanjung Piai, Johor. Pp. 183–186 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
129. RUSHDAN, I., SHARMIZA, A. & AZIZI, A.J. The effect of mineral pulp fiber on paper properties. Pp 125–130 in Hendro, R. et al. (Eds.) *Prosiding Seminar Teknologi Pulpa & Kertas 2013 (STPK2013)*, Balai Besar Pulp dan Kertas, 2 Oktober 2013, Indonesia. (ISBN 978-602-17761-1-7)
130. SAIDATUL HUSNI, S., NOR AZAH, M.A., NURHAZWANI, M.H., MAILINA, J., NORULAIMAN, Y., MUHAMMAD FARIDZ, Z.P., ZAMREE, M.S., FADZUREENA, J., NUZIAH, H., AZRINA, A. & MUHD HAFIZI, Z. Inovasi produk minyak urut berasaskan halia (*Zingiber officinale*) sebagai terapi ibu selepas bersalin. Pp. 104–111 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
131. SAIFUL ISKANDAR, K., MOHAMAD DANIAL, M.S., FIRDAUS, Z.M.A., GHAZALI, H., IBRAHIM, H., SHAHRUL ZAMAN, I., ABDUL RAHMAN, K. & MOHD FAIZAL, A. Relationship between canopy openness and erosion at a stream bank of Sungai Chini. Pp. 72–77 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
132. SALLEH, M., ABD. RAZAK, O. & AZHAN SHAH, I. Harvesting evaluation of *Dendrocalamus asper* (buluh betung) on shoot productivity. Pp. 6–9 in Ahmad Nazarudin, M.R. et al. (Eds.). *Transactions of the Malaysian Society of Plant Physiology 22: Innovative Plant Productivity and Quality*, 27–29 August 2013, Terengganu.
133. SALLEH, M., ABD. RAZAK, O. & AZHAN SHAH, I. Viability of *Gigantochloa albociliata* (Buluh Madu) plantation for shoot production in Peninsular Malaysia. Pp. 6–9 in Ahmad Nazarudin, M.R. et al. (Eds.). *Transactions of the Malaysian Society of Plant Physiology 22: innovative plant productivity and quality*, 27–29 August 2013, Terengganu.
134. SHALINI, M., VIMALA, S. & PIRIYA, E.J. ORAC analysis: antioxidant capacity of 10 selected Malaysian traditional vegetables/ulam. Pp. 290–293 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
135. SHARMILLAH, S., NIK AZYYATI, A.K. & NOOR AZLIN, Y. Creating an urban fForest environment: a forest tree planting programme in Malaysian schools. Pp. 48–54 in Noor Azlin, Y., Ahmad Azaruddin, MN. & Sharmillah, S. *Proceedings of the Urban Forestry Conference 2012. Forests & Parks: Communicating Messages for Sustainability*. Forest Research Institute Malaysia, Kepong.

136. SHARMILLAH, S., NIK AZYYATI, A.K. & NOOR AZLIN, Y. Establishing a nature education centre in Malaysia: a collaboration between the bodies of government, NGO and a corporate company. Pp. 74–78 in Noor Azlin, Y., Ahmad Azaruddin, MN. & Sharmillah, S. *Proceedings of the Urban Forestry Conference 2012. Forests & Parks: Communicating Messages for Sustainability*. Forest Research Institute Malaysia, Kepong.
137. SIK, H.S., SARANI, Z., WOON, W.C., CHOO, K.T., LEE, S.S., KHAIRUL, M., SAHRIM, A., NORDAHLIA, A.S. & MOHD KHAIDZIR, M.O. Saw-dry-rip (SDR) process for rubberwood. Pp. 110–113 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
138. SITI AISAH, S., YUSOP, Z., NOGUCHI, S., MARRYANNA, L., SITI NURHIDAYU, A.B. & ABD RAHMAN, K. Influence of *Hopea odorata* plantation establishment on the water yields of small forested catchment in Peninsular Malaysia. Pp. 25–27 in *Extended Abstracts of the Asia Pacific Workshop on Forest Hydrology, Water and Forests-Beyond Traditional Forest Hydrology*, 23–25 September 2013, India.
139. SITI AISAH, S., ZULKIFLI, Y., NOGUCHI, S. & MARRYANNA, L. Effect of clear-cutting on discharge during the preparation of forest plantation establishment in forested catchment. Pp. 57–62 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
140. SITI NUR AISYAH, M.H., FADZUREENA, J., NUZIAH, H. & HANI IDAYU, B. Inhibitory effects of crude extract and sub-fractions of *Baeckea frutescens* on 13-LOX activity. Pp. 305–307 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
141. SITI NUR AISYAH, M.H., KHOO, M.G.H., FADZUREENA, J., CHEE, B.J., ROHANA, S., HANI IDAYU, B., TAN, A.L., NURUL HUSNA, Z., NORSHAKILA, Y., INTAN NURULHANI, B., LIM, H.F., NIK MUSAADAH, M., ADIANA, M.A. & NUZIAH, H. Tumbuhan ubatan Malaysia yang berpotensi sebagai penawar bagi penyakit gout. 112–116 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
142. SITI SUHAILA, A.R., MOHD SALEH, N., NORWATI, M., CLYDE, M.M., NOR AZAH, M.A., NAMASIVAYAM, P., KANDASAMY, K.I., MAILINA, J., AZRINA, A., NOR HASNIDA, H., HALIZA, I., NAZIRAH, A. & MUHD FUAD, Y. Variations in the phytochemical production in relation to changes in ploidy level in *Aquilaria malaccensis*. Pp. 24 in Ng, C.C., Mazatulikhma, M.Z. (Eds.) *Proceeding of Malaysian Society of Molecular Biology and Biotechnology (MSMBB2014)*, 1–3 Oktober 2014, Kuala Lumpur.
143. SITI SUHAILA, A.R., NORWATI, M., YAP, B.J.W., MAHANI, M.C., KANDASAMY, K.I., FARIDAH, Q.Z., FADELAH, A.A., NOR HASNIDA, H., NAZIRAH, A., HALIZA, I., MUHD FUAD, Y. & NORMAH, B. The potential of *Paphiopedilum callosum* polyploids -towards the development of an improved native Malaysian Slipper Orchid. Pp. 200–204 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
144. SUFFIAN, M., HASHIM, W.S., MOHD YUSOUF, A.L., RAFAEDAH, R. & SITI NOR AIN, T. Compliance of Malaysian wood-based panels to international requirements. Pp. 127–130 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
145. SUFFIAN, M., WAN ASMA, I. & MOHD YUSOUF, A.L. Potential of recycled wood utilisation in Malaysia. 2014. Pp. 78–86 in Mohd Fadzil, M.I. et al. (Eds.) *Proceedings of the International Conference on Biomass for Biofuels and Value Added Products 2012, 23–24 October 2012*, Kuala Lumpur.
146. SYAFIQAH NABILAH, S.B., FARAH FAZWA, M.A., NOR HASNIDA, H., SITI SUHAILA, A.R., NORHAYATI, S., NAZIRAH, A., MUHAMMAD FUAD, Y., HALIZA, I. & MOHAMAD, O. Preliminary study on in vitro propagation of selected high yielding clone of kaci fatimah (*Labisia pumila* var. *alata*). Pp. 171–175 in Masni, M.A., Shahrizad, Y., Ramlan, O. et al. (Eds.) *Proceedings of the 13th Symposium of the Malaysian Society of Applied Biology 2014*, 8–10 June 2014, Kuantan.
147. SYAFIQAH NABILAH, S.B., SHARIFAH, M., NOR HASNIDA, H., FARAH FAZWA, M.A., SITI SUHAILA, A.R., NAZIRAH, A., MUHAMMAD FUAD, Y., HALIZA, I. & MOHAMAD, O. Development of a surface sterilization method for culture initiation of field-grown *Labisia pumila* (Kaci fatimah) explants. Pp. 398–400 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
148. TAN, A.L., NURUL HUSNA, Z., INTAN NURULHANI, B., NORSHAKILA, Y., LIM, H.F., FADZUREENA, J. & NIK MUSAADAH, M. Keterancaman pengetahuan tradisi komuniti Orang Kanaq: satu kes kajian di Kg Sungai Selangi, Kota Tinggi, Johor. Pp. 40–44 in Mastura, M., Chee, B.J., Tan, A.L., Nor Azah, M.A., Rohana, A.R. & Noor Hazmira, M. (Eds.) *Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestari Legasi Pengetahuan Tradisi*, 23–24 Mei 2014, Kuala Lumpur.
149. TAN, H.P., ZUNOLIZA, A., SALBIAH, M., TAN, A.L., NURNIDA, M.K. & LING, S.K. Chemical fingerprinting of *Eurycoma longifolia* (tongkat ali) for quality control. Pp. 168–171 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
150. TAN, Y.S., CHONG, V.C., SING, H.R., RAJA BARIZAN, R.S. & CHENG, S. Kesan dan pengawalan 'Biofouling' terhadap anak pokok Bakau di Sungai Haji Dorani dan Sungai Limau, Selangor, Malaysia. Pp. 50–60 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
151. TANG, L.K., ANG, L.H. & HO, W.M. Natural regeneration under tree stands, grassland and secondary forest in an ex-tin mine in Peninsular Malaysia. Pp. 331–334 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
152. TANG, L.K., ANG, L.H. & HO, W.M. Species composition of natural regeneration under *Acacia mangium*, *Khaya ivorensis* and *Hopea odorata* grown on slime tailing in Peninsular Malaysia. Pp. 407–409 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
153. TANG, L.K., ANG, L.H., HO, W.M., KHOO, V. & NADA, B. Rehabilitation of firefly habitat at the riverbank of Sg. Kuala Selangor. Pp. 404–406 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
154. TANG, L.K., HO, W.M. & ANG, L.H. Survival and growth performance of selected tree species grown on landfill of Ara Damansara Eco-Park, Peninsular Malaysia. Pp. 322–326 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
155. TARIQ MUBARAK, H., MOHD AFENDI, H., MARZALINA, M. & MOHD. AZHARIZAN, M.N. Kajian awal: ujian percambahan biji benih lenggadai (*Bruguiera parviflora*) pada media berbeza. Pp. 190–192 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
156. TARIQ MUBARAK, H., MOHD. NASIR, H., AZHARIZAN, M.N. & MOHD. RIZUWAN, M. Kesan penambakan tanah selut ke atas nyireh batu (*Xylocarpus moluccensis*) di Sg. Hj. Dorani, Selangor. Pp. 289–291 in Yap, Y.H. et al. *Prosiding Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara 2013: Pemuliharaan dan Pemulihan Hutan Pesisiran Pantai untuk Kesejahteraan Masyarakat*, 11–13 Jun 2013, Kuala Terengganu.

157. TARIQ MUBARAK, H., NORAISHAH, S., MOHD. RIZUWAN, M. & AZHARIZAN, M.N. Penilaian stok karbon di Hutan Paya Laut Kukup. Pp. 292–295 in Yap, Y.H. *et al. Prosiding Seminar Kebangsaan Pemuliharaan Hutan Pesisiran Pantai Negara 2013: Pemeliharaan dan Pemulihan Hutan Pesisiran Pantai untuk Kesejahteraan Masyarakat*, 11–13 Jun 2013, Kuala Terengganu.
158. TUAN ANIS NADIA, T.M.S., SITI RAFAEDAH, A.K., ABD. HAMID, S., YANTI, A.K., HAMDAN, H., MUHAMAD IQRAM, I. & MOHD AMINUDDIN, C.H. Recovery and veneer quality of buluh betong (*Dendrocalamus asper*). Pp. 99–104 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
159. TUMIRAH, K., MOHD ZOBIR, H., ZULKARNAIN, Z. & RAFAEDAH, R. Nanoencapsulated fatty acid into styrene/methyl methacrylate copolymer shell as the thermal energy storage for building application. Pp. 834–842 Mustafa, *et al.* (Eds.) *Conference Proceeding of Advanced Materials Conference 2014 (AMC2014)*, 25–26 November 2014, Langkawi.
160. WAN ASMA, I., WAN RASHIDAH, K., ZULKIFLI, R., MD ZUKI, I. & MUKHLIS, Z.A. Suitability of two types of compost for selected vegetables, herbal and ornamental plants. Pp. 285–290 in Rosazlin, A., Radziah, O., Jalloh, M.B., Fakhri, M.I., Vijandran, J.R. & Wan Rasidah, K. (Eds.) *Proceedings of the Soil Science Conference of Malaysia 2014*, 8–10 April 2014, Kangar.
161. WAN ASMA, I., ZULKAFI, H., RAFIDAH, J., ZAINATUL BAHYIAH, H., KHAIRATUN NAJWA, M., MUHAMMAD FAISAL, M.Y., PUAD, E., OTHMAN, S. & NURUL FAHIZA, A.Z. Waste oil palm trees (WPT) as a resource. Pp. 53–69 in Mohd Fadzil, M.I. *et al.* (Eds.) *Proceedings of the International Conference on Biomass for Biofuels and Value Added Products 2012*, 23–24 October 2012, Kuala Lumpur.
162. WAN ASMA, I., ZULKAFI, H., RAFIDAH, J., ZAINATUL BAHYIAH, H., KHAIRATUN NAJWA, M., PUAD, E., OTHMAN, S. & CHANDAK, S. Emerging renewable bioenergy system in Malaysia. Pp. 63–66 in Tanay, S.U. *et al.* (Eds.) *Proceedings of the 4th International 100% Renewable Energy Conference (IRENEC 2014)*, 26–28 June 2014, Turkey.
163. WAN MOHD AZRUL, W.A., MOHD FARID, A., LEE, S.S., SAJAP, A.S., TOSIAH, S., PATAHAYAH, M. & TANG, S.B. Update on pests, diseases and disorders of *Eurycoma longifolia* Jack. (tongkat ali) in Peninsular Malaysia. Pp. 210–214 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
164. WAN MOHD AZRUL, W.A., MOHD FARID, A., LEE, S.S., SAJAP, A.S., TOSIAH, S., PATAHAYAH, M., & TANG, S.B. Variation in the virulence of *Metarhizium anisopliae* and *Beauveria bassiana* isolated from forest soils against tiger moth (*Atteva sciodoxa*) larvae. In *8th International Conference on Plant Protection in the Tropics “Plant Protection for Food Security and Safety” 2014*, 8–10 April 2014, Kuala Lumpur.
165. WAN RASIDAH, K., MOHD FAKHRI, I., SUHAIMI, W.C., ROZITA, A. & JEYANNY, V. Tanah pesisir pantai dan kesesuaian untuk penanaman pokok. Pp. 25–29 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*. 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
166. WAN TARMEZE, A.A., MOHD NOOR, M. & MOHAMAD OMAR, M.K. Converting young plantation trees into structural engineered lumbers. Pp. 237–239 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
167. WAN TARMEZE, W.A., NORUL MASLISSA, A. & MARZALINA, M. Sistem pengurusan maklumat bagi kegunaan projek-projek bakau. Pp. 109–116 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
168. YANTI, A.K., ABD. HAMID, S., MARZALINA, M., SAID, A., IZRAN, K. & KHAIRUL, M. E-PAWV (Engineered Palm Wood Veneer) chair: the manufacturing and innovation. Pp. 124–127 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
169. ZAHIDAH, Z., NORLIA, B., NOR HASNIDA, H. & NORWATI, M. Isolation of partial squalene synthase gene from the root of tongkat ali (*Eurycoma longifolia*) Pp. 388–382 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
170. ZAIHAN, J., HASHIM, W.S., RAFAEDAH, R., KHAIRUL AZAMI, J. & SITI NUR AIN, T. The effect of wood species and thermal modification on the sorption isotherms properties. Pp. 155–161 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.
171. ZAIRUL AMIN, R. KHAIRUL, M. & GAN, K.S. Kadar perolehan penggergajian kayu bakau. Pp. 145–151 in Azian, M., Marryanna, L., Tariq Mubarak, H. & Wan Rasidah, K. (Eds.) *Prosiding Seminar Kebangsaan Projek-Projek Penyelidikan dan Pembangunan (R&D) bagi Hutan Pesisiran Pantai di Malaysia*, 7–8 Jun 2011, Institut Penyelidikan Perhutanan Malaysia, Kepong.
172. ZARIDAH, M.Z., NOR AZAH, M.A., MAILINA, J., ABDUL MAJID, J. MOHD FARIDZ, Z.P., MOHD IRMAN SHAH, M. & ROHANI, A. *Clausena excavata*: Larvicidal activity against *Aedes aegypti* and its major chemical constituents. Pp. 12–13 in Rahim, S., Lim, H.F., Huda Farhana, M.M. & Mahmudin, S. (Eds.) *Proceeding Conference on Forestry and Forest Products Research: Forestry R&D: Meeting National and Global Needs*, 12–13 November 2013, Kuala Lumpur.

KERTAS KERJA/PAPERS

1. ABD. HAMID, S., SITI RAFEDAH, A.K., YANTI, A.K., TUAN ANIS NADIA, T.M.S., SITI ZALIFAH, M, HAMDAN, H. & KHAIRUL, M. Rotary veneer bamboo technology (RoVBAM) using *Dendrocalamus asper* for value added product. Paper presented at the International Workshop on Advanced Bamboo Utilization and Its Strategy, 30–31 October 2014, Thailand.
2. ABD. LATIF MOHMOD & R.C.K. CHUNG. Botanical research and plant conservation at the Forest Research Institute Malaysia. Paper presented at the 5th Conference of IABG Asian Division and East Asian Botanical Garden Network Meeting, 18–22 October 2014, Nanjing, China.
3. ABD. LATIF, M. & MARZALINA, M. The future wealth within our tropical forest. Paper presented at the Conference on Tropical Resources & Sustainable Sciences 2014, 17–19 October 2014, Kelantan.
4. ABD. LATIF, M. & MOHAMED NOR, M.Y. The role of forest science network in response to ASEAN 2015 – APAFRI contributing to AEC. Paper presented at the 2nd International Conference on Forestry Education and Research (FORED2014), 19–22 November 2014, Philippines.
5. ABD. LATIF, M. Pemikiran kreatif dan inovatif. Paper presented at the Program NRE School of Leadership (SOL) 2014, Kumpulan 2, Kementerian Sumber Asli dan Alam Sekitar (NRE), 27 Ogos 2014, Putrajaya.
6. ABD. LATIF, M. Research and development (R&D) on biodiversity-related issues in Malaysia. Paper presented at the ‘Minggu Bersama FRIM’, Universiti Malaysia Kelantan (UMK), 10 June 2014, Kelantan.
7. ABD. LATIF, M., ISMAIL, H. & ELIZABETH, P. Carbon stocks and emissions of Malaysian forest. Paper presented at the International Palm Oil Sustainability Conference 2014, 19–20 August 2014, Kota Kinabalu.
8. ABD. RAHMAN, K. Analysis of tree diversity using biodiversity R package. Paper presented at the ‘Seminar Kebangsaan ISM 2014’, 11 February 2014, Serdang.
9. ABD. RAHMAN, K. Influence of soil types on tree diversity and abundance in a primary lowland dipterocarp forest. Paper presented at the Soil Science Conference of Malaysia 2014: Soil Management and Environment, 8–10 April 2014, Kangar.

10. ABDUL KHALIM, A.S., NOR HAIDI, Y., ISMAIL, P. & SAMSUDIN, M. Reducing emissions from the forests under REDD+: a case study of Pahang. Paper presented at the 'Persidangan Kebangsaan Penilaian Ekonomi Sumber Hutan Tahun 2014, "Penjanaaan Kekayaan Baru Barangan Dan Perkhidmatan Hutan: Ke Arah Negara Maju Berpendapatan Tinggi"', 2–5 September 2014.
11. ADNAN, M., AHMAD AZARUDDIN, M.N., NOOR AZLIN, Y., LIM, H.F. & MOHD AFENDI, H. Status of urban tree management by the local councils in Peninsular Malaysia. Paper presented at the National Arboriculture Conference 2014, 2–4 December 2014, Putrajaya.
12. AHMAD AZARUDDIN, M.N., ADNAN, M., NOOR AZLIN, Y. & MOHD AFENDI, H. Status pengurusan pokok di kawasan hijau oleh PBT Semenanjung Malaysia. Paper presented at the 'Bengkel Konsultansi Stakeholder Kajian Pengurusan Landskap, Kawasan Hijau dan taman awam oleh Pihak Berkuasa tempatan di Sabah tapak Sarawak', 30 September–1 October 2014, Kuching.
13. AHMAD AZARUDDIN, M.N., AMAT RAMSA, Y., ADNAN, M. & MOHD AFENDI, H. Non-invasive assessment of internal tree decay: some experiences on Pcus Sonic Tomograph. Paper presented at the National Arboriculture Conference 2014, 2–4 December 2014, Putrajaya.
14. AHMAD AZARUDDIN, M.N., AMAT RAMSAR, Y., ADNAN, M. & MOHD AFENDI, H. Management and conservation of veteran and heritage tree in Malaysia. Paper presented at the Malaysia Urban Green Space & IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.
15. AHMAD FAUZI MOHD SHARIFF. Pemakanan tumbuhan dan pembajaan. Paper presented at the 'Kursus Asas Pengurusan Penyelenggaraan dan Pengindahan Landskap di Parlimen Malaysia', 17–18 September 2014, Kuala Lumpur.
16. AHMAD FAUZI, M.S. Amalan dan pengurusan tapak semeaian serta penghasilan bahan tanaman. Paper presented at the 'Kursus Kajian/ Demo Teknik Pemulihan Hutan Paya Gambut Terosot', 5–7 February 2014, Kepong.
17. AHMAD FAUZI, M.S. Kepentingan pokok dalam landskap. Poster presented at the 'Kursus Kaedah Pelaksanaan Penanaman dan pengalihan Pokok Landskap', 28–29 October 2014, Kuala Lumpur.
18. AHMAD FAUZI, M.S. Kompos. Paper presented at the 'Kursus Asas Pengurusan Penyelenggaraan dan Pengindahan Landskap di Parlimen Malaysia', 17–18 September 2014, Kuala Lumpur.
19. AHMAD FAUZI, M.S. Media tanaman. Paper presented at the 'Kursus Asas Landskap: tanaman Pokok Hiasan untuk Pejabat Daerah Gombak', 6–8 May 2014, Kepong.
20. AHMAD FAUZI, M.S. Media tanaman. Paper presented at the 'Kursus Asas Pengurusan Penyelenggaraan dan Pengindahan Landskap di Parlimen Malaysia', 17–18 September 2014, Kuala Lumpur.
21. AHMAD FAUZI, M.S. Pemakanan tumbuhan dan pembajaan. Paper presented at the 'Kursus Baja dan Kaedah Pembajaan Pokok Landskap', 25–26 Mac 2014, Kuala Lumpur.
22. AHMAD FAUZI, M.S. Pengeluaran bahan tanaman. Paper presented at the 'Kursus Asas Landskap: tanaman Pokok Hiasan untuk pejabat daerah Gombak', 6–8 May 2014, Kepong.
23. AHMAD FAUZI, M.S. Pengenalan kepada propagasi tumbuhan. Paper presented at the 'Kursus Asas Teknik Pengutipan Tumbuhan Hidup Di Lapangan Bagi Tujuan Konservasi Ex-Situ & Pembangunan Taman', 12–19 November 2014, Kepong.
24. AHMAD FAUZI, M.S. Pengenalan kepada tanaman landskap. Poster presented at the 'Kursus Kaedah Pelaksanaan Penanaman dan pengalihan Pokok Landskap', 28–29 October 2014, Kuala Lumpur.
25. AHMAD FAUZI, M.S. Penghasilan bahan tanaman herba. Paper presented at the 'Kursus Mengenal Herba Dan Tumbuhan Ubatan Beraroma Serta Khasiatnya', 5–6 November 2014, Kepong.
26. AHMAD FAUZI, M.S. Racun makhluk perosak. Paper presented at the 'Kursus Perlindungan dan Kawalan Serangga serta Penyakit Tanaman Landskap', 30 April 2014, Kuala Lumpur.
27. AHMAD FAUZI, M.S. Tanaman semusim. Paper presented at the 'Kursus Asas Pengurusan Penyelenggaraan dan Pengindahan Landskap di Parlimen Malaysia', 17–18 September 2014, Kuala Lumpur.
28. AHMAD FAUZI, M.S. Tapak semeaian: amalan, pengurusan dan penghasilan bahan tanaman. Paper presented at the 'Kursus Tapak Semaian' 1–2 April 2014, Serdang.
29. AHMAD NAZARUDIN, M.R. Inducing flowers to attract urban park users. Paper presented at the Malaysia Urban Green Space & IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Bayview Beach Resort, Pulau Pinang, Malaysia.
30. AHMAD NAZARUDIN, M.R., TSAN, F.Y., NORMANIZA, O. & ADZMI, Y. Flowering improvement of a landscape tree, *Xanthostemon chrysanthus* by using paclobutrazol and potassium nitrate. Paper presented at the International Conference of Plant Physiology, 26–28 August 2014, Bali.
31. AHMAD ZUHAI, Y. & ROSDI, K. Long-term observation from model plantation of *Dyera costulata* (jelutong) in Kemasul Forest Reserve, Peninsular Malaysia: 12 years after planting. Paper presented at the 17th Malaysian Forestry Conference, 11–12 November 2014, Kota Kinabalu.
32. AHMAD ZUHAI, Y. Forest plantation in Malaysia. Paper presented at the Orientaring Cum Exposure to Teak Plantation Innovation Course, 23 February–2 March 2014, Mata Ayer.
33. AHMAD ZUHAI, Y. Inclusion of *Paraserianthes falcataria* as Forest Plantation Species: forester perspective. Paper presented at the Conference on Planted Forest, 13–15 October 2014, Bintulu.
34. AHMAD ZUHAI, Y. *Neolamarckia cadamba*: on-going assessment of its potential and suitability as forest plantation species. Paper presented at the Conference on Tropical Resources and Sustainable Science, 17–19 October 2014, Kota Bharu.
35. AHMAD ZUHAI, Y. *Neolamarckia cadamba*: Prospects for future planting. Paper presented at the "Suruhanjaya Koperasi Malaysia", 5 February 2014, Kuala Lumpur.
36. AHMAD ZUHAI, Y. Status penyelidikan dan pembangunan *Eucalyptus* spp. di Semenanjung Malaysia. Paper presented at the "Mesyuarat Teknikal Pembangunan Ladang Hutan" 3/2014, 30 Oktober 2014, Kuala Lumpur.
37. AMINAH, H. & AHMAD FAUZI, M.S. Production of teak planting stocks in containers. Paper presented at the Orientation Cum Exposure to Teak Plantation Innovation, 23 February–2 March 2014, Mata Ayer.
38. ANWAR, UMK, HAMDAN, H. MOHD TAMIZI, M. & NORDAHLIA, A.S. Buluh: potensi untuk komersial. Paper presented at the 'Mesyuarat Kursus dan Program Pembangunan Keusahawanan dalam Produk berasaskan Buluh dan Herba', 19 September 2014, Kuching.
39. ANWAR, U.M.K., SITI RAFIDAH, M., MAT YAACOB, C.W. & MOHD FAIZUL, M.S. Finishing properties of sesendok. Paper presented at the Forest Products Division Mini Seminar: Properties & Utilization of Sesendok for Value-Added Products, 16 July 2014, Forest Research Institute Malaysia, Kepong.
40. AZIAN, M. Kajian penilaian tahap kualiti degradasi hutan di dalam hutan pengeluaran di Negeri Pahang Darul Makmur. Paper presented at the 'Pembentangan kertas cadangan pengajian Doktor Falsafah di Seminar Fakulti Sains dan Teknologi', 19 May 2014, Bangi.
41. AZIAN, M., ISMAIL, P., SAMSUDIN, M., HAMDAN, O., KOH, H.I., HAMDAN, N., YUSOFF M., MOHD BASRI, A.M., BADROL HISAM, A.R. & MANGSOR, M.Y. Assessment of aboveground carbon stock changes in Asean Peatland Forest Projects (APFP) pilot site at Raja Musa Forest Reserve, Selangor, 23 June 2014, Shah Alam.
42. AZIAN, M., NUR HAJAR, Z.S., SAMSUDIN, M., NAZARUDIN, R. & MOHD HAKIMI, Z. Carbon stocks and carbon stocks changes in tree biomass of Malaysia tropical forest. Paper presented at the Conference on Tropical Resources and Sustainable Sciences 2014 (CTReSS2014), Conserving Resources for Future Generation, 17–19 October 2014, Kota Bharu.
43. AZYYATI, A.K., NUR SURIANI, S., NOR AZLIN, M.F., NAIMAH, C.L., AZAHARI, M.Y. & NOOR AZLIN, Y. Enhancing facilitators capacity to appreciate natural resources in urban parks. Paper presented at the Malaysia Urban Green Space & IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.

44. CHENG, S. DNA barcoding - Species discovery in insects (case study). Paper presented at the DNA Profiling & Barcoding Workshop, 4–7 November 2014, Forest Research Institute Malaysia, Kepong.
45. CHUA, L.S.L., OLDFIELD, S. & HAMIDAH, M. Beyond the Red List and setting of priorities for species conservation: bridging the gap between science, decision making and implementation. Paper presented at the The Third Asia Regional Conference of the Society of Conservation Biology – Asia Section, 19–22 August 2014, Melaka.
46. FADZUREENA, J, NIK MUSA'ADAH, M., ADIANA, M.A., MASTURA, M., VIMALA, S., KHOO, M., ROHANA, S., MOHAMAD JEMAIN, M.R., MAZURAH, M.I., NUZIAH, H., NOR AZAH, M.A., MAILINA, J., TAN, A.L., NORSHAKILA, Y., INTAN NURULHANI, B., NURUL HUSNA, Z., RASADAH, M.A., LIM, H.F. & NORINI, H. Pengetahuan tradisi suku kaum Temuan. Paper presented at the 'Mesyuarat bersama sub-etnik Che Wong di Kg. Sungai Enggang', 23 July 2014, Lanchang.
47. 4FADZUREENA, J, NIK MUSA'ADAH, M., ADIANA, M.A., MASTURA, M., VIMALA, S., KHOO, M., ROHANA, S., MOHAMAD JEMAIN, M.R., MAZURAH, M.I., NUZIAH, H., NOR AZAH, M.A., MAILINA, J., TAN, A.L., NORSHAKILA, Y., INTAN NURULHANI, B., NURUL HUSNA, Z., RASADAH, M.A., LIM, H.F. & NORINI, H. Pengetahuan tradisi suku kaum Temuan. Paper presented at the 'Mesyuarat bersama sub-etnik Temuan di Kg. Bukit Cheeding dan Kg. Ulu Kempas', 7 April 2014, Kuala Langat.
48. FADZUREENA, J, NIK MUSA'ADAH, M., ADIANA, M.A., MASTURA, M., VIMALA, S., KHOO, M., ROHANA, S., MOHAMAD JEMAIN, M.R., MAZURAH, M.I., NUZIAH, H., NOR AZAH, M.A., MAILINA, J., TAN, A.L., NORSHAKILA, Y., INTAN NURULHANI, B., NURUL HUSNA, Z., RASADAH, M.A., LIM, H.F. & NORINI, H. Pengetahuan tradisi suku kaum Jahut. Paper presented at the 'Mesyuarat bersama sub-etnik Jahut di Kg. Paya Mendoi.', 6 June 2014, Kuala Krau.
49. FADZUREENA, J, NIK MUSA'ADAH, M., ADIANA, M.A., MASTURA, M., VIMALA, S., KHOO, M., ROHANA, S., MOHAMAD JEMAIN, M.R., MAZURAH, M.I., NUZIAH, H., NOR AZAH, M.A., MAILINA, J., TAN, A.L., NORSHAKILA, Y., INTAN NURULHANI, B., NURUL HUSNA, Z., RASADAH, M.A., LIM, H.F. & NORINI, H. Pengetahuan tradisi suku kaum Jakun. Paper presented at the 'Mesyuarat bersama sub-etnik Jakun di Kg. Bangkong', 7 June 2014, Pekan.
50. FADZUREENA, J., NIK MUSA'ADAH, M., ADIANA, M.A., MASTURA, M., VIMALA, S., ROHANA, S., MOHAMAD JEMAIN, M.R., MAZURAH, M.I., NUZIAH, H., NOR AZAH, M.A., MAILINA, J., TAN, A.L., NORSHAKILA, Y., INTAN NURULHANI, B., NURUL HUSNA, Z., RASADAH, M.A., LIM, H.F. & NORINI, H. Analisa fitokimia dan biologi. Paper presented at the 'Mesyuarat Ahli Jawatankuasa Teknikal Projek Pengetahuan Tradisi di bawah MOU antara FRIM & JAKOA', 25 May 2014, Kuala Lumpur.
51. FADZUREENA, J., NIK MUSA'ADAH, M., ADIANA, M.A., MASTURA, M., VIMALA, S., KHOO, M., ROHANA, S., MOHAMAD JEMAIN, M.R., MAZURAH, M.I., NUZIAH, H., NOR AZAH, M.A., MAILINA, J., TAN, A.L., NORSHAKILA, Y., INTAN NURULHANI, B., NURUL HUSNA, Z., RASADAH, M.A., LIM, H.F. & NORINI, H. Pengetahuan tradisi suku kaum Kanaq. Paper presented at the 'Mesyuarat bersama sub-etnik Kanaq di Kg. Sungai Selangi', 12 August 2014, Kota Tinggi.
52. FADZUREENA, J., SITI NUR AISYAH, M.H., SAIDATUL HUSNI, S., NOOR RASYILA M.N., MOHAMAD JEMAIN, M.R., PIN, K.Y., NIK MUSA'ADAH, M., HANI IDAYU, B., ABDULL RASHIH, A. & AZMAN, M. Anti-gout herbal remedies from standardised extract (SEBF) of *Baeckea frutescens*. Paper presented at the 'Hari Inovasi 1NRE 2014', 16–17 October 2014, Putrajaya.
53. FARAH FAZWA, M.A., NORHAYATI, S., SYAFIQAH NABILAH, S.B., MOHD ZAKI, A. & MOHD ASRI, L. Sustainability of kacip fatimah (*Labisia pumila*) through ex-situ conservation. Paper presented at the Conference on Tropical Resources and Sustainable Sciences 2014, 17–19 October 2014, Kota Bharu.
54. FARAH FAZWA, M.A., NORHAYATI, S., SYAFIQAH NABILAH, S.B., MOHD ZAKI, A., NOR HASNIDA, H., MOHD LOKMAL, N., SITI SALWANAH, H. & AHMAD FAUZI, M.S. Identification and production of elite planting materials of *Labisia pumila* for sustainable supply. Paper presented at the Project Evaluation Meeting, Forest Research Institute Malaysia, 10 November 2014, Kepong.
55. GEN, T., KHALI AZIZ, H., MOHD AZAHARI, F. & HAMDAN, O. Tropical forest change detection by a trend analysis of time series satellite images. Paper presented at the 35th Asian Conference on Remote Sensing (ACRS), 27–31 October 2014, Myanmar.
56. GETHA, K., MUHD SYAMIL, A., ASIAH, O., HEMA THOPLA, G., MASTURA, M., SITI SYARIFAH, M.M., ROSHAN JAHN, M.S. & HATSU, M. Discovery of a potential methicillin-resistant *Staphylococcus aureus* inhibitor from root rot-associated *Ganoderma* sp. isolated from *Acacia mangium*. Paper presented at the 32nd Symposium of the Malaysian Society for Microbiology (MSM 2014), 6–8 December 2014, Terengganu.
57. HALIZA, I. Tools in tree improvement: tissue culture techniques. Paper presented at the Orientaring cum exposure to teak plantation innovation course, 24 February–1 March 2014, Mata Ayer.
58. HALIZA, I., NOR HASNIDA, H., NAZIRAH, A., SITI SUHAILA, A.R. & MUHD FUAD, Y. What is plant tissue culture? Paper presented at the Taylor's Biodiversity & Conservation Course, 31 October 2014, Forest Research Institute Malaysia, Kepong.
59. HALIZA, I., SITI SUHAILA, A.R., NOR HASNIDA, H. NAZIRAH, A. & MUHD FUAD, Y. Large scale production of *Grammatophyllum speciosum* Blume (Tiger Orchid) using temporary immersion bioreactor system. Paper presented at the Project Evaluation Meeting, 10 November 2014, Forest Research Institute Malaysia, Kepong.
60. HAMDAN, H. & ANWAR, U.M.K. Development of Cross Laminated Timber (CLT) using pioneer timber species into structural panel for IBS Application. Paper presented at the Science Fund Monitoring Workshop 1/2014 (Industry Cluster), 12–14 October 2014, Putrajaya.
61. HAMDAN, H., MASTURA, M. & MOHD ZAKI, A. Introduction to Sesendok (FRIMsrp001). Paper presented at the Properties and Utilization of Sesendok for Value-Added Products, Forest Products Division Mini Seminar 2014, 6 July 2014, Forest Research Institute Malaysia, Kepong.
62. HAMDAN, O., NORSHEILLA, M.J.C., ABDUL KHALIM, A.S., ISMAIL, P. & SAMSUDIN, M. Assessing rate of deforestation and changes of carbon stock on mangroves in Pahang, Malaysia. Paper presented at the International Conference on Mangroves of Asia-Pacific Countries in View Of Climate Change (MAPCVCC-2014), 11–13 November 2014, Kuala Lumpur.
63. HAMDAN, O. MOHD AZAHARI, F. & ABD RAHMAN, K. Identifying spatial distribution of *Melaleuca* Swamp Forest in the east coast of Peninsular Malaysia from L-Band Palsar and GIS. Paper presented at the National Seminar on Heath Ecosystem 2014, 17–18 June 2014, Kuala Terengganu.
64. HAMDAN, O. Performances of UAV and WorldView-2 Images for individual canopy delineation in tropical forest. Paper presented at the Malaysia Geospatial Forum 2014, 11–12 March 2014, Kota Kinabalu.
65. HAMDAN, O., ISMAIL, P., NORSHEILLA, M.J.C., SAMSUDIN, M. & NORHAIDI, Y. Identifying drivers of deforestation and developing reference emission level for REDD+ In Peninsular Malaysia. Paper presented at the International Workshop on REDD+ and Sustainable Landuse Management, 16–18 December 2014, Myanmar.
66. HAMDAN, O., NORSHEILLA, M.J.C., ABDUL KHALIM, A.S., ISMAIL, P. & SAMSUDIN, M. Identifying drivers of deforestation in pahang by using multi temporal satellite images. Paper presented at the International Symposium and Exhibition Geoinformation (ISG 2014), 14–15 October 2014, Kuala Lumpur.
67. HAMDAN, O., NORSHEILLA, M.J.C., ISMAIL, P., ABDUL KHALIM, A.S. & SAMSUDIN, M. Assessing carbon pools in dipterocarp forests of Peninsular Malaysia. Paper presented at the Conference on Tropical Resources and Sustainable Sciences 2014 (CTReSS 2014), 17–19 October 2014, Jeli, Kelantan.
68. HASHIM, W.S., KHAIRUL, A. & RAFEADAH, R. Pengenalan kepada ujian 'in situ'/in situ quality control test (IQC), Paper presented at the 'Latihan Kompetensi Personnel: In-Situ Test, 11 September 2014, Forest Research Institute Malaysia, Kepong.
69. HASHIM, W.S., KHAIRUL, A. & RAFEADAH, R. Procedure 17: Batch Inspection, Paper presented at the 'Program Latihan Kompetensi Personel PCS', 24–28 August 2014, Pulau Pangkor.

70. HASHIM, W.S., ZAIHAN, J. & RAFEADAH, R. FRIM PCS QC plan and batch inspection di kilang Perabot. Paper presented at the 'Taklimat FRIM PCS', 16 October 2014, Kelantan.
71. HUDA FARHANA, M.M., LIM, H.F., MOHD PARID, M., NIK AZYYATI, A.K., AHMAD AZARUDDIN, M.N. & NOOR AZLIN, Y. Malaysian public park users: socio-demography and needs. Paper presented at the Malaysia Urban Green Space and IFPPA Asia Pasific Conference 2014, 24–28 June 2014, Penang.
72. JEYANNY, V & WAN RASIDAH, K. Kesuburan tanah dan pemakanan pokok. Paper presented at the 'Kursus Baja dan Kaedah Pembajaan Tanaman Lanskap', 25–26 March 2014, Kuala Lumpur.
73. JEYANNY, V. Basic training on eddy covariance methods for CO₂ flux measurements. Paper presented at the Lets Talk Science Forum, 25 April 2014, Forest Research Institute Malaysia, Kepong.
74. JEYANNY, V. Simptom kekurangan nutrien pada pokok. Paper presented at the 'Kursus Baja dan Kaedah Pembajaan Tanaman Lanskap', 25–26 March 2014, Kuala Lumpur.
75. JEYANNY, V. Soil carbon sequestration potential at varying altitudes of tropical forest reserves, Pahang. UPM Graduate Seminar, 3–5 June 2014, Serdang.
76. JEYANNY, V., HUSNI, M.H.A., WAN RASIDAH, K., SIVA KUMAR, B. & ARIFIN, A. Estimation of forest floor carbon stocks in tropical montane forest. Paper presented at the IUFRO World Congress 2014, 5–11 October 2014, USA.
77. JIE-SHENG, T. S., NORLIYANA, A., ISMARIAH, A., SUBHRENDU K.P. & JEFFREY, R. V. Conversion of tropical rainforests to oil palm and rubber increased flooding in Peninsular Malaysia. Paper presented at the International Union of Forest Research Organizations (IUFRO) World Congress, 5–11 October 2014, USA.
78. JULIANA, A., ISMARIAH, A., NOOR AINI, Z., NORLIYANA, A. & NOOR HAZMIRA, M. Economic valuation of Terengganu Recreational Forest. Paper presented at the National Seminar on Heath Ecosystem, 17–18 June 2014, Terengganu.
79. JULIANA, A., ISMARIAH, A., NOOR AINI, Z., NORLIYANA, A. & NURCAHAYA, K.M.A. Economic benefit of REDD+: a preliminary steps in the analysis. Paper presented at the Persidangan Kebangsaan Penilaian Ekonomi Sumber Hutan, 2–5 September 2014, Putrajaya.
80. JULIANA, A., NORLIYANA, A. & ISMARIAH, A. The opportunity cost of logging in Terengganu Forest Reserves. Paper presented at the Conference on Tropical Resources and Sustainable Science 2014, 17–19 October 2014, Kota Bharu.
81. KHAIRUL AZWA, T., MOHD ZAKI, A., SITI SALWAN, H., AHMAD FAUZI, S. & FARAH FAZWA, M.A. Ex- situ conservation of *Endospermum malaccense* (Sesendok): tree selection, wilding handling and seed germination. Paper presented at the Conference on Tropical Resources and Sustainable Sciences 2014, 17–19 October 2014, Kota Bharu.
82. KHAIRUL, M., IZRAN, K., MOHAMAD OMAR, M.K., ABDUL HAMDU S., MOHD NOOR, M., MOHD JAMIL, A.W., KHAIRUL, A. & YANTI, A.K. New clone of Sesendok (FRIMsrp 001). Paper presented at the Conference on Tropical Resources and Sustainable Sciences, 17–19 October 2014, Kota Bharu.
83. KHAIRUL, M., MOHD NOOR, M., MOHAMAD OMAR, M.K., IZRAN, K., KHAIRUL, A. & MOHD JAMIL, A.W. Sesendok clone FRIMsrp001–timber recovery and mechanical properties. Paper presented at the Forest Products Division Mini Seminar 2014 'Mengoptimumkan Penggunaan Bahan Mentah daripada Spesies Sesendok FRIMsrp001 bagi Menghasilkan Produk Berkualiti dan Bernilai Tambah Tinggi', 16 July 2014, Forest Research Institute Malaysia, Kepong.
84. KHOO, M. Evaluasi terapeutik dan toksisiti tumbuhan ubatan beraroma serta khasiatnya', 5–6 November 2014, Forest Research Institute Malaysia, Kepong.
85. KHOO, M., ROHANA, S., MAILINA, J. & CHEE, B.J. Development of an assay to assess the toxic effect of extracts/compounds from medicinal and aromatic plants in response to light exposure. Paper presented at the Project Evaluation Meeting Seminar 2014, 10 November 2014, Forest Research Institute Malaysia, Kepong.
86. KHOO, V., NADA, B. & KIRTON, L.G. Conservation of the Selangor River population of *Pteroptyx tener* in Malaysia: results of seven years of monitoring. Paper presented at the International Firefly Symposium, "Illuminating Discovery", 11–15 August 2014, USA.
87. LATIF, A.M., ISMAIL, H. & AHMAD ZUHAI, Y. Critical evaluation on the various technical assumptions utilized by Peninsular Malaysia's SFM. Paper presented at the Seminar Undang-Undang dan Dasar Berkaitan Perhutanan di Semenanjung Malaysia: Analisa dan Tinjauan Semula, 28 January 2014, Kuala Lumpur.
88. LEE, C.T. How to develop microsatellite marker? Paper presented at the DNA Profiling & Barcoding Workshop, 4–7 November 2014, Forest Research Institute Malaysia, Kepong.
89. LEE, C.T., LAU, K.H., NURUL FARHANAH, Z., TNAH, L.H., NG, C.H., NG, K.K.S., LEE, S.L. & CHUA, L.S.L. Reproductive and genetic studies towards the conservation and management of *Aquilaria malaccensis* in Peninsular Malaysia. Paper presented at the IUFRO XXIV World Congress 2014 'ITTO and CITES collaboration to sustain tropical tree species', 9 October 2014, USA.
90. LEE, C.T., TNAH, L.H., LEE, S.L., NG, K.K.S., NG, C.H., DIWAY, B. & KHOO, E. Development of a DNA-based timber tracking system for *Koompasia malaccensis* in Malaysia. Paper presented at the IUFRO XXIV World Congress 2014, 5–11 October 2014, USA.
91. LEE, S.L. How to reveal genetic variation? Paper presented at DNA Profiling & Barcoding Workshop, 4 - 7 November 2014, FRIM.
92. LEE, S.L. What is barcoding? Paper presented at the DNA Profiling & Barcoding Workshop, 4–7 November 2014, Forest Research Institute Malaysia, Kepong.
93. LIM, H.F., HUDA FARHANA, M.M., INTAN NURULHANI, B., MOHD PARID, M., TARIQ MUBARAK, H., NORSHAKILA, Y & MOHD NASIR, H. Local consultation and involvement: the way forward for mangrove replanting & conservation. Paper presented at International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change 2014 (MAPCVCC-2014), 11–13 November 2014, Kuala Lumpur.
94. LIM, H.F., INTAN NURULHANI, B. & NORSHAKILA, Y. Development of community-based forest ecotourism: the case of Ulu Geroh in peninsular malaysia. Paper presented at the Persidangan Kebangsaan Penilaian Ekonomi Sumber Hutan, 2–5 September 2014, Putrajaya.
95. LIM, H.F., NOOR AZLIN, Y., AHMAD AZARUDDIN, M.N., ADNAN, M., MOHD PARID, M., HUDA FARHANA, M.M. & AZYYATI, A.K. Socio-economic issue in park management by Municipal Councils in Peninsular Malaysia: some survey findings. Paper presented at the Malaysia Urban Green Space & IFPPA Asia Pacific Conference 2014, 24–28 June 2014, Penang.
96. LIM, H.F., NOOR AZLIN, Y., AHMAD AZARUDDIN, M.N., ADNAN, M., MOHD PARID, M., HUDA FARHANA, M.M., NIK AZYYATI, A.K. Socio-economic issues in park management by Municipal Councils in Peninsular Malaysia: some survey findings. Paper presented at the Malaysia Urban Green Space and IFPPA Asia Pasific Conference 2014. Parks as Melting Pots & Venues for Environmental Learning, 24–28 June 2014, Penang.
97. LIM, H.F., NORINI, H., NORSHAKILA, Y., INTAN NURULHANI, B., NIK MUSAADAH, M., TAN, A.L., NURUL HUSNA, Z. & FADZUREENA, J. Case study in Malaysia: documenting traditional forest-related knowledge of medicinal plants. Paper presented at the Regional Workshop on Sharing Traditional Forest-Related Knowledge for Ecosystem Services in ASEAN Countries, 24–25 March 2014, Kuala Lumpur.
98. LIM, H.F., NORINI, H., NORSHAKILA, Y., INTAN NURULHANI, B., NIK MUSAADAH, M., TAN, A.L., NURUL HUSNA, Z. & FADZUREENA, J. Documenting traditional forest-related knowledge of medicinal plants: malaysia experience for the world. Paper presented at the Regional Workshop on Sharing Traditional Forest-Related Knowledge for Ecosystem Services in ASEAN Countries, 24–25 Mac 2014, Kuala Lumpur.
99. LIM, H.F., NORINI, H., NORSHAKILA, Y., INTAN NURULHANI, B., NIK MUSAADAH, M., TAN, A.L., NURUL HUSNA, Z., FADZUREENA, J. & MASTURA, M. Documenting traditional forest-related knowledge of medicinal plants in Malaysia: a comprehensive approach. Paper presented at the Conference on Tropical Resources and Sustainable Science 2014, 17–19 October 2014, Kota Bharu.
100. LIPEH, S., LOVE, C.S., & MORRELL, J.J. Field performance of wood-based decking materials in th Western United States. Paper presented at the International Research Group on Wood Protection IRG45, 11–15 May 2014, USA.

101. LOK, E.H. & AHMAD ZUHAIDI, Y. Teknik penanaman dan pengurusan ladang hutan Pokok Karas. Paper presented at the 'Kursus Asas Tanaman Karas Bagi Pengeluaran Gaharu', 8–11 April 2014, Miri.
102. LOK, EH, DELL, B & O'HARA, G. Root nodulation and nitrogen-fixation in *Pterocarpus indicus*. Paper presented at the International Conference on Plant Physiology 2014. Enhancing Strategic Plant Physiology Research and Technologies for Sustainable resources, 26–28 August 2014, Bali.
103. MAHANIM, S.M.A., RAFIDAH, J., PUAD, E., WAN ASMA, I. & SHAHARUDDIN, H. Material advancements in supercapacitors: from bamboo activated carbon. Paper presented at The 27th International Symposium on Chemical Engineering (ISChE 2014), 5–7 December 2014, Kuala Lumpur.
104. MARRYANNA, L., SITI AISAH, S. & WAN MOHD SHUKRI, W.A. Water use variations of *Tectona grandis*. Paper presented at the Conference of Tropical Resources and Sustainable sciences 2014 (CTRESS2014), 17–19 October 2014, Kota Bharu.
105. MARZALINA, M & ROSNIZA, R. Konservasi pengetahuan tradisi. Paper presented at the 'Simposium Konservasi Kebangsaan 2014', 11–14 August 2014, Kota Kinabalu.
106. MASTURA, M. Meneroka potensi & merealisasi manfaat hasil semula jadi. Paper presented at the 'Kursus Teknologi Pemiawaian Tumbuhan Ubatan dan Peningkatan Kualiti Produk Herba', 2–4 September 2014, Forest Research Institute Malaysia, Kepong.
107. MAZIDAH, M., PATAHAYAH, M., ROSNANI, A.G., ERWAN SHAH, S., ZALILAH, M.A. & BADROL HISHAM, I. Etiology of powdery mildew and little leaf: two new common diseases in dukung anak (*Phyllanthus* spp) cultivated in Malaysia. Paper presented at the 8th International Conference on Plant Protection in the Tropics, 8–10 April 2014, Kuala Lumpur.
108. MOHAMAD JEMAIN, M.R., NIK MUSAADAH, M., ZUNOLIZA, A., NURNIDA, M.K., NUZIAH, H. & AZMAN, M. Antidiabetic effects of *Phyllanthus pulcher* against carbohydrate metabolizing enzymes. Paper presented at the Project Evaluation Meeting Seminar 2014, 10 November 2014, Forest Research Institute Malaysia, Kepong.
109. MOHAMAD LOKMAL, N., MOHD ZAKI A., FARAH FAZWA M.A. Tree improvement in forest plantation species (forest species) - breeding trial - tree selection /provenance trial/ progeny trial/ clonal trial. Paper presented at Orientation Cum Exposure to Teak Plantation Innovation, 23 February–2 March 2014, Mata Ayer.
110. MOHAMAD LOKMAL, N., MOHD ZAKI, A., FARAH FAZWA, M.A. Establishment & management of seed production area. Paper presented at the Orientation Cum Exposure to Teak Plantation Innovation, 23 February–2 March 2014, Mata Ayer.
111. MOHAMED NOR, M.Y. Current issues of pallet industry in Malaysia. Paper presented at the 9th General Assembly for APSF, 25 September 2014, Bangkok.
112. MOHAMED NOR, M.Y. Overview of Agarwood R&D&C in FRIM. Paper presented at the FRIM Agarwood Technology Talk, 2–3 Disember 2014, Forest Research Institute Malaysia, Kepong.
113. MOHAMED NOR, M.Y. Pengenalan kepada Simposium Konservasi Kebangsaan 2014: "Melestari Khazanah Warisan Negara". Paper presented at the 'Simposium Konservasi Kebangsaan 2014', 11–14 August 2014, Kota Kinabalu.
114. MOHD AFENDI, H. Indoor Plants-tumbuhan hiasan dalaman: kepelbagaian, pengayaan dan kegunaan. Paper presented at the 'Kursus Asas Pengurusan Penyelenggaraan dan Pengindahan Landskap', 17–18 September 2014, Kuala Lumpur.
115. MOHD AFENDI, H. Senario landskap semasa-landskap, taman dan pengaruhnya. Paper presented at the 'Kursus Asas Pengurusan Penyelenggaraan dan Pengindahan Landskap', 17–18 September 2014, Kuala Lumpur.
116. MOHD AZAHARI, F., KHALI AZIZ, H. & HAMDAN, O. Tropical forest biomass and carbon stock assessment using remote sensing data. Paper presented at the International Seminar on Tropical Forest Carbon Stock Assessment, 29 May 2014, Kuala Lumpur.
117. MOHD AZAHARI, F., MUHAMAD AFFIZUL, M. & KHALI AZIZ H. Assessment of peat swamp forest cover changes of malaysia using remote sensing. Paper presented at the 35th Asian Conference on Remote Sensing (ACRS), 27–31 October 2014, Myanmar.
118. MOHD AZAHARI, F., MUHAMAD AFFIZUL, M. & KHALI AZIZ, H. Forest cover and forest changes of Malaysia. Paper presented at the Final Workshop of Forest Cover and Carbon Mapping in the Greater Mekong Subregion and Malaysia Project, 16–21 June 2014, Beijing.
119. MOHD FARID, A., WAN MOHD AZRUL, W.A., LEE, S.S., MOHD ROSLI, H., PATAHAYAH, M., SAJAP, A.S. & TOSIAH, S. Assessment on the virulent strains of entomopathogenic fungi obtained from natural forest with potential for control of the economically important insect pests of Tongkat Ali, Paper presented at the Project Evaluation & Monitoring Seminar, 10–12 November 2014, Forest Research Institute Malaysia, Kepong.
120. MOHD FARID, A., WAN MOHD AZRUL, W.A., LEE, S.S., PATAHAYAH, M., SAJAP, A.S. & TOSIAH, S. Characterization of *Metarhizium anisopliae* obtained from natural forest soils of Peninsular Malaysia for virulence against defoliator, *Atteva sciodoxa* and phylogenetic analysis. Paper presented at the International Scientific Genetic Conference XXVI, GENETIC DAYS, 1–5 September 2014, Czech Republic.
121. MOHD IZWAN, J., ROZITA, A., JEYANNY, V., MOHD FAKHRI, I., HASNIDARUL, A., NOR RASHIDAH, M., FADZLINAH, Z. & YAHYA, M. Pengabungan dua kaedah ujian yang bersesuaian (Two in One Method). Paper presented at the 'Hari Inovasi dan KIK FRIM 2014', 19–20 November 2014, Forest Research Institute Malaysia, Kepong.
122. MOHD JAMIL, A.W. & MOHAMAD OMAR, M.K. Safety matters concerning timber scaffold board application in national oil and gas industry. Paper presented at the International Conference on Environmental and Occupational Health 2014, 7–9 April 2014, Putrajaya.
123. MOHD NASIR, H., TARIQ MUBARAK, H. & SAMSUDIN, M. Eleven restricted, site specific and endangered mangrove species of Peninsular Malaysia. Paper presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change 2014 (MAPCVCC-2014), 11–13 November 2014, Kuala Lumpur.
124. MOHD PARID, M. Assessing the conservation value of Malayan Tiger in Peninsular Malaysia. Paper presented at the Postgraduate Colloquium, Faculty of Environmental Study, University Putra Malaysia, 3–4 June 2014, Serdang.
125. MOHD PARID, M., KHALI, A., RODZIAH, H. & SITI AISHAH, S. Sosio-ekonomi komuniti sekitar Tapak Ramsar Tasik Bera. Paper presented at the Stakeholder Consultation Workshop Integrated Management Plan for RAMSAR Site Tasek Bera, 8 September 2014, Tasek Bera, Pahang.
126. MOHD PARID, M., LIM, H.F., NORAZLIN, Y. & NIK AZYYATI, A.K. Pengurusan Taman Awam yang efektif ke arah manfaat sosio-ekonomi yang lestari. Paper presented at the Stakeholder Consultation Workshop Pengurusan Landskap, Kawasan Hijau dan Taman Awam oleh Pihak Berkuasa Tempatan di Sarawak & Sabah, 30 September 2014, Kuching.
127. MOHD PARID, M., MUKRIMAH, A. & LIM, H.F. Extent of forest dependent by local community in Peninsular Malaysia: a case study of protected area. Paper presented at The ASFN 5th Conference "Enhancing Livelihood & Conservation Benefits from Social Forestry towards a Green ASEAN Community", 24–26 May 2014, Kota Kinabalu.
128. MOHD ZAKI, A. Establishment and management of seed production area. Paper presented at the Orientaring cum Exposure to Teak Plantation Innovation Course, 23 February–2 March 2014, Mata Ayer.
129. MOHD ZAKI, A., FARAH FAZWA, M.A. & MOHAMAD LOKMAL, N. Production of high quality planting materials of *Eurycoma longifolia* and *Labisia pumila* in FRIM: status, achievement and the way forward. Paper presented at the 2nd International Plant Breeding Seminar, 14–15 October 2014, Serdang.
130. MOHD ZAKI, A., NOR FADILAH, W., MOHAMAD LOKMAL, N., FARAH FAZWA, M.A., AB RASIP, A.G. & REGINA MARIAH, J. Provenances trial of *Eurycoma longifolia*. Paper presented at International Scientific Genetic Conference XXVI: Genetic Days, 1–5 September 2014, Republic Czech.
131. MOHD ZAKI, A., NOR FADILAH, W., MOHD FARID, A., WAN MUHD AZRUL, W.A. & MOHAMAD LOKMAL, N. Disease incidence on *Eurycoma longifolia* provenances of Peninsular Malaysia. Paper presented at the 5th Asian Conference on Plant Pathology (ACPP2014), 3–6 November 2014, Chiangmai, Thailand.

132. MOHD ZOBIR, H., TUMIRAH, K., ZULKARNAIN, Z. & RAFEADAH, R. Nanoencapsulated n-nonadecane into styrene-methylmethacrylate copolymer shell as potential thermal energy storage for building material. Paper presented at the 2nd International Conference on Innovation and Technology for Sustainable Built Environment 2014 (icitsbe2:2014), 27–28 May 2014, Ipoh.
133. MOHD. ZAKI, A., NOR FADILAH, W., MOHAMAD LOKMAL, N., FARAH FAZWA M.A., AB. RASIP, A.G. & REGINA MARIAH J. Provenance trial of *Eurycoma Longifolia*. Paper presented at the Project Evaluation Meeting, 10 November 2014, Forest Research Institute Malaysia, Kepong.
134. MORIMOTO, A., NUMATA, S., HOSAKA, T., HASHIM, M., TANI, N., SATAKE, A. ICHIE, T., NORALIZA, A. & NASHATUL ZAIMAH, N.A. Interspecific comparison in reproductive phenology of dipterocarps using long-term flowering and fruiting data at FRIM. Paper presented at the 51st ATBC Annual Meeting 2014, 20–24 April 2014, Cairns, Australia.
135. MUKRIMAH, A., MOHD PARID, M., MOTOE, M. & LIM, H.F. Ecotourism, income generation and poverty reduction: a case of Kuala Tahan National Park (KTNP), Pahang, Malaysia. Paper presented at the Conference on Tropical Resources and Sustainable Sciences, 17–19 October 2014, Kota Bharu.
136. NADA, B., MOHD SALLEH, S., MUHAMMAD FARID, A.R., SAIFUL ISKANDAR, K. & KIRTON, L.G. Fireflies in the grounds of the Forest Research Institute Malaysia (FRIM): studies on their diversity and seasonality. Paper presented at the International Firefly Symposium, “Illuminating Discovery”, 11–15 August 2014, Gainesville, Florida, USA.
137. NADIAH SALMI, N., ISMANIZAN, I., NASHATUL ZAIMAH, N.A. & NOR HASNIDA, H. An encapsulation-dehydration protocol for cryopreservation of *Eurycoma longifolia* (tongkat ali) hairy root cultures for long-term preservation. Paper presented at The 14th Postgraduate Colloquium UKM, 9–10 April 2014, Bangi.
138. NADIAH SALMI, N., NASHATUL ZAIMAH, N.A., NORALIZA, A. & NOR ASMAH, H. Pembangunan teknologi biji benih untuk kelestarian khazanah hutan negara. Paper presented the ‘Seminar Bioteknologi Jabatan Pertanian Negeri Perak Tahun 2014’, 1–2 October 2014, Ipoh.
139. NASHATUL ZAIMAH, N.A. Tools in tree improvement: seed technology. Paper presented at the orienteering cum exposure to teak plantation innovation course, 23 February–2 March 2014, Mata Ayer.
140. NAZIRAH, A., NOR HASNIDA, H., ISMANIZAN, I., NORLIA, B., ABDUL RASHIH, A., SITI SUHAILA, A.R., LING, S.K., HALIZA, I., MUHAMMAD FUAD, Y., ROZIDAH, K. & ROHANI, A. Effect of different elicitors on the production of secondary metabolites in *E. longifolia* hairy root. Paper presentation at the Conference on Tropical Resources And Sustainable Sciences 2014, 17–19 October 2014, Kota Bharu.
141. NG, K.K.S. Development of SNP markers of Meranti Tembaga (case study). Paper presented at the DNA Profiling & Barcoding Workshop, 4–7 November 2014, Forest Research Institute Malaysia, Kepong.
142. NIK HASAN, M.K., MOHD ZAIN, M., MIZATON, H.H., ADAM, A., PONTO, T. & ABDUL WAHAB, I. Anti-hypercholesterol study of *Myrmecodia platytrayae*. Paper presented at the Post-graduate Colloquium, April 2014, Shah Alam.
143. NIK HASAN, M.K., MOHD ZAIN, M., MIZATON, H.H., ADAM, A., PONTO, T., & ABDUL WAHAB, I. Cholesterol and bile acid binding properties of *Myrmecodia platytrayae* in hyper cholesterolaemic induced rats, holistic healthcare through pharmaceutical sciences. Paper presented at the iPOPs Conference, 11–12 August 2014, Shah Alam.
144. NIK MUSA’ADAH M., FADZUREENA J., ADIANA M.A., MASTURA M., VIMALA S., ROHANA S., MOHAMAD JEMAIN M.R., CHEE B.J., KHOO M.G.H., NURHANAN MURNI Y., MAZURAH M.I., NUZIAH H., NOR AZAH M.A., MAILINA J., TAN A.L., NORSHAKILA Y., INTAN NURULHANI B., NURUL HUSNA Z., RASADAH M.A., LIM H.F., & NORINI H. IN COLLABORATION WITH FRIM/JAKOA MOU TECHNICAL COMMITTEE. Analisis bioaktiviti dan fitokimia: tumbuhan ubatan terpilih subetnik Bateq. Paper presented at the “Lawatan Semula dan Mesyuarat Bersama Subetnik Bateq”, 15 Julai 2014, Gua Musang
145. NIK MUSA’ADAH, M., ABD. RASHID, L., MOHAMAD JEMAIN, M.R., MOHD RADZI, A., ROHANA, S., AHMAD SYUKRI A., AZMAN, M. & NOURISH CARE, SDN BHD. Penilaian bioaktiviti ke arah pembangunan produk mesra pesakit diabetes: Le Natura. Paper presented at the ‘Kursus Teknologi Pemiawiaan Tumbuhan Ubatan & Peningkatan Kualiti Produk Herba, 2–4 September 2014, Forest Research Institute Malaysia, Kepong.
146. NIK MUSA’ADAH, M., FADZUREENA, J., ADIANA, M.A., MASTURA, M., VIMALA, S., ROHANA, S., MOHAMAD JEMAIN, M.R., CHEE, B.J., KHOO, M.G.H., NURHANAN MURNI, Y., MAZURAH, M.I., NUZIAH, H., NOR AZAH, M.A., MAILINA, J., TAN, A.L., NORSHAKILA, Y., INTAN NURULHANI, B., NURUL HUSNA, Z., RASADAH, M.A., LIM H.F. NORINI, H. & IN COLLABORATION WITH FRIM/JAKOA MOU TECHNICAL COMMITTEE. Analisa bioaktiviti dan fitokimia: tumbuhan ubatan terpilih subetnik Semoq Beri. Paper presented at the ‘Lawatan semula dan mesyuarat bersama subetnik Semoq Beri’, 16 July 2014, Kuala Berang.
147. NIK MUSA’ADAH, M., NORINI, H., LIM, H.F., NORSHAKILA, Y., INTAN NURULHANI, B., TAN, A.L., NURUL HUSNA, Z. FADZUREENA, J. & IN COLLABORATION WITH FRIM/JAKOA MOU TECHNICAL COMMITTEE. Documentation of the orang asli traditional knowledge: safeguarding knowledge, securing benefits. Paper presented at the Conference on Preserving the Past And Sustaining the Future of the Indigenous Culture Heritage and Rights, 5 November 2014, Petaling Jaya.
148. NIK MUSA’ADAH, M., NORINI, H., LIM, H.F., NORSHAKILA, Y., INTAN NURULHANI, B., TAN, A.L., NURUL HUSNA, Z. FADZUREENA, J. & IN COLLABORATION WITH FRIM/JAKOA MOU TECHNICAL COMMITTEE. Documenting traditional knowledge of the orang asli in Peninsular Malaysia. Paper presented at the 8th International traditional & complementary medicine (INTRACOM) conference, 30 October–2 November 2014, Petaling Jaya.
149. NIK MUSA’ADAH, M., NORINI, H., LIM, H.F., NORSHAKILA, Y., INTAN NURULHANI B., TAN, A.L., NURUL HUSNA, Z. FADZUREENA, J. & IN COLLABORATION WITH FRIM/JAKOA MOU TECHNICAL COMMITTEE. Documentation of the orang asli traditional knowledge on medicinal and aromatic plants. Paper presented at the UMCares Community Exchange & Summit 2014, 11–13 November 2014, Petaling Jaya.
150. NIK MUSA’ADAH, M., FADZUREENA, J., MOHAMAD JEMAIN, M.R., SITI NUR AISYAH, H., VIMALA, S., SHALINI, M., MASTURA, M., CHEE, B.J., ADIANA, M.A., NUZIAH, H., ABDUL RASHIH, A., NURUL HUSNA, Z., TAN, A.L., NADIAH, I., MAILINA, J., AZRINA, A., NOR AZAH, M.A., NOOR RASYILA, M.N., RASADAH, M.A., NORSHAKILA, Y., INTAN NURULHANI, B., LIM, H.F. & NORINI, H. Merealisasikan pembangunan produk berasaskan pengetahuan tradisi Orang Asli: sumber kekayaan baharu negara. Paper presented at the Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi, 23–25 May 2014, Kuala Lumpur.
151. NOOR AZLIN, Y. Professionalism in park management: the Malaysian way forward. Paper presented at the Malaysia Urban Green Space & IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.
152. NOOR AZLIN, Y. Conveying sustainability messages in tourism practice. Paper presented at the ‘Seminar Kebangsaan Agropelancongan 2014’, 14–15 October 2014, Cameron Highland.
153. NOOR AZLIN, Y. Learning from the past to move into the future: urban green space issues and trends in Malaysia. Paper presented at the 2nd International Congress on Green Urban Futures 2014, 3–7 November 2014, Bangalore, India.
154. NOOR AZLIN, Y. Networking towards professionalism in urban green space management. Paper presented at the ‘Bengkel Konsultansi Stakeholders Kajian Pengurusan Landskap, Kawasan Hijau dan Taman Awam oleh Pihak Berkuasa Tempatan Sabah dan Sarawak’ 30 September–1 October 2014, Kuching.
155. NOOR AZLIN, Y. Pendidikan pemuliharaan bagi pengurusan sumber. Paper presented at the ‘Kursus Kompetensi Jurupandu Alam FRIM 2014’, 27–30 January 2014, Forest Research Institute Malaysia, Kepong.
156. NOOR AZLIN, Y. Trends and challenges to address conservation of resources and users need for urban parks in Malaysia. Paper presented at the Malaysia Urban Green Space & IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.
157. NOOR AZRIEDA, A.R., SALMIAH, U. & RAHIM, S. Comparison of accelerated decay and graveyard test on selected Malaysian timber species. Paper presented at the Conference on Tropical Resources & Sustainable Sciences, 17–19 October 2014, Kota Bharu.

158. NOOR HAZMIRA, M., ROHANA, A.R., NOR AZILA, M., ISMARIAH, A. & MOHD SHAHWAHID, O. Factor determinants on availability and consumption of rubberwood in Peninsular Malaysia. Paper presented at the Conference on Tropical Resources & Sustainable Sciences, 17–19 October 2014, Kota Bharu.
159. NOOR HAZMIRA, M., ISMARIAH, A. & NORLIYANA, A. Value added of timber in primary wood-based industry in Peninsular Malaysia. Paper presented at the National Conference on Economic Valuation of Forest Resource, 2–5 September 2014, Putrajaya.
160. NOORSIHA, A. Hala tuju pembangunan dan pengurusan taman botani di Semenanjung Malaysia. Paper presented at the 'Seminar Konservasi Flora Borneo: Perkongsian Pengalaman & Pengetahuan', 24 September 2014, Kuching.
161. NOORSIHA, A. Hala tuju tapak warisan kebangsaan FRIM sebagai tapak warisan dunia UNESCO. Paper presented at the 'Seminar Pemeliharaan Tapak Warisan Semula Jadi Negeri Selangor', 18 November 2014, Subang Jaya..
162. NOR AZAH, M.A. & RASADAH M.A. Peranan R&D FRIM dalam membantu memartabatkan industri herba negara. Paper presented at the 'Kursus Teknologi Pemiawaian Tumbuhan Ubatan dan Peningkatan Kualiti Produk Herba', 2–4 September 2014, Forest Research Institute Malaysia, Kepong.
163. NOR AZAH, M.A., SAHRIM, L., MAILINA, J., SAIDATUL HUSNI, S., MUHD HAFIZI, Z., ABDUL MAJID, J. & MOHAMAD NASIR, M.A. Classification of agarwood quality by electronic nose technology. Paper presented at the XXIV World congress (IUFRO), 5–11 October 2014, Utah, USA.
164. NOR AZAH, M.A., SAIDATUL HUSNI S., MAILINA J. & MOHD FARIDZ, Z. The potential of SFE extracts. Paper presented at the Supercritical Fluid Extraction Workshop. 8–10 January 2014, Shah Alam .
165. NOR AZLIN, M.F., NOOR AZLIN, Y., AZYATI, A.K., NUR SURIANI, S. & NAIMAH, C.L. Bird diversity in urban green space areas of Peninsular Malaysia. Paper presented at the Malaysia Urban Green Space & IFPRA Asia Pacific Conference 2014, 24–28 Jun 2014, Pulau Pinang.
166. NOR HASNIDA, H., HALIZA, I., SITI SUHAILA, A.R. & MUHD FUAD, Y. Kultur tisu spesies herba. Paper presented at the 'Kursus Herba', 5 November 2014, Forest Research Institute Malaysia, Kepong.
167. NOR HASNIDA, H., NAZIRAH, A., MUHAMMAD FUAD, Y., ABDUL RASHIH, A., LING, S.K., SITI SUHAILA, A.R., HALIZA, I., ROZIDAH, K. & ROHANI, A. Sustainable production of *Eurycoma longifolia* (tongkat ali) bioactive compounds in hairy root cultures using bioreactor technology. Paper presented at the Malaysian Symposium Applied Biology, 8–10 June 2014, Cherating.
168. NOR MAZLANA, M., ROSNITA, A.T., RUSHDAN, I., RUSSLY, A.R. & AINUN ZURIYATI, M. Suitability of coir fibers as pulp and paper .Paper presented at the 2nd International Conference on Agriculture and Food Engineering (CAFEI2014), 1–3 December 2014, Kuala Lumpur.
169. NORAISHAH, S., AZIAN, M., SAMSUDIN, M., ISMAIL, P., ABD RAHMAN, K., NUR HAJAR, Z.S. & A. RAHIM, O. A comparative study of carbon stock changes from different logging techniques. Paper presented at the International Conference on Tropical Resources and Sustainable Sciences 2014 (CTReSS2014), 17–19 October 2014, Kota Bharu.
170. NORAISHAH, S., SAMSUDIN, M. & TARIQ MUBARAK, H. Assessment of soil carbon in Matang Mangrove Forest, Malaysia. Paper presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change 2014 (MAPCVCC-2014), 11–13 November 2014, Kuala Lumpur.
171. NORALIZA, A., WAN MOHD AIZAT, W.K., NORWATI, M. & NORMAH, M.N. Changes in the protein profile of *Swietenia macrophylla* seed upon cold storage. Paper presented at the INBIOSIS Postgraduate Research Progress Seminar, 19 August 2014, Bangi.
172. NORINI, H., & ABD LATIF, M. FRIM'S Contribution towards mainstreaming conservation, protection and management of the national biological diversity. Paper presented at the International Conference on Tropical Resources and Sustainable Sciences 2014 (CTReSS2014), 17–19 October 2014, Kota Bharu.
173. NORINI, H., ABD LATIF M., LIM, H.F., NIK MUSAADAH, M. & FRIM/JAKOA MOU TECHNICAL COMMITTEE. Transforming traditional knowledge related to biodiversity to bioeconomy potential: a case for Orang Asli Peninsular Malaysia. Paper presented at the Forum Traditional Knowledge, 15 September 2014, Kuala Lumpur.
174. NORINI, H., ABD. LATIF, M., LIM, H.F., NIK MUSA'ADAH, M. & FRIM/JAKOA MOU TECHNICAL COMMITTEE. Documentation of traditional knowledge on medicinal plants used by the orang asli in Peninsular Malaysia. Paper presented at the WIPO forum on traditional knowledge & traditional culture expressions, 15 September 2014, Kuala Lumpur.
175. NORINI, H., ABD. LATIF, M., LIM, H.F., NIK MUSAADAH, M. & FRIM/JAKOA MOU TECHNICAL COMMITTEE. Pendokumentasian pengetahuan tradisi Orang Asli: satu model dunia. Paper presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2014: Melestari Legasi Pengetahuan Tradisi', 23–24 May 2014, Kuala Lumpur.
176. NORLIA, B., NORWATI, A., MOHD ROSLI, H. & NORWATI, M. Genetic study of Teak: an overview. Paper presented at the Orientaring cum Exposure to Teak Plantation Innovation Course, 23 February–2 March 2014, Mata Ayer.
177. NORLIA, B., LEE, C.T., TNAH, L.H. & ZAHIDAH, Z. Development of SSRs from transcriptome sequences of tongkat ali (case study). Paper presented at the DNA Profiling & Barcoding Workshop, 4–7 November 2014, Forest Research Institute Malaysia, Kepong.
178. NORLIYANA, A. & ISMARIAH A. Watershed's forest and non-forest land use impacts on water quality. Paper presented at the National Seminar on Heath Ecosystem (NSOHE 2014), 17–18 June 2014, Kuala Terengganu.
179. NORLIYANA, A. & ISMARIAH, A. The status of forest in watersheds of Pahang: a spatial approach. Paper presented at the 'Persidangan Kebangsaan Penilaian Ekonomi Sumber Hutan', 2–5 September 2014, Putrajaya.
180. NORLIYANA, A., JULIANA, A., ISMARIAH, A. Value of carbon stored provided by tropical forest. Paper presented at the Conference on Tropical Resources and Sustainable Science 2014, 17–19 October 2014, Kota Bharu.
181. NORSHAM SUHAINA, Y. & SYAFIDA, C.S. Barcode KBG: DNA barcoding the nation's native flowering plants. Paper presented at the Malaysia Urban Green Space and IFPRA Asia Pacific Conference, June 2014, Pulau Pinang.
182. NORSHEILLA, M.J.C, HAMDAN, O. & ISMAIL, P. Identifying drivers of deforestation in Peninsular Malaysia by using satellite imagery. Paper presented at the Malaysia Geospatial Forum, 11–12 March 2014, Kota Kinabalu.
183. NORSHEILLA, M.J.C, HAMDAN, O. & ISMAIL, P. Identifying drivers of deforestation in Peninsular Malaysia by using satellite imagery. Paper presented at the Malaysia Geospatial Forum, 11–12 March 2014, Kota Kinabalu.
184. NORSUHAINA, Z., ABD. RASHID, L., ZUNOLIZA, A. KHAIRUL KAMILAH, A.K., MOHD RADZI, A., NUR ZALIKHA, T., MUHD KHAIR, M.A. & KHALIJAH, A. The chemical characterization of water soluble polysaccharide from *Averrhoa carambola* fruits. Paper presented at the International Conference Natural Products 2014, 18–19 March 2014, Putrajaya.
185. NORYA, A., NORSHAKILA, Y., LIM, H.F. & INTAN NURULHANI, B. Pengalaman komuniti Orang Asli dalam pendokumentasian pengetahuan tradisi: penglibatan & cabaran. Paper presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestari Legasi Tradisi', 23–24 Mei 2014, Kuala Lumpur.
186. NUR ATIQA, S. & WAN ASMA, I. Oil extraction from *Calophyllum inophyllum* kernel via soxhlet extraction: optimization using Response Surface Methodology (RSM). Paper presented at the Biannual Postgraduate Conference (I), 14–16 May 2014, Tronoh.
187. NUR HAJAR, Z.S., MOHD DANIAL, M.S. & WAN MOHD SHUKRI, W.A. Estimating tropical forest carbon stocks: a case of Gunung Ledang Virgin Jungle Reserves. Paper presented at the Scientific Seminar of Johor National Park 2014 - Unravelling biodiversity for future generations, 13–14 August 2014, Pulau Pinang.
188. NUR HAJAR, Z.S., MOHD DANIAL, M.S., WAN MOHD SHUKRI, W.A. & MOHD SHAHID, M. Estimation of tree biomass in logged and primary Malaysia tropical lowland forests using sampling plot data. Paper presented at the Conference on Tropical resources and Sustainable Sciences (CTReSS), 17–19 October 2014, Kota Bharu.

189. NUR'ATIQA, M.S., SUZANA, Y. & WAN ASMA, I. Acid esterification of *Calophyllum inophyllum* seed oil under ultrasonic effect. Paper presented at the Biannual Post Graduate Conference (BAPC), 6 November 2014, Tronoh.
190. NUR'ATIQA, M.S., SUZANA, Y. & WAN ASMA, I. Preliminary investigation of acid esterification of *Calophyllum inophyllum* seed oil under ultrasonic effect. Paper presented at the Biannual Post Graduate Conference I (BAPC I), May 2014, Tronoh.
191. NUR'ATIQA, M.S., SUZANA, Y. & WAN ASMA, I. Preliminary investigation of acid esterification of *Calophyllum inophyllum* seed oil under ultrasonic effect. Paper presented at the International Symposium on Chemical Engineering (ISChE), 5–7 December 2014, Kuala Lumpur.
192. NURUL HUSNA, Z. & TAN, A.L. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi Jahut). Paper presented at Kg. Paya Mendoi, Kuala Krau, 9 June 2014, Pahang.
193. NURUL HUSNA, Z. & TAN, A.L. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi Orang Kanaq). Paper presented at Kg. Sg. Selangi, Kota Tinggi, 12 August 2014, Johor.
194. NURUL HUSNA, Z. & TAN, A.L. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi Semoq Beri). Paper presented at Kg. Berua, Kuala Berang, 16 July 2014, Terengganu.
195. NURUL HUSNA, Z. & TAN, A.L. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi Temuan). Paper presented at Kg. Pulau Kempas, Kuala Langat, 7 April 2014, Selangor.
196. NURUL HUSNA, Z. & TAN, A.L. Teknik pengutipan sampel tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi). Paper presented at the 'Bengkel Pengutipan & Pendokumentasian Tumbuhan Ubatan & Beraroma (Berasaskan Pengetahuan Tradisi Kensi)', 27–31 October 2014, Baling.
197. ONG, B.K. Development of natural preservative for herbal and food product from *Syzygium aromaticum* and *Syzygium grande*. Paper presented at the ScienceFund Evaluation Workshop, 16 June 2014, Putrajaya.
198. ONG, B.K. Penilaian kawalan kualiti produk herba berdasarkan garis panduan BPFK, Kementerian Kesihatan Malaysia. Paper presented at the 'Kursus Teknologi Pemriawaian Tumbuhan Ubatan dan Peningkatan Kualiti Produk Herba', 2–4 September 2014, Forest Research Institute Malaysia, Kepong.
199. ONG, B.K., NORULAIMAN, Y., NOR HAYATI, A. & NUR HAZWANI, M.H. Kawalan kualiti produk herba. Paper presented at the 'Kursus Mengenal Herba dan Tumbuhan Ubatan beraroma serta Khasiatnya', 5 November 2014, Forest Research Institute Malaysia, Kepong.
200. PHILIP, E. & ABDUL RAHIM, NIK. Top-down approach in REDD+ implementation: Malaysian Experience. Paper presented at the Forest Asia Submit, 5–6 May 2014, Jakarta.
201. PHILIP, E. Ameliorating climate change by conserving urban plant diversity. Paper presented at the International Green Space Conference, 24–26 June 2014, Penang.
202. PHILIP, E. Biennial update reports: mitigation actions and their effects. Paper presented at the Stakeholders Consultation Workshop on Mitigation actions for Biennial Update Report for Malaysia to UNFCCC, 25 September 2014, Putrajaya.
203. PHILIP, E. Forestry sector's potential nationally appropriate mitigation actions. Paper presented at the Workshop on NAMA, 14–18 April 2014.
204. PHILIP, E. Greenhouse gas inventory for LULUCF Sector (Sarawak). Paper presented at the 'Bengkel GHG Inventory, Sarawak', 23–24 March 2014, Kuching.
205. PHILIP, E. Greenhouse gas inventory for LULUCF Setor (Peninsular Malaysia). Paper presented at the 'Bengkel GHG Inventory, Peninsular Malaysia', 20–21 March 2014, Putrajaya.
206. PHILIP, E. IPCC guidelines and preparations for BUR and TNC. Paper presented at the Inception Workshop for BUR and NC3, 28–29 August 2014, Port Dickson.
207. PHILIP, E. Malaysia's GHG inventories on AFOLU sector: achievements, gaps and necessary supports. Paper presented at the Working Group on GHG Inventory for Asia Workshop, 4–7 August 2014, Bangkok.
208. PHILIP, E. Procedural manual and uncertainty assessment. Paper presented at the National Greenhouse Gas Inventory Seminar, 6 November 2014, Petaling Jaya.
209. PHILIP, E. QA/QC process for LULUCF sector for the Greenhouse Gas Inventory, 9–11 October 2014, Singapore
210. PHON, C.K., KIRTON, L.G. & NORMA RASHID, Y. Nectaring behaviour of the Rajah Brooke's Birdwing, *Trogonoptera brookiana albescens* (Papilionidae) in Ulu Geroh village. Paper presented at the 18th Biological Sciences Graduate Congress, "Nurturing Talents, Stimulating Research", 6–7 January 2014, Kuala Lumpur.
211. PHON, C.K., KIRTON, L.G. & NORMA RASHID, Y. The distribution, behaviour and ecology of the Rajah Brooke's Birdwing (*Trogonoptera brookiana*) in Peninsular Malaysia. Paper presented at the Candidature Defense Seminar, 11–12 February 2014, Kuala Lumpur.
212. PHON, C.K., KIRTON, L.G. & Y. NORMA RASHID, Y. A monitoring technique for puddling butterflies. Paper presented at The Expert Workshop to Develop Guidelines for Standardised Global Butterfly Monitoring, 8–9 December 2014, German.
213. PUAD, E., RAFIDAH, J., MAHANIM, S.M.A., WAN ASMA, I., & SHAHARUDDIN, H. Industri pellet kayu di Malaysia- cabaran dan hala tuju. Paper presented at the 'Seminar Keusahawanan', 26 February 2014, Jeli.
214. PUAD, E., RAFIDAH, J., WAN ASMA, I., MAHANIM, S.M.A. & SHAHARUDDIN, H. The situation and potential of forestry and wood waste to energy in Malaysia. Paper presented at the World Bio Markets Asia, 17–18 June 2014, Kuala Lumpur.
215. RAFAEADAH, R., HASHIM, W.S. & ZAIHAN, J. Safe laboratory practices and procedures. Paper presented at the 'Tahap Keselamatan', 7 August 2014, Forest Research Institute Malaysia, Kepong.
216. RAFAEADAH, R., ZAIHAN, J. & HASHIM, W.S. Nanocellulose: fundamental and application. Paper presented at the Training on the Production of Cellulose from Biomass, 28–30 October 2014, Forest Research Institute Malaysia, Kepong.
217. RAFIDAH J., WAN ASMA I., PUAD E., MAHANIM S.M.A. & SHAHARUDDIN H. Sesendok as a potential solid fuel feedstocks. Paper presented at Forest Products Division Mini Seminar 2014, 16 Julai 2014, FRIM.
218. RAFIDAH, J., WAN ASMA, I., PUAD, E., MAHANIM, S.M.A. & SHAHARUDDIN, H. Sesendok as a Potential Solid Fuel Feedstocks. Paper presented at the Forest Products Division Mini Seminar 2014, 16 July 2014, Forest Research Institute Malaysia, Kepong.
219. RAFIDAH, J., WAN ASMA, I., MAHANIM, S.M.A., PUAD, E. & SHAHARUDDIN, H. Forestry biomass as potential carboxymethyl cellulose (CMC) production. Paper presented at The 27th International Symposium on Chemical Engineering (ISChE 2014), 5–7 December 2014, Kuala Lumpur.
220. RAHIM, S., ZAIHAN, J. & NASIR, M.A. Rawatan kayu SG2-SG4 untuk selipar keretapi dengan kreosot dan CCA. Paper presented at the FRIM, PEKA, MTIB & KTMB Sdn Bhd Meeting, 2 September 2014, Kuala Lumpur.
221. RAHIM, S., ZAIHAN, J., HAFIZ, M., HASHIM, W.S. & KHAIRUL, A. Peranan PCS FRIM sebagai badan persijilan produk dalam pensijilan kualiti produk perabot. 26 March 2014, Putrajaya.
222. RAJA BARIZAN, R.S. & FARAH SHAHANIM, M.M. Silviculture and arboriculture practices in assisting regeneration of logged-over Natural Tropical Forest. Paper presented at the National Arboriculture Conference (NAC) 2014, 2–4 December 2014, Putrajaya.
223. RAJA BARIZAN, R.S. & ISMAIL, H. Rehabilitation of eroded seaward coastal mangroves using innovative planting techniques. Paper presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change 2014 (MAPCVCC-2014), 11–13 November 2014, Kuala Lumpur.
224. RAJA BARIZAN, R.S., SUHAILI, R., RICKY, J. & WONG, C.C. Training & education on rehabilitation of eroded coastal mangroves in Malaysia based on research findings. Paper presented at The 3rd ASEAN Shared-Learning Workshop "Mangrove Conservation Education", 23–28 February 2014 Balikpapan, Indonesia.

225. RASADAH, M.A., LING., S.K., TAN, A.L., & NURNIDA, M.K. Plant characterisation & chemical fingerprinting as a tool for authentication in the quality control of botanicals case study of *Melastoma* species in Peninsular Malaysia. Paper presented at the meeting of experts in strengthening QC of herbal medicines, 27–29 May 2014, Seoul.
226. ROSDI, K. Evaluation of four *Macaranga tanarius* provenance in Peninsular Malaysia. Paper presented at the UPM Graduate Seminar, 17 June 2014, Serdang.
227. ROSDI, K., WAN ASMA, W.I., MOHD PARID, M. & NOR AZMAN, H. Potensi *Jatropha* untuk Biodiesel. Paper presented at the 'Mesyuarat Penyelidikan', 30 September 2014, Forest Research Institute Malaysia, Kepong.
228. ROSHAN JAHN, M.S., GETHA, K., HEMA, T., NORHAYATI, I., MUHAMAD SYAMIL, A., LILI SYAHIRA, H., NUR FAIRUZ, M.Y., MOHD ILHAM, A. & VANESSA, Y. Screening of Malaysian Biodiversity for new candidates effective against leishmaniasis. Paper presented at the 6th ASEAN Congress of Tropical Medicine and Parasitology, 5–7 March 2014, Kuala Lumpur.
229. ROSZAINI, K. Termite resistance test for TNB cables. Paper presented at the 'Mesyuarat Ujian Kabel TNB', 30 January 2014, Kuala Lumpur.
230. ROSZAINI, K. Durability of *Endospermum malaccense* against subterranean termite. Paper presented at the 'Mini Seminar of Sesendok: Properties & Utilization of Sesendok for Value-Added Products, 16 July 2014, Forest Research Institute Malaysia, Kepong.
231. ROSZAINI, K. Natural durability of *Dyera costulata* plantation timbers against subterranean termite. Paper presented at the 'Mini Seminar of Jelutong', 9 July 2014, Forest Research Institute Malaysia, Kepong.
232. ROZITA, A., MOHD ZOBIR, H., SITI HALIMAH, S. & TAUFIK YAP, Y.H. Synthesis and physico-chemical characteristics of a pheromone, valeric acid nanomaterial using zinc layered hydroxide as carrier for insect control. Paper presented at the 18th Malaysian Chemical Congress (18MICC 2014), 3–5 November 2014, Kuala Lumpur.
233. ROZITA, A., WAN RASIDAH, K. & MOHD FAKHRI, I. Evaluation of heavy metals concentrations in two medicinal plants grown on different soils. Paper presented at the Advances in Soil, Plant and Fertilizer Analysis (ASPPA 2014), 25–27 November 2014, Kuching.
234. RUSHDAN, I., SHARMIZA, A. & MAHMUDIN, S. Characterization of black liquor from oil empty fruit bunch soda-AQ pulping. Paper presented at the 'Seminar Teknologi Pulp & Kertas', 2 October 2014, Bandung, Indonesia.
235. RUSHDAN, I. Production of paper from Oil Palm Empty Fruit Bunches. Paper presented at the 4th International Conference on Oil Palm Biomass 2014 (ICPOB: 2014), 26–28 May 2014, Jakarta, Indonesia.
236. SAIDATUL HUSNI, S., NOR AZAH, M.A., MAILINA, J., MOHD FARIDZ, Z., PIN, K.Y. & AZRINA, A. Pengekstrakan tumbuhan ubatan dan beraroma menggunakan teknologi sfe dan potensinya dalam pembangunan produk. Paper presented at the 'Kursus Teknologi Pemiawain Tumbuhan Ubatan dan Peningkatan Kualiti Produk Herba', 2–4 September 2014, Forest Research Institute Malaysia, Kepong.
237. SAIFUL ISKANDAR, K. Kaedah-kaedah penilaian kuantiti dan pemantauan kualiti air sungai siri. Paper presented at the 'Kursus Penilaian Kuantifikasi dan Pemantauan Kualiti Air Sungai Siri (2/2014)', 4–6 November 2014, Terengganu.
238. SAIFUL ISKANDAR, K. Kaedah-kaedah penilaian kuantiti dan pemantauan kualiti air sungai. Paper presented at the 'Kursus Penilaian Kuantifikasi dan Pemantauan Kualiti Air Sungai Siri (1/2014)', 11–13 June 2014, Sg. Siput, Perak.
239. SAIFUL ISKANDAR, K. Klasifikasi keupayaan tanah runtuh di kawasan sekitar tabk menggunakan SHALSTAB. Paper presented at the 'Mesyuarat dan Pembentangan Laporan Teknikal Bagi Cadangan Kajian Inventori dan Kesesuaian Spesies Pokok di Taman Persekutuan Bukit Kiara, Kuala Lumpur', 7 August 2014, Kuala Lumpur.
240. SAIFUL, A.J., MASTURA, M., ROHANA, S., MOHD. FAZLI, M. & SHARIFAH AMINAH, S.M. MFM501: new pyrrolidine derivative against multi-drug resistant MRSA isolates. Paper presented at the Antibiotic Alternatives for the New Millennium, 5–7 November 2014, London.
241. SALLEH, M. & ABDUL RAZAK, O. Analisa ekonomi perladangan buluh. Paper presented at the 'Kursus pembangunan perladangan buluh', Ipoh.
242. SAW, L.G., Herbarium data and plant conservation in Malaysia. ASEAN-EU STI days (Science, Technology and Innovation Days). Paper presented at the Workshop on Integration of biodiversity data recording and information management systems for environmental sustainability: a call for EU-ASEAN collaboration, 21–23 January 2014, Bangkok, Thailand.
243. SAW, L.G., Keynote speaker: challenges in plant and forest conservation. Paper presented at the The Third Asia Regional Conference of the Society of Conservation Biology – Asia Section, 19–22 August 2014, Melaka.
244. SAW, L.G., *Vatica kanthanensis* (Dipterocarpaceae), a newly discovered tree species at risk of extinction. Paper presented at the The Third Asia Regional Conference of the Society of Conservation Biology – Asia Section, 19–22 August 2014, Melaka.
245. SHAHARUDDIN, H., WAN ASMA, I., NUR ATIKAH, S. & M. EDZIAN, I.R. Kawalan mutu pengeluaran Biodiesel. Paper presented at the 'Kursus Kesedaran penggunaan perangkap minyak untuk pihak berkuasa tempatan (PBT) bagi tahun 2014', 22 May 2014, Forest Research Institute Malaysia, Kepong.
246. SHARMILLAH, S. & NOOR AZLIN, Y. Attractions from biodiversity resources in FRIM: addressing needs for less able users. Paper presented at the Malaysia Urban Green Space & IFPPA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.
247. SHAWN, C. & ROSZAINI, K. Tropical termites: ecology, management and biotechnology. Paper presented at the 'Mesyuarat Penyelidikan', 5 March 2014, Forest Research Institute Malaysia, Kepong.
248. SHIMIZU, K.K., KOBAYASHI, M.J., TAKEUCHI, Y., KENTA, T., KUME, T., DIWAY, B., HATAKEYAMA, M., NG, K.K.S., YEW, C., ROBINSON, M & NOWICKA, M. Ecological transcriptome with meteorological data: synchronous flowering of Dipterocarps in tropical forests triggered by drought. Paper presented at the Plant & Animal Genome XXII: The Largest Ad-Genomics Meeting in the World, 10–15 January 2014, San Diego, California.
249. SIK, H.S., ABDUL LATIF, M., CHOO, K.T. & WOON, W.C. Development of lumber treatment technology. Paper presented at the Commonwealth Association for Public Administration and Management (CAPAM) 2014 Biennial Conference – Public Service Transformation: A New Conversation, 18–21 October 2014, Putrajaya.
250. SIK, H.S., CHOO, K.T., WOON, W.C. & TAN, Y.E. Introduction to high temperature drying system. Paper presented at the Forum on High Temperature Drying, 7 January 2014, Forest Research Institute Malaysia, Kepong.
251. SIK, H.S., TAN, Y.E., CHOO, K.T. & WOON, W.C. FRIM's high temperature drying technology for rubberwood. Paper presented at the Malaysian International Furniture Fair, 4–8 March 2014, Kuala Lumpur.
252. SITI AISAH, S. & MARRYANNA, L. Taman Persekutuan Bukit Kiara: kriteria hidrologi & iklim mikro. Paper presented at the 'Mesyuarat dan Pembentangan Laporan teknikal bagi Cadangan Kajian Inventori dan Kesesuaian Spesis Pokok di Taman Persekutuan Bukit Kiara, Kuala Lumpur, 7 August 2014, Kuala Lumpur.
253. SITI AISAH, S. & MARRYANNA, L. Tasek Bera: hydrological aspect. Paper presented at the 'Bengkel Konsultansi Tapak Ramsar Tasek Bera Pahang bagi komponen pendidikan dan penyelidikan, 8–9 September 2014, Pahang.
254. SITI AISAH, S. Pengenalan kepada kualiti dan kuantiti air serta pengukuran hujan. kursus penilaian kuantifikasi dan pemantauan kualiti Air Sungai. Paper presented at the 'Kursus Penilaian Kuantifikasi dan Pemantauan Kualiti Air Sungai Siri (2/2014)', 4–6 November 2014, Terengganu.
255. SITI AISAH, S. Pengenalan kepada kualiti dan kuantiti air serta pengukuran hujan. Paper presented at the 'Kursus penilaian kuantifikasi dan pemantauan kualiti Air Sungai Siri (1/2014)', 11–13 June 2014, Sg. Siput, Perak.
256. SITI NUR RIDHWAH, M.R., TENGKU ELIDA, T.Z.M & WAN ASMA, I. Bioethanol production from oil palm frond lignocelluloses using facultative anaerobic thermophilic bacteria. Paper presented at the International Colloquium on Science and Technology, 7–8 April 2014, Penang.
257. SITI SALWANA, H., ABDUL RAZAK, S., MOHD YUSOFF, A.R. & AHMAD, H. Pembinaan tampang. Paper presented at the 'Kursus Tapak Semaian', 4–6 November 2014, Forest Research Institute Malaysia, Kepong.

258. SITI SALWANA, H., NORWATI, M., LEE, C.T., LEE, S.L. & TNAH, L.H. End of project & benefits report: Authentication of important *Aquilaria* species for plantation in Malaysia using molecular marker technology. Paper presented at the 'Pemantauan Projek eScience (MOSTI), February 2015, Putrajaya.
259. SUFFIAN, M., MOHD YUSOUF, A.L., HASHIM, W.S. & RAFEADAH, R. Composite products. Paper presented at the 'Mini Seminar KH: Khaya thinning', 9 July 2014, Forest Research Institute Malaysia, Kepong.
260. SUFFIAN, M., MOHD YUSOUF, A.L., HASHIM, W.S. & RAFEADAH, R. Composite products. Paper presented at the 'Mini Seminar KH: Projek Sesendok srp001', 16 July 2014, Forest Research Institute Malaysia, Kepong.
261. SUHAILI, R., RAJA BARIZAN, R.S. & NOR ASLINDA, A. The physical outcomes of planting mangroves and suitable species towards strengthening coastal buffer zone in Malaysia. Paper presented at International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change 2014 (MAPCVCC-2014), 11–13 November 2014, Kuala Lumpur.
262. TAN, A.L. & NURNIDA, M.K. Autentikasi herba berdasarkan ciri morfologi tumbuhan. Paper presented at the 'Kursus Teknologi Pemiawaian Tumbuhan Ubatan & Peningkatan Kualiti Produk Herba', 2 September 2014, Forest Research Institute Malaysia, Kepong.
263. TAN, A.L. & NURNIDA, M.K. Mengenali herba dan khasiatnya. Paper presented at the 'Kursus Mengenali Herba dan Tumbuhan Ubatan Beraroma serta Khasiatnya', 5 November 2014, Forest Research Institute Malaysia, Kepong.
264. TAN, A.L. & NURUL HUSNA, Z. Laporan kemajuan bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (Berasaskan Pengetahuan Tradisi). Paper presented at the 'Mesyuarat Ahli Jawatankuasa Teknikal Projek Pengetahuan Tradisi di bawah MOU antara FRIM & JAKOA, 25 May 2014, Kuala Lumpur.
265. TAN, A.L. & NURUL HUSNA, Z. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan Tradisi Bateq). Paper presented at Kg. Aring 5, Gua Musang, 15 July 2014, Kelantan.
266. TAN, A.L. & NURUL HUSNA, Z. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi Jakun). Paper presented at Kg. Bangkong, Paloh Hinai, Pekan, 10 June 2014, Pahang.
267. TAN, A.L. & NURUL HUSNA, Z. Teknik pengutipan sampel tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi). Paper presented at the 'Bengkel Pengutipan & Pendokumentasian Tumbuhan Ubatan & Beraroma (Berasaskan Pengetahuan Tradisi Kintak)', 5–7 August 2014, Kg. Bukit Asu, Pangkalan Hulu, Perak.
268. TAN, A.L., NORSHAKILA, Y., NURUL HUSNA, Z. & NURNIDA, M.K. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan Tradisi Semai). Paper presented at Kg. Ulu Geroh, Gopeng, 25 February 2014, Perak.
269. TAN, A.L., NURNIDA, M.K., NURUL HUSNA, Z. & CHANG, Y.S. Laporan Lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan Tradisi Temiar/Jahai). Paper presented at RPS Air Banun, Gerik, 11 March 2014, Perak.
270. TAN, A.L., NURUL HUSNA, Z. & INTAN NURULHANI, B. Workshop on herbal plant collection technique, documentation & herbarium specimen preparation (based on traditional knowledge). Paper presented at the Workshop on Herbal Plant Collection & Documentation Based on Traditional Knowledge, 11 November 2014, Kilanas, Brunei Darussalam.
271. TAN, A.L., NURUL HUSNA, Z. & NURNIDA, M.K. Laporan lawatan balik ke komuniti: bengkel pengutipan & pendokumentasian tumbuhan ubatan & beraroma (berasaskan pengetahuan tradisi Che Wong). Paper presented at Kg. Sg. Enggang, Lanchang, 23 July 2014, Pahang.
272. TAN, Y.E. & SIK, H.S. High temperature drying. Paper presented at the 'Simposium Rekabentuk Perabot Nasional 2014: Rekabentuk Perabot - Keselesaan Pengguna', 26–27 November 2014, Port Dickson.
273. TNAH, L.H. DNA barcoding - Authentication of medicinal plants (case study). Paper presented at DNA Profiling & Barcoding Workshop, 4–7 November 2014, FRIM.
274. TNAH, L.H. DNA profiling - Timber tracking (case study). Paper presented at the DNA Profiling & Barcoding Workshop, 4–7 November 2014, Forest Research Institute Malaysia, Kepong.
275. TNAH, L.H., LEE, S.L., NG, K.K.S., TANI, N., BHASSU, S., OTHMAN, R.Y., FARIDAH, Q.Z. & FARIDAH HANUM, I. Timber tracking system of Chengal (*Neobalanocarpus heimii*) using DNA approach. Paper presented at the Taylors's University Biodiversity & Conservation Course, 31 October 2014, Petaling Jaya.
276. TUMIRAH, K., MOHD ZOBIR, H., ZULKARNAIN, Z. & RAFEADAH, R. Nanoencapsulated fatty acid into styrene/methyl methacrylate copolymer shell as the thermal energy storage for building application. Paper presented at the Advanced Materials Conference 2014 (AMC2014), 25–26 November 2014, Langkawi.
277. TUMIRAH, K., MOHD ZOBIR, H., ZULKARNAIN, Z. & RAFEADAH, R. Nanoencapsulation of n-octadecane with styrene/methyl methacrylate copolymer shell as thermal energy storage material. Paper presented at the 18th Malaysian International Chemical Congress (18MICC) 2014, 3–5 November 2014, Kuala Lumpur.
278. VIMALA, S., SHALINI, M., JULIZA, M. & ABDULL RASHIH, A. A scientific evaluation on the antioxidant properties of *Ocimum sanctum*. Paper presented at the 8th International Traditional & Complementary Medicine (INTRACOM) conference, 30 October–2 November 2014, Petaling Jaya.
279. VINCENT, J.R., ISMARIAH, A., NORLIYANA, A., JIE SHENG, T.S. & THOMAS, K. Accounting for the water purification service of tropical rainforests. Paper presented at the World Congress of Environmental and Resource Economists, 28 June–4 July 2014, Istanbul, Turkey.
280. WAN ASMA, I., NUR ATIKAH, S., M. EDZIANI, R. Teknologi pengeluaran Biodiesel. Paper presented at Majlis Perbandaran Sepang, 24 January 2014, Cyberjaya.
281. WAN ASMA, I., WAN RASIDAH, K., ZULKIFLI, R., MD ZUKI, I. & MUKHLIS, Z.A. Suitability of two types of compost for selected vegetables, herbal and ornamental plants. Paper presented at the Soil Science Conference of Malaysia 2014, 8–10 April 2014, Kangar.
282. WAN ASMA, I., ZULKAFLI, H., RAFIDAH, J., ZAINATUL BAHYAH, H., KHAIRATUN NAJWA, M., PUAD, E., OTHMAN, S. & CHANDAK, S. Emerging renewable bioenergy system in Malaysia. Paper presented at the 4th International 100% Renewable Energy Conference (IRENEC 2014), 26–28 June 2014, Turkey.
283. WAN RASIDAH, K., MOHD. FAKHRI, I., ROSNANI, A.G., SUHAIMI, W.C., ROZITA, A. & ROSDI, K. Current status of Tongkat Ali plantations in Peninsular Malaysia & their associated growth & biomass yield. Paper presented at the Project Evaluation & Monitoring Seminar (PEM 2/2014), 10–12 November 2014, Forest Research Institute Malaysia, Kepong.
284. YASUMASA, H., KHALI AZIZ, H., HAMDAN, O. & MOHD AZAHARI, FAIDI. Use of remote sensing for forest monitoring at a national level in REDD+ implementation. Paper presented at the IUFRO World Congress, 2014.
285. YOEH, S.H., SATAKE, A., NUMATA, S., ICHIEI, T., LEE, S.L., NORLIA, B., NORWATI, M., KONDO, T., OTANI, T., HASHIM, M. & TANI, N. When do rainforest trees bloom?. Paper presented at the 5th Annual Meeting of Association for Tropical Biology and Conservation (ATBC) 2014, 2–24 July 2014, Cairns, Australia.
286. ZAIHAN, J. & KHAIRUL, A. FRIM PCS- PROCEDURE 3: Procedure for evaluation audit. Paper presented at the 'Program Latihan Kompetensi Personel PCS', 24–28 August 2014, Pulau Pangkor.
287. ZAIHAN, J. & KHAIRUL, A. ISO/IEC 17020:1998: General criteria for the operation of various types of bodies performing inspection. Paper presented at the 'Program Latihan Kompetensi Personel PCS', 24–28 August 2014, Pulau Pangkor.
288. ZAIHAN, J., HASHIM, W.S. & RAFEADAH, R. FRIM PCS : tatatertib audit di kilang perabot. Paper presented at the 'Taklimat FRIM PCS di Kelantan', 16 October 2014, Kota Bharu.

289. ZAIHAN, J., HASHIM, W.S. & RAFEADAH, R. FRIM PCS : tatatertib audit di kilang perabot. Paper presented at the 'Taklimat FRIM PCS di Kelantan', 16 September 2014, Terengganu.
290. ZAIHAN, J., RAFEADAH, R. & HASHIM, W.S. What is wood. Paper presented at the Training on the Production of Cellulose from Biomass, 28-30 October 2014, Forest Research Institute Malaysia, Kepong.
291. ZAMREE, M.S., AHMAD FAUZI, M.S.F. HADA MASAYU, I., SHARMIZI, I. & MOHD SHARUL, N.U. Teknologi pengeluaran dan pengendalian lepastuai Tongkat Ali. Paper presented at the 'Kursus Penghasilan Bahan Tanaman Tongkat Ali di Stesen Penyelidikan FRIM Maran, Pahang', 28-29 January 2014, Maran.
292. ZULKAFI, H.A., WAN ASMA, I. & RAFIDAH, J. Sequestering carbon through utilisation of waste Oil Palm Trees in Malaysia, International Conference on Global sustainability & Chemical Engineering 2014, 20-22 August 2014, Kuala Lumpur.
293. ZUNOLIZA, A., LING, S.K., TAN, H.P., FAUZIAH, A., TAN, A.L., SALBIAH, M. & NUZIAH, H. Autentikasi herba melalui pendekatan analisis kimia. Paper presented at the 'Kursus Teknologi Pemiawaian Tumbuhan Ubatan dan Peningkatan Kualiti Produk Herba 2014', Forest Research Institute Malaysia, Kepong.
294. ZUNOLIZA, A., LING, S.K., TAN, H.P., FAUZIAH, A., TAN, A.L., SALBIAH, M. & NUZIAH, H. Mengenali herba melalui kaedah analisis kimia. Paper presented at the 'Kursus Mengenali Herba dan Tumbuhan Ubatan Beraroma serta Khasiatnya', 5-6 November 2014, Forest Research Institute Malaysia, Kepong.

POSTER/POSTERS

1. ABD. HAMID, S., YANTI, A.K., TUAN ANIS NADIA, T.M.S, HAMDAN, H., MARZALINA, M., KHAIRUL, M., SITI ZALIFAH, M., SITI RAFAEDAH, A.K., SOPIAN, M., OTHMAN, D. & AB JALIL, M. Moulded Rotary Veneer Bamboo (RoVBAM) chair. Poster presented at the Malaysia International Technology Expo, 20-22 February 2014, Kuala Lumpur.
2. ABD. HAMID, S., YANTI, A.K., TUAN ANIS NADIA, T.M.S, HAMDAN, H., MARZALINA, M., KHAIRUL, M., SITI ZALIFAH, M., SITI RAFAEDAH, A.K., SOPIAN, M., OTHMAN, D. & AB JALIL, M. RoVBAM plyboard for panel furniture and interior products. Poster presented at the Malaysia International Technology Expo, 20-22 February 2014, Kuala Lumpur.
3. ABD. HAMID, S., YANTI, A.K., TUAN ANIS NADIA, T.M.S., HAMDAN, H., MARZALINA, M., KHAIRUL, M., SITI ZALIFAH, M., SITI RAFAEDAH, A.K. SOPIAN, M., AB JALIL, M., NOORAZNIZAM, A., OTHMAN, D. & MUHAMMAD IQRAM, I. Bybrid Bamboo Veneer Flooring (HBVF). Poster presented at the 25th International Invention, Innovation & Technology Exhibition, 8-10 May 2014, Kuala Lumpur.
4. ABD. HAMID, S., YANTI, A.K., TUAN ANIS NADIA, T.M.S., HAMDAN, H., MARZALINA, M., KHAIRUL, M., SITI ZALIFAH, M., SITI RAFAEDAH, A.K. SOPIAN, M., AB JALIL, M., NOORAZNIZAM, A., OTHMAN, D. & MUHAMMAD IQRAM, I. RoVBAM technology. Poster presented at the 25th International Invention, Innovation & Technology Exhibition, 8-10 May 2014, Kuala Lumpur.
5. ABD. HAMID, S., YANTI, A.K., TUAN ANIS NADIA, T.M.S., MUHAMMAD FARIS, Y., NURUL LIYANA NAZURAH, S. & KHAIRULNAZRAH, A.R. Multipurpose interlock "V" shape. Poster presented at the 'Hari Inovasi FRIM', 24 November 2014, Kepong.
6. ABD. HAMID, S., YANTI, A.K., TUAN ANIS NADIA, T.M.S., NURHAZWANI, O. & MOHAMMAD JAWAID, M. Particleboard from bamboo veneer waste. Poster presented at the 'Hari Inovasi FRIM', 24 November 2014, Kepong.
7. ABDUL KHALIM, A.S., MOHD PAIZ, K., KHALI AZIZ, H., NORHAIDI, Y., EDEVALDO, J.Y., NURULHIDAYAH, H., NURULHUDA, A. & INTAN DALINA, O. Biodiversity conservation in Pahang through establishment of High Conservation Value Forest (HCVF) areas. Poster presented at the 17th Malaysian Forestry Conference, 11-12 November 2014, Kota Kinabalu.
8. AHMAD AZARUDDIN, M.N., NAZIMATUL AZMA, N. & MOHD AFENDI, H. Urban forestry & landscape services by FRIM. Poster presented at the 'Sesi Demonstrasi dan Penerangan Alat Picus Sonic Tomograph', 17-18 Julai 2014, Johor Bharu.
9. AHMAD AZARUDDIN, M.N., NAZIMATUL AZMA, N. & MOHD AFENDI, H. Urban forestry and landscape services by FRIM. Poster presented at the Malaysia Urban Green Space and IFPPA Asia Pacific Conference 2014, 24-28 June 2014, Pulau Pinang.
10. AHMAD FAUZI, M.S. & SITI SALWANAH, H. Cawangan Pengeluaran Bahan Tanaman. Poster presented at the 'Pameran Hari Terbuka Bangunan Bioteknologi', 8 Oktober 2014, Kepong.
11. AHMAD NAZARUDIN, M.R., TSAN, F.Y., NORMANIZA, O., ROSFARIZAL, K. & Adzmi, Y. Physiological changes of *Xanthostemon chrysanthus* as affected by paclobutrazol and potassium nitrate. Poster presented at the International Conference of Plant Physiology, 26-28 August 2014, Bali, Indonesia.
12. AHMAD NAZARUDIN, M.R., TSAN, F.Y., NORMANIZA, O., ROSFARIZAL, K. & Adzmi, Y. Flowering response of *Xanthostemon chrysanthus* to paclobutrazol and potassium nitrate. Poster presented at the Malaysia Urban Green Space and IFPPA Asia Pacific Conference 2014, 24-28 June 2014, Pulau Pinang.
13. ALIA AINA, A., NURHANAN MURNI, Y. & NORFILZA, M. Establishment of an animal model in BALB/c nude mice for assessment of anti-ovarian cancer activities of natural products. Poster presented at the Asian Federation of Animal Science Association Congress 2014, 11-12 November 2014, Kuala Lumpur.
14. ALIA AINA, A., NURHANAN MURNI, Y., NORFILZA, M., ANEE SURYANI, S., MUHAMMAD HAFFIZ, J., SITI SYARIFAH, M.M. & NOR HASNIDA, H. Evaluation of anti-tumor activity of EL50 compound from Simaroubaceae family in induced-ovarian cancer BALB/c nude mice. Poster presented at the Pharmacology & Physiology International Scientific Congress 2014, 23-24 August 2014, Kuala Lumpur.
15. ANEE SURYANI, S., CHEE, B.J. SITI HUMEIRAH, A.G., IHSAN SAFWAN, K., ADIANA, M.A., MAILINA, J., MOHD FAIZULZAKI, M.Y., MOHD FAISAL ISKANDAR, S., MOHD NIZAL, S., MOHD RADZI, A. & NOR DATIAKMA, M.A. "SMART" - Mobile Drying Chamber. Poster presented at the 'Hari Inovasi FRIM', 24 November 2014, Kepong.
16. ANEE SURYANI, S., FARAH FAZWA, M.A., ZUNOLIZA, A., NORHAYATI, S., SYAFIQAH, N., SAMSUL, B. & MOHD ZAKI, A. Total phenolic content of *Labisia pumila* var alata from selected forest reserve in Peninsular Malaysia Poster presented at the 13th Symposium Malaysian Society of Applied Biology, 8-10 June 2014, Kuantan.
17. ANEE SURYANI, S., GETHA, K. & MUHD SYAMIL, A. Acute toxicity evaluation of active pharmaceutical ingredient F4009b. Poster presented at the AFLAS Congress 2014, 11-12 November 2014, Kuala Lumpur.
18. ANG, L.H., HO, W.M. & TANG, L.K. 2014. A model of greened ex-tin mine as a lowland biodiversity depository in Malaysia. Poster presented at the Seminar Biodiversiti 2014, 25-28 November 2014, Kuala Tahan.
19. ANG, L.H., HO, W.M. & TANG, L.K. A depository of lowland forest tree species established on a brown-filled site in Ara Damansara, Selangor. Poster presented at the Seminar Biodiversiti 2014, 25-28 November 2014, Kuala Tahan.
20. ASIAH, O., NURHANAN MURNI, Y., SITI SYARIFAH, M.M. & MOHD HAFFIZ, J. Molecular properties prediction, molecular docking and inhibition activity of an Anticancer Compound SNA209. Poster presented at the Joint Malaysia-UK Symposium on Natural Product Chemistry and Drug Discovery, 13 December 2014, Kuala Lumpur.
21. AZIAN, M., MARRYANNA, L. & MOHD GHAZALI, H. Water quality study on planted Rhizophora in Tanjung Piai, Johor. Poster presented at the Mangroves of Asia-Pacific Countries in View of Climate Change (MAPCVCC-2014), 11-13 November 2014, Kuala Lumpur.
22. AZYYATI, A.K., HUDA FARHANA, M.M., MOHD PARID, M., LIM, H.F., AHMAD AAZARUDDIN, M.N., ADNAN, M. & NOOR AZLIN, Y. Visit characteristics of public parks in Peninsular Malaysia. Poster presented at the Malaysia Urban Green Space and IFPPA Asia Pacific Conference 2014, 24-28 June 2014, Pulau Pinang.
23. AZYYATI, A.K., NOOR AZLIN, Y. & NAIMAH, C.L. The need for in-service training for environmental education facilitators in Malaysia. Poster presented at the 6th International Conference on Environmental Education and Sustainability "Best of Both Worlds", 12-16 May 2014, Brazil.

24. AZYYATI, A.K., SHARMILLAH, S., NOOR AZLIN, Y., NAIMAH, C.L. & NOOR AZLIN, M.F. Visit motivation factor and the visitor experience at forest park: a preliminary study on FRIM's visitors. Poster presented at the Conference on Tropical Resources and Sustainable Science 2014 (CTReSS 2014), 17–19 October 2014, Kelantan.
25. EN, T., YASUMATA, H., HIDEKI, S., NAOYUKI, F., KHALI AZIZ, H., HAMDAN, O. & MOHD AZAHARI, F. Efficiency of the fixed-angle sampling as a means of ground truthing for the forest biomass estimation in tropical forest. Poster presented at the International Seminar on Tropical Forest Carbon Stock Assessment, 29 May 2014, Kota Kinabalu.
26. FADZUREENA, J., SITI NUR AISYAH, M.H., SAIDATUL HUSNI, S., NOOR RASYILA, M.N., MOHAMAD JEMAIN, M.R., PIN, K.Y., NIK MUSAADAH, M., HANI IDAYU, B., ABDULL RASHIH, A. & AZMAN, M. Anti-gout herbal remedies from standardised extract (SEBF) of *Baeckea frutescens*. Poster presented at the 25th International Invention, Innovation & Technology Exhibition, 8–10 Mei 2014, Kuala Lumpur.
27. FARAH FAZWA, M.A., NORHAYATI, S., SYAFIQAH NABILAH, S.B., MOHD ASRI, L., SAMSURI, T.H., ROHAIDAH, N. & MOHD ZAKI, A. Mini portable shade house for Kacip Fatimah planting. Poster presented at the 'Hari Inovasi FRIM', 24 November 2014, Kepong.
28. FARAH FAZWA, M.A., NORHAYATI, S., SYAFIQAH NABILAH, S.B., MOHD ZAKI, A. & MOHD ASRI, L. Establishment of four clonal trial plots of *Labisia Pumila* in FRIM. Poster presented at the 13th Symposium Malaysian Society of Applied Biology 2014, 8–10 June 2014, Kuantan.
29. FARAH SHAHANIM, M.M. & RAJA BARIZAN, R.S. Production of quality *Neobalanocarpus heimii* (Chengal) stocks for open planting in rehabilitating logged-over tropical forests. Poster presented at the National Arboriculture Conference (NAC) 2014, 2–4 December 2014, Putrajaya.
30. FAUZIAH, A. & NOR HADIANI, I. Purification of flavonoid methyl ether from *Tetracera indica* using recycling preparative HPLC. Poster presented at the International Conference of Natural Products (ICNP 2014), 18–19 March 2014, Putrajaya.
31. GAN, K.S., & ZAIRUL AMIN, R. The occurrence of wet pockets in the drying of *Acacia mangium* using conventional steam-heated kiln. Poster presented at IUFRO Congress, 5–11 October 2014, Salt Lake City, USA.
32. HAMDAN, O., ISMAIL, P., NORSHEILA, M.J.C., SAMSUDIN, M. & NORHAIDI, Y. Assessing rate of deforestation and changes of carbon stock on mangroves in Pahang, Malaysia. Poster presented at the International Workshop on REDD+ and Sustainable Landuse Management, 16–18 December 2014, Myanmar.
33. HAMDAN, O., NORSHEILLA, M.J.C., ABDUL KHALIM, A.S., ISMAIL, P., SAMSUDIN, M. Assessing rate of deforestation and changes of carbon stock on mangrove in Pahang, Malaysia. Poster presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change (MAPCVCC), 11–13 November 2014, Kuala Lumpur.
34. HO, W.M., TANG, K.L., ANG, L.H., KANG, H.S. & LEE, D.K. Enrichment planting in a greened slime tailings in Peninsular Malaysia. Poster presented at the Seminar Biodiversiti 2014, 25–28 November 2014, Kuala Tahan.
35. HUSSEIN, M.Z., TUMIRAH, K., ZULKARNAIN, Z. & RAFAEDAH, R. Nanocapsules organic phase change material as advanced thermal energy storage for energy-saving, intelligent building application. Poster presented at the International Engineering Invention & Innovation Exhibition (i-ENVEV 2014), 11–13 April 2014, Arau.
36. INTAN NURULHANI, B., NORSHAKILA, Y., LIM, H.F., TAN, A.L., NURUL HUSNA, Z. & NIK MUSAADAH, M. Pengetahuan tradisi berkaitan tumbuhan ubatan Orang Asli: proses dokumentasi di kalangan kumpulan Melayu Proto. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi: Melestarikan Legasi Tradisi', 23–24 Mei 2014, Kuala Lumpur.
37. ISMAIL, P. & NUR HAJAR, Z.S. Identifying Payments for Environmental Services on Malaysian Forests. Poster presented at International Forum on Payments for Environmental Services (PES) of Tropical Forests, 7–10 April 2014, Costa Rica.
38. ISMARIAH A., NORLIYANA, A. & MOHD FARIDZUL, Y. PES: Watershed services of tropical forest. Poster presented at the International Union of Forest Research Organizations (IUFRO) World Congress, 5–11 October 2014, Salt Lake City, USA.
39. KHAIRUL AZWA, T., SITI SALWANA, H., MOHD ZAKI, A., NORWATI, M., MOHD LOKMAL, N., AHMAD AUZI, M.S. & FARAH FAZWA, M.A. Germination of *Endospermum diadenum* Seed (Sesendok) by using different media. Poster presented at the 2nd International Plant Breeding Seminar, 4–5 October 2014, Serdang.
40. LATIFAH, J., EYLEY, S. & THIELEMANS, W. Modification strategies of cellulose nanocrystals. Poster presented at the COST FP1205-International Training School, 5–6 May 2015, Spain.
41. LEE, C.T., NORLIA, B., TNAH, L.H., LEE, S.L., NG, C.H., NG, K.K.S., NOR HASNIDA, H. Discovery of genic microsatellite markers from transcriptome sequences of *Eurycoma longifolia* root. Poster at the IUFRO XXIV World Congress 2014, 5–11 October 2014, Salt Lake City, USA.
42. LILI SAHIRA, H., GETHA, K., MOHD ILHAM, A., MUHD SYAMIL, A., HEMA THOPLA, G., NORHAYATI, I., MUHD HAFFIZ, J., NUR FAIRUZ, M.Y., SITI SYARIFAH, M.M., ROSHAN JAHN, M.S. Antitrypanosomal compound isolated from an indigenous *Streptomyces* sp. Poster presented at the 6th ASEAN Congress of Tropical Medicine and Parasitology, 5–7 March 2014, Kuala Lumpur.
43. MAILINA, J., NOR AZAH, M.A., SAIDATUL HUSNI, S., SAHRIM, L., MUHD. HAFIZI, Z., AZRINA, A. & MOHAMMAD FARIDZ, Z.P. Volatile components, extractive content and e-nose study on two natural B Grade Agarwood samples. Poster presented at the ICNP2014, 18–19 March 2014, Putrajaya.
44. MANORENJITHA MALAR, S., ZAIRI, J., LING, S.K., MAILINA, J. & NUZIAH, H. Effect of *Citrus grandis* (L.) Osbeck fruit peel extracts against *Aedes aegypti* (Linn) larvae. Poster presented at the 6th ASEAN Congress of Tropical Medicine of Parasitology, 5–7 Mac 2014, Kuala Lumpur.
45. MARRYANNA, L. & SITI AISAH, S. Suspended sediment concentration from an upper hill dipterocarp forest. Poster presented at the 1st Seminar on Non Point Source Pollution (NPS2014), 14–15 May 2014, Kuala Lumpur.
46. MARRYANNA, L., MOHD GHAZALI, H., SAIFUL ISKANDAR, K., SITI AISAH, S. & MOHD, M.S. Daily variations of water use in *Tectona grandis*. Poster presented at the National Seminar on Heath Ecosystem 2014, 17–18 Jun 2014, Kuala Terengganu.
47. MASTURA, M., SAIFUL AZMI, J., MAZURAH, M.I., MOHD RAMDAN, P. & WAN SABARIAH, S. Inspirasi pengetahuan tradisi dalam misi memerangi makhluk halus. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Mei 2014, Kuala Lumpur.
48. MOHAMAD FAKHRI, I., WAN RASIDAH, K., SUHAIMI, W.C., JEYANNY, V., & ROZITA, A. The effectiveness of geotube in soil stabilization for mangroves planting. Poster presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change (MAPCVCC), 11–13 November 2014, Kuala Lumpur.
49. MOHAMAD NASIR, M.A. Development of chemical sensor and biosensor for determination of permethrin pesticide. Poster presented at the The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (PITTCON 2014), 1–9 Mac 2014, Chicago.
50. MOHD AFENDI, H., AHMAD AZARUDDIN, M.N. & NAZIMATUL AZMA, N. Tips pemangkasan pokok bandar. Poster presented at the 'Sesi Demonstrasi dan Penerangan Alat Picus Sonic Tomograph' 17–18 Julai 2014, Johor Bahru.
51. MOHD AZAHARI, F. Hyperspectral imaging for mapping of CITES-listed Peat Swamp Forest species in Malaysia: a case study of *Gonystylus bancanus*. Poster presented at the 'Simposium Maklumat Geospasial Kebangsaan', 17–18 Mac 2014, Putrajaya.
52. MOHD FARID, A., LEE, S.S., WAN MOHD AZRUL, W.A. & PATAHAYAH, M. Surveys on diseases of *Aquilaria* spp. in Peninsular Malaysia. Poster presented at the 5th Asian Conference on Plant Pathology, 3–6 November 2014, Thailand.
53. MOHD ZAKI, A., NOR FADILAH, W., MOHD RADZI, A., LING, S.K., MOHAMAD LOKMAL, N., ABDUL RAHID, L., AHMAD FAUZI, M.S., FARAH FAZWA, M.A., AB RASIP, A.G. & REGINA MARIAH, J. Preliminary phytochemical screening of *Eurycomanone* for selection of high quality planting materials: *Eurycoma longifolia*. Poster presented at the 13th Symposium Malaysian Society of Applied Biology, 8–10 June 2014, Kuantan.

54. MUHAMMAD FUAD, Y., NOR HASNIDA, H., NAZIRAH, A., SITI SUHAILA, A.R., HALIZA, I., MOHD ZAKI, A., FARAH FAZWA, M.A., MOHAMAD LOKMAL, N., ROSDI, K., ROZIDAH, K., ROHANI, A., NORFARHANA, Z. & NORHIDAYAH, Z. Acclimatization of *Eurycoma longifolia* (Tongkat Ali) plantlets to *ex vitro* conditions. Poster presented at the Conference On Tropical Resources and Sustainable Sciences 2014, 17–19 October 2014, Kelantan.
55. MUKRIMAH, A., MOHD PARID, M., LIM, H.F. & TARIQ MUBARAK, H. Economic analysis of Mangrove Forests: a case of Delta Kelantan Mangrove Forest (DKMF). Poster presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change (MAPCVCC), 11–13 November 2014, Kuala Lumpur
56. MUKRIMAH, A., MOHD PARID, M., LIM, H.F. & TARIQ MUBARAK, H. Economic analysis of Mangrove forests: a case of Delta Kelantan Mangrove Forest (DKMF). Poster presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change (MAPCVCC), 11–13 November 2014, Kuala Lumpur
57. MUSALMAH, N. & FLETCHER, C. The 50ha Plot. Poster presented at the 2014 International Long Term Ecological Research East Asia Pacific Biennial Meetings, 5–6 June 2014, Philippines.
58. NADIAH SALMI, N., ISMANIZAN, I., NASHATUL ZAIMAN, N.A., NOR HASNIDA, H., NORALIZA, A. & MOHAMAD NASIR, M.A. Preservation at ultra-low temperature of *Eurycoma longifolia* (Tongkat Ali) hairy root cultures *via* encapsulation-dehydration protocol. Poster presented at the 8th National Seed Symposium 2014, 29–30 April 2014, Putrajaya.
59. NADIAH SALMI, N., NASHATUL ZAIMAN, N.A., NORALIZA, A. & NOR ASMAM, H. FRIM seed technology towards environmental sustainability. Poster presented at the Rimba dan Alam Sekitar Tanggungjawab Anda (RASTA), 9–10 September 2014, Seri Iskandar.
60. NASHATUL ZAIMAN, N.A., NOR ASMAM, H., NADIAH SALMI, N., & NORALIZA, A. Storage technique for *Shorea ovalis* seeds (Meranti kepong), a critically endangered forest tree species. Poster presented at the 8th National Seed Symposium 2014, 29–30 April 2014, Putrajaya.
61. NAZIMATUL AZMA, N. & AHMAD AZARUDDIN, M.N. Urban Forestry and Landscape Services by FRIM. Poster presented at the Malaysia Urban Green Space and IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.
62. NG, K.K.S., KOBAYASHI, M., LEE, S.L., PAPPE, T., NG, C.H., TNAH, L.H., LEE, C.T., HATAKEYAMA, M. & SHIMIZU, K.K. Genome-wide polymorphism study in a non-model timber tree *Shorea leprosula* using next-generation sequencing. Poster presented at the Practical Workshop on High-Throughput Sequencing Data, Okinawa Institute of Science & Technology, 6–10 October 2014, Okinawa.
63. NG, S.C., CHEW, M.Y., SHAMSUL, K., NOORSIHA, A., LIM, C.L. & KAMARIAH, M. Klang Gates-the quarts ridge eden. Poster presented at the Seminar Pemeliharaan Tapak Warisan Semula Jadi Negeri Selangor, 18 November 2014, Selangor.
64. NOORSIHA, A., AINNUR AMIRA, A.M., KAMARIAH, M. & SITI FATIMAH ZAHARAH, D. Dokumentasi spesies etnobotanikal di bawah Program Inventori Flora di Tapak Warisan FRIM. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Mei 2014, Kuala Lumpur.
65. NOORSIHA, A., AINNUR AMIRA, A.M., SAHARUDDIN, S., SITI FATIMAH ZAHARAH, D., KAMARIAH, M., NURATIKAH, A., AJEERA, T. & NURFASEHAH, M.Z. Kampus FRIM sebagai Tapak Warisan Dunia - ke arah pemuliharaan tapak warisan FRIM di persada dunia. Poster presented at the 'Simposium Kebangsaan Konservasi 2014', 11–14 Ogos 2014, Kota Kinabalu.
66. NOORSIHA, A., NURATIKAH, A., SAHARUDDIN, S., AINNUR AMIRA, A.M. & KAMARIAH, M. Pembangunan koleksi etnobotani kawasan tanah tinggi di bawah Program Konservasi ex-situ Projek Taman Gunung Cameron Highlands, Tanah Rata, Pahang. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Jun 2014, Kuala Lumpur.
67. NOORSIHA, A., SAHARUDDIN, S., NURATIKAH, A., SITI FATIMAH ZAHARAH, D., AINNUR AMIRA, A.M. & KAMARIAH, M., Pemuliharaan flora gunung Semenanjung Malaysia - ke arah melestarikan khazanah alam warisan negara. Poster presented at the 'Simposium Kebangsaan Konservasi 2014', 11–14 Ogos 2014, Kota Kinabalu.
68. NOR ASMAM, H., NORALIZA, A., NASHATUL ZAIMAN, N.A. & NADIAH SALMI, N. Effect of storage temperature, packaging materials and storage duration on postharvest germination rate and moisture content of *Shorea rubra*. Poster presented at the 8th National Seed Symposium 2014, 29–30 April 2014, Putrajaya.
69. NOR AZAH, M.A., AZRINA, A., MUHD HAFIZI, Z., MAILINA, J. & MOHAMMAD FARIDZ, Z.P. Volatile oil composition of *Neobalanocarpus heimii*. Poster presented at the Malaysian International Chemical Congress (18Micc) 2014, 3–5 November 2014, Kuala Lumpur.
70. NOR AZAH, M.A., MAILINA J., AZRINA, A., TAN, A.L., NIK MUSAADAH, M. & MOHAMMAD FARIDZ, Z.P. Kajian ke atas minyak pati daripada tumbuhan terpilih di kalangan komuniti Orang Asli di Pahang dan Perak . Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Mei 2014, Kuala Lumpur.
71. NOR AZAH, M.A., MAILINA, J., SAIDATUL HUSNI, S., MASTURA, M., SITI HUMEIRAH, A.G., AZRINA, A., MUHD HAFIZI, Z., MOHD FARIDZ, Z.P. & SAHRIM, L. Malaysian aromatic plants as herbal, health care and personal care ingredients. Poster presented at the 45th International Symposium of Essential Oils (ISEA), 7–10 September 2014, Turkey.
72. NOR AZAH, M.A., MUHD HAFIZI, Z., SAHRIM, L., MOHAMMAD FARIDZ, Z.P., MAILINA, J. & RASADAH, M.A. Essential oil composition of two ficus species. Poster presented at The International Conference on Natural Products 2014, 18–19 March 2014, Putrajaya.
73. NOR FAILAH, W., MOHD ZAKI, A., MOHAMAD, O., MOHAMAD LOKMAL, N., AHMAD FAUZI, M.S., FARAH FAZWA, M.A., AB RASIP, G. & REGINA MARIAH, J. Provenance resource stands establishment of *Eurycoma longifolia*: a FRIM's Research Stations. Poster presented at the 2nd International Plant Breeding Seminar, 14–15 October 2014, Serdang.
74. NOR HAYATI, A., NURHAZWANI, M.H., ONG, B.K., NORULAIMAN, Y. & MOHD IRMAN SHAH, M. AAS estimation of heavy metals in selected Malaysian ulam. Poster presented at the Malaysian International Chemical Congress (18Micc) 2014, 3–5 November 2014, Kuala Lumpur.
75. NORALIZA, A., NOR ASMAM, H., NADIAH SALMI, N., SITI HASANAH, M.S. & NASHATUL ZAIMAN, N.A. Desiccation sensitivity of *Hopea nervosa* seeds. Poster presented at the 8th National Seed Symposium 2014, 29–30 April 2014, Putrajaya.
76. NORHAYATI, S., FARAH FAZWA, M.A., MOHAMAD, O. & MUHAMMAD ASRI, L. Variability in morphological characteristics among various clones of *Labisia pumila* at four different locations. Poster presented at the 2nd International Plant Breeding Seminar, 14–15 October 2014, Serdang.
77. NORSHAKILA, Y., INTAN NURULHANI, B., LIM, H.F. & AMELIA, A. Pengetahuan tahap penggunaan tumbuhan ubatan & beraroma di kalangan komuniti Orang Asli Lanoh di Perak & Mendriq di Kelantan. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Mei 2014, Kuala Lumpur.
78. NUR FAIRUZ, Y., GETHA, K., ZAHARI, O., HEMA, T.G. & LILI SHAHIRA, H. Unique Malaysian Biodiversity: FRIM actinobacteria culture collection (FACC). Poster presented at the Exhibition of Fraser Hill's Bird Race Competition, 21–22 June 2014, Bukit Fraser.
79. NUR FAIRUZ, Y., GETHA, K., ZAHARI, O., HEMA, T.G., LILI SHAHIRA, H., ROSHAN, J. & MUHAMMAD SYAMIL, A. Development of FRIM actinobacteria culture collection (FACC) database management system. Poster presented at the 32nd Symposium of the Malaysian Society for Microbiology (SMSM2014), 6–8 December 2014, Kuala Terengganu.
80. NUR NAZIHAH, M., FARAH FAZWA, M.A. & ZUNOLIZA, A. Chemical fingerprinting using FTIR and HPLC as qualitative analysis in the study of propagation of *Labisia pumila* var. *pumila*. Poster presented at the Conference on Tropical Resources and Sustainable Sciences 2014, 17–19 October 2014, Kota Bharu.
81. NURHANAN, M.Y. , MUHAMMAD HAFFIZ, J., SITI SYARIFAH, M.M., ABDUL RASHIH, A., ASIAH, O. , ALIA AINA, A., LING, S.K., NOR DATIAKMA, M.A., NOR HASNIDA, H. & ANEE SURYANI, S. Preliminary anti-proliferative studies on the effect of cisplatin when combined with phytochemical from Simaroubaceae plant species (CFPR138) in ovarian cancer. Poster presented at the Pharmacology & Physiology International Scientific Congress 2014, 23–24 August 2014, Kuala Lumpur.

82. ONG, S.P., PATAHAYAH, M., WAN RASIDAH, A.K. & SUHAIMI, W.C. Death of avicennia trees: a natural succession process or sign of ecosystem disturbance? Poster presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change (MAPCVCC), 11–13 November 2014, Kuala Lumpur.
83. PATAHAYAH, M., ONG, S.P. & MOHD FARID, A. Pests, diseases and disorders of Mangroves and Non-mangroves planted in Peninsular Malaysia. Poster presented at the International Conference on Mangroves of Asia-Pacific Countries in View of Climate Change (MAPCVCC), 11–13 November 2014, Kuala Lumpur.
84. ROSDI, K., NASHATUL ZAIMAH, N.A., MOHD ZAKI, H., WAN RASDIAH, A.K. PATAHAYAH, M. & MARZALINA, M. Phenology observation of *Macaranga tanarius* in four regions in Peninsular Malaysia. Poster presented at 2014 IUFRO World Congress, 5–12 October 2014, Salt Lake City, USA.
85. RUSHDAN, I., LATIFAH JASMANI, SHARMIZA, A. & MAHMUDIN, S. Kidney tray for hospital – an environmental friendly antimicrobial Kenaf core pulp poulding. Poster presented at the 25th International Invention, Innovation & Technology Exhibition (ITEX 2014), 8–10 May 2014, Kuala Lumpur.
86. RUSHDAN, I., LATIFAH, J., SHARMIZA, A. & MAHMUDIN, S. Kidney tray for hospital-an environmental friendly antimicrobial kenaf core pulp moulding. Poster presented at the 25th International Invention, Innovation & Technology Exhibition, 8–10 Mei 2014, Kuala Lumpur.
87. RUSHDAN, I., MAHMUDIN, S., SHARMIZA, A., AZIZI, A.J., MOHD SHUKRI, S., MUZALINA, M. & HAMSINAH, H. Producing pulp and chemicals from rice straw. Poster presented at the 'Hari Inovasi FRIM', 24 November 2014, Kepong.
88. RUSHDAN, I., NURUL HUSNA, M.H., LATIFAH, J., AINUN, Z.M.A., SHARMIZA, A. & MAHMUDIN, S. Mathematical models for alkaline pulp and paper properties of oil palm empty fruit bunch fibre. Poster presented at the Malaysia International Technology Expo, 20–22 February 2014, Kuala Lumpur.
89. SAIDATUL HUSNI, S., NOR AZAH, M.A., MAILINA, J., PIN, K.Y., AZRINA, A. & MOHAMMAD FARIDZ, Z.p. Natural fragrance extract production using supercritical carbon dioxide. Poster presented at International Conference Of Natural Products (ICNP2014), 18–19 March 2014, Putrajaya.
90. SAIDATUL HUSNI, S., NOR AZAH, M.A., NURHAZWANI, M.H., MAILINA, J., NORULAIMAN, Y., MOHAMMAD FARIDZ, Z.P., ZAMREE, M.S., FADZUREENA, J., NUZIAH, H., AZRINA, A. & MUHD HAFIZ, I. Z. Inovasi produk minyak urut berasaskan halia (*Zingiber officinale*) sebagai terapi ibu selepas bersalin. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Mei 2014, Kuala Lumpur.
91. SAIDATUL HUSNI, S., NOR AZAH, M.A., MAILINA, J., MOHAMMAD FARIDZ, Z.P., IRENEO, K. & DARIO, S. Comparison of the chemical constituents of *Alpinia galangal* extracts extracted by two different techniques; hydrodistillation and supercritical fluid extraction system. Poster presented at Malaysian International Chemical Congress (18Micc) 2014., 3–5 November 2014, Kuala Lumpur.
92. SHALINI, M., VIMALA, S., ABDULL RASHIH, A., & MUHAMMAD KAMIL, O. Antioxidant evaluation of agricultural waste: *Sandoricum koetjape* (Burm.f) meer fruit peel extract. Poster presented at the 5th International Conference on Biotechnology for the Industry Wellness. 10–11 June 2014, Kuala Lumpur.
93. SHARMILLAH, S. & AHMAD NAZARUDDIN, M.R. Benefits of urban green space. Poster presented at the Malaysia Urban Green Space & IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.
94. SITI HUMEIRAH, A.G., NOR AZAH, M.A., SAIDATUL HUSNI, S., MOHD NOOR, M., PIN, K.Y., SHALINI, M. & MOHD FARIDZ Z.P. Study on the antioxidant activity of *Aquilaria malaccensis* leaves at different solvent extraction and drying temperature. Poster presented at Pharmaceutical Research Day 2014, 11–12 February 2014, Kuala Lumpur.
95. SITI NUR AISYAH, M.H., KHOO, M.G.H., FADZUREENA, J., CHEE, B.J., ROHANA, S., HANI IDAYU, B., TAN, A.L., NURUL HUSNA, Z., NORSHAKILA, Y., INTAN NURULHANI, I. B., LIM, H.F., NIK MUSAADAH, M., ADIANA, M.A. & NUZIAH, H. Tumbuhan ubatan Malaysia yang berpotensi sebagai penawar bagi penyakit gout. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Mei 2014, Kuala Lumpur.
96. SITI SALWANA, H., KHAIRUL AZWA, T., NORWATI, M., MOHD ZAKI, A., ABDUL RAZAK, S., MOHD LOMKAL, N. & AHMAD FAUZI, M.S. Macropropagation of *Endospermum diadenum*: cutting and marcot techniques. Poster presented at the 2nd International Plant Breeding Seminar, 4–5 October, Serdang.
97. SITI SUHAILA, A.R., NORIHAN, M.S., NORWATI, M., MAHANI, M.C., NOR AZAH, M.A., NAMASIVAYAM, P., KANDASAMY, K.I., MAILINA, J., AZRINA, A., NOR HASNIDA, H., HALIZA, I., NAZIRAH, A. & MUHD FUAD, Y. Effect of polyploidy on chemical constituents enhancement in leaf, stem and roots of *Aquilaria malaccensis*. Poster presented at the International Conference on Natural Product 2014, 18–19 Mac 2014, Putrajaya.
98. SITI SYARIFAH, M.M., NURHANAN, M.Y., PUTERI SHAFINAZ AKMAR, A.R., ASIAH, O. Proteomics-based approach: elucidating the mechanisms of action of SNA209 in SKOV-3 Ovarian Cancer Cell. Poster presented at the Pharmacology & Physiology International Scientific Congress 2014, 23–24 August 2014, Kuala Lumpur.
99. Syafiqah Nabilah, S. B., Farah Fazwa, M. A, Norhayati, S. and Mohd Zaki, A. Evaluation of Growth Performances of *Labisia pumila* var. *alata* (KF 07) at Four Different Study Areas. Poster presented at 2nd International Plant Breeding Seminar. Universiti Putra Malaysia, Serdang, Selangor. 14 – 15 October 2014
100. TAN, A.L., NURUL HUSNA, Z., INTAN NURULHANI, B., NORSHAKILA, Y., LIM, H.F., FADZUREENA, J. & NIK MUSA'ADAH, M. Keterancaman pengetahuan tradisi komuniti Orang Kanaq: satu kes kajian di Kg Sungai Selangi, Kota Tinggi, Johor. Poster presented at the 'Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi', 23–24 Mei 2014, Kuala Lumpur.
101. TANG, L.K., L.K., ANG, L.H., HO, W.M., KHOO, S.I. & NADA, B. 2014. Rehabilitation of degraded fire-fly habitat in Firefly Conservation at Riverbank of Sungai Kuala Selangor. Poster presented at the Seminar Biodiversiti 2014, 25–28 November 2014, Kuala Tahan.
102. THI, B.K., OTA, Y., HATTORI, T., LEE, S.S. & SOTOME, K. Phylogenetic analysis based on the ITS sequences of *Microporus* spp. from Japan and Malaysia. Poster presented at the Annual Meeting of the Mycological Society of Japan, 13–15 June 2014, Ishikawa, Japan.
103. TREVOR, W.S., OMARI, S.K., MAZURA, P., MARIA, C.J.V., CAROLINE, F.M., LINDA, G.D. Prenatal inhibition of the kynurenine pathway leads to structural changes in the hippocampus of adult rat offspring. Poster presented at the 9th Forum of Neuroscience (Fed. Europ. Neurosci. Soc) 5–9 July 2014, Milan, Italy.
104. TUAN NORAIIDA, T.H., CHEW, M.Y., SHAMSUL, K., NOORSIHA, A., LIM, C.L. & KAMARIAH, M. The living germs of Klang gates. Poster presented at the 'Seminar Pemeliharaan Tapak Warisan Semula Jadi Negeri Selangor', 18 November 2014, Selangor.
105. TUMIRAH, K. Nanoencapsulated organic phase change material using copolymer nanocomposite as thermal energy storage. Poster presented at the 'Pameran rekacipta, Penyelidikan dan Inovasi (PRPI) 2014', 30 September–1 Oktober 2014, Serdang.
106. WAN MOHD NAFIZUL, W.A., SHARMILLAH, S. AHMAD NAZARUDDIN, M.R. & NOOR AZLIN, Y. FRIM's Ecotourism attractions. Poster presented at the Malaysia Urban Green Space and IFPRA Asia Pacific Conference 2014, 24–28 June 2014, Pulau Pinang.
107. WAN RASIDAH, K., MOHAMAD FAKHRI, I., HAAZIZKIN, J. & SUHAIMI, W.C. Soil assessment at degrading mangrove forests: a case study in Lawas, Sarawak. Poster presented at the 20th World Congress of Soil Science: Soils embrace life and universe, 8–13 June 2014, Jeju, Korea.
108. WAN RASIDAH, K., SUHAIMI, W.C., MOHAMAD FAKHRI, I. & ROZITA, A. Methodology for classifying post-mining soil for tree planting. Poster presented at the 20th World Congress of Soil Science: Soils embrace life and universe, 8–13 June 2014, Jeju, Korea.
109. WAN ZAHIRI, W.Y. & NORUL MASLISSA, A. Sistem Pengurusan Penyelidikan R&D FRIM. Poster presented at the 'Hari ICT dan GIS, Kementerian Sumber Asli dan Alam Sekitar', 17 November 2014, Putrajaya.

110. WAN ZAHIRI, W.Y. & ZAHARI, O. Penjimatan Melalui Pembangunan Sistem ICT FRIM. Poster presented at the 'Hari ICT dan GIS, Kementerian Sumber Asli dan Alam Sekitar', 17 November 2014, Putrajaya.
111. WAN ZAHIRI, W.Y. & ZAHARI, O. Sistem Intranet INFOCENTER FRIM. Poster presented at the 'Hari ICT dan GIS, Kementerian Sumber Asli dan Alam Sekitar', 17 November 2014, Putrajaya.
112. WAN ZAHIRI, W.Y., ZAHARI, O. & NORUL MASLISSA, A. Sistem Inventori Pengurusan Pokok (SIPP). Poster presented at the 'Hari ICT dan GIS, Kementerian Sumber Asli dan Alam Sekitar', 17 November 2014, Putrajaya.
113. WAN, M.A., MOHD FARID, A., LEE, S.S., SAJAP, A.S., TOSIAH, S., PATAHAYAH, M., & TANG, S.B. Variation in the virulence of *Metarhizium anisopliae* and *Beauveria bassiana* isolated from forest soils against tiger moth (*Atteva sciodoxa*) larvae. Poster presented at the 8th International Conference on Plant protection in the Tropics "Plant Protection for Food Security and Safety", 8–10 April 2014, Kuala Lumpur.
114. ZAHIDAH, Z., NORLIA, B., NOR HASNIDA, H. & NORWATI, M. Isolation of partial farnesyl diphosphate synthase gene from root of Tongkat Ali (*Eurycoma longifolia*). Poster paper presented at the 39th Annual MSBMB Conference, 25–26 June 2014, Sepang.
115. Zulkafli H., A, Wan Asma I. & Rafidah J. Sequestering carbon through utilisation of waste oil palm trees in Malaysia. Poster paper presented at the International Conference on Global Sustainability & Chemical Engineering 2014, 20–22 August 2014, Kuala Lumpur.

ARTIKEL SEPARA TEKNIKAL/SEMI-TECHNICAL ARTICLES

1. LEE, S.L. Updates on Timber Tracking Projects at the Forest Research Institute Malaysia. Article in Global Timber Tracking Network (GTTN) Newsletter, Issue 1, June 2014. Pp. 17–18.
2. MOHD. FARID, A., WAN MOHD AZRUL, W.A., ONG, S.P. & LEE, S.S. Destructive leaf cutter (Tiger Moth) of *Eurycoma longifolia*. *FRIM Technical Information No. 73*, Forest Research Institute Malaysia, Kepong. 4 pp.
3. NORDAHLIA, A.S., LIM, S.C., HAMDAN, H. & ANWAR, U.M.K. Wood properties of selected plantation species: *Tectona grandis* (Teak), *Neolamarckia cadamba* (Kelempayan/Laran), *Octomeles sumatrana* (Binuang) and *Paraeserianthes falcataria* (Batai). Timber Technology Bulletin No. 54, Forest Research Institute Malaysia, Kepong. 8 pp.
4. ONG, S.P., LEE, S.S. & KIRTON, L.G. The *Khaya ivorensis* bark borer – *Cossus chloratus*. *FRIM Technical Information No. 74*, Forest Research Institute Malaysia, Kepong. 4 pp.
5. ONG, S.P., MOHD. FARID, A., LEE, S.S. & KIRTON, L.G. *Heortia vitessoides*, an agarwood (Karas) defoliator. *FRIM Technical Information No. 72*, Forest Research Institute Malaysia, Kepong. 4 pp.
6. WAN TARMEZE, W.A. Building houses using young *Acacia mangium*? Article in Focus on Forest Products, Timber Technology Bulletin No. 53, Forest Research Institute Malaysia, Kepong. Pp. 66–67.

ARTIKEL BUKAN TEKNIKAL/NON-TECHNICAL ARTICLES

1. ABDUL HAMID, S., YANTI, A.K. & TUAN ANIS NADIA, T.M.S. RoVBAM technology for furniture component and interior product. *FRIM in Focus*, December 2014. Pp. 6–7.
2. AHMAD FIRDAUS, Z., CHEW, M.Y. & MOHD GHAZALI, H. Kenali tumbuhan akuatik. *Dewan Kosmik*, 5/2014. Pp. 46–48.
3. AHMAD ZUHAI, Y. Bina hutan baharu melalui perladangan hutan, FRIM-UTM. *Melaka Hari Ini Maju Fasa II*, BULAN 2014. pp 21
4. AHMAD ZUHAI, Y. Research for effective plantation forestry. *FRIM in Focus*, June 2014. Pp. 2–3.
5. ANG, L.H. & HO, W.M. Transformation of barren land to lush greens. *FRIM in Focus*, June 2014. Pp. 6–7.
6. ANWAR, U.M.K., ABD. MAJID, J., MOHD ZAIN, M., ABDUL HALIM, T. & WAN MOHD NAFIZUL HAL-ALIM, W.A. Laluan basikal bukit di kawasan FRIM. *FRIM in Focus*, March 2014. Pp. 9.
7. AZIAN, M. & MUHAMMAD FARID, A.R. Pembalakan balak alternatif: Memulihara alam sekitar. *Dewan Kosmik*, 9/2014. Pp. 48–49.
8. CHAN, Y.K. Educating the young guardians of mother earth. *FRIM in Focus*, June 2014. Pp. 12–13.
9. CHAN, Y.M. Begonia abdullahpieei Kiew. *Flora of Peninsular Malaysia Online Newsletter*: 147(8). 25 August 2014.
10. CHEE, B.J. Belalai Gajah-Antivirus semula jadi. *Dewan Kosmik*, 4/2014. Pp. 48–49.
11. CHEE, B.J. Bunga Melur kurangkan susu badan. *Dewan Kosmik*, 7/2014. Pp. 38–40.
12. CHEE, B.J. Keladi Murai antikanser. *Dewan Kosmik*, 9/2014. Pp. 32–33.
13. CHEW, M.Y. Jelatang-The Secret Weapon of Pulau Tioman. *Conservation Malaysia*, 20. Pp. 8–10.
14. HAMDAN, H., MOHD KHAIRUN ANWAR, U., NORDAHLIA, A.S., ISKANDAR, M.M., MOHD IZANI, I., MOHD TAMIZI, M. & OTHMAN, M.D. Cross laminated timber as structural panel. *FRIM in Focus*, September 2014. Pp. 2–3.
15. HAMIDAH, M., YASSER, M.A. & ASLINA, B. Perkongsian maklumat kepelbagaian biologi Malaysia. *Dewan Kosmik*, 10/2014. Pp. 32–34.
16. IDA SURAINI, A.S. *Baeckea frutescens* (Cucur atap) for gout. *FRIM in Focus*, December 2014. Pp. 12.
17. IDA SURAINI, A.S. Biodegradable kidney tray from antimicrobial kenaf core pulp. *FRIM in Focus*, December 2014. Pp. 10.
18. IDA SURAINI, A.S. Mathematical models for alkaline pulp and paper properties of oil palm efb fibre. *FRIM in Focus*, December 2014. Pp. 11.
19. IDA SURAINI, A.S. Organic phase change material nanocapsule. *FRIM in Focus*, December 2014. Pp. 5.
20. ISMAIL, P., AZHARIZAN, M.N., TARIQ MUBARAK, H. & MOHD IZWAN, R. Hutan Ladang Jati: Alternatif sumber industri perikanan. *Dewan Kosmik*, 5/2014. Pp. 22–23.
21. JEYANNY, V. & WAN RASIDAH, W.A.K. Soil basics in forest plantation. *FRIM in Focus*, June 2014. Pp. 11.
22. KHAIRUL, M. Pokok landskap hutan bandar bukan untuk dipaku. *Dewan Kosmik*, 10/2014. Pp. 44–45.
23. LAU, K.H. *Geostachys secunda* (Baker) Ridl. *Flora of Peninsular Malaysia Online Newsletter*: 140(1). 28 Januari 2014.
24. LEE, S.S. Forestry research issues in Malaysia. *Commonwealth Forestry Association Newsletter* 64: Pp. 3–5.
25. LIM, H.F., NORINI, H., NIK MUSADAH, M., NORSHAKILA, Y., INTAN NURULHANI, B., TAN, A.L., NURUL HUSNA, Z., FADZUREENA, J. & MASTURA, M., Traditional knowledge documentation in Malaysia: Developing a comprehensive approach. *FRIM in Focus*, March 2014. Pp. 14–15.
26. LOK, E.H. Agarwood: A highly-prozod forest produce. *FRIM in Focus*, June 2014. Pp. 4–5.
27. MARRYANNA, L. & SITI AISAH, S. Pengaruh kualiti air sungai. *Dewan Kosmik*, 2/2014. Pp. 28–29.
28. MOHAMAD NASIR, M.A. Wood preservative analysis: Ensuring quality products. *FRIM in Focus*, September 2014. Pp. 6–7.
29. MOHD IZWAN, R., AZHARIZAN, M.N., SAMSUDIN, M. Impak ladang buluh berpensijilan terhadap industri perikanan. *Dewan Kosmik*, 1/2014. Pp. 32–33.
30. MOHD IZWAN, R., AZHARIZAN, M.N., SAMSUDIN, M. Penjagaan alam sekitar dalam konteks pensijilan hutan. *Dewan Kosmik*, 4/2014, Pp. 58–59.
31. MOHD RIZUWAN, M., WAN MOHD SHUKRI, W.A., & MOHAMAD FAIZUL, K. Forest mobile bridge for reduced environmental impact. *FRIM in Focus*, December 2013. Pp. 7.
32. MOHD YUSOUF, A.L. & SUFFIAN, M. Unleashing the potential of composite brick from wood particles. *FRIM in Focus*, September 2014. Pp. 4–5.
33. MUHAMMAD FARID, A.R., AZIAN, M., AZHARIZAN, M.N. & KHAIRUN NAJIBAH, M.S. Sistem pembalakan kabel: Mengurangkan kerosakan hutan?. *Dewan Kosmik*, 2014.
34. NOOR AZRIEDA, A.R. & SALMIAH, U. Apa itu kulat. *FRIM in Focus*, December 2014. Pp. 14–15.

35. NOR EZZAWANIS, A.T. *Rubus sumatranus* Miq. *Flora of Peninsular Malaysia Online Newsletter*: 142(3). 12 March 2014.
36. NOR EZZAWANIS, A.T. *Sauropus calcareus* M.R.Hend. (Phyllanthaceae). *Flora of Peninsular Malaysia Online Newsletter*: 150(11) 25 November 2014.
37. NOR HALIYAN, T.S. FRIM dan pensijilan produk. *FRIM in Focus*, September 2014. Pp. 12.
38. NORAISHAH, S. Peranan hutan paya laut dalam perubahan iklim. *Dewan Kosmik*, 6/2014. Pp. 60–61.
39. NORDAHLIA, A.S., LIM, S.C., ROHANA, I. & MOHD ZAHARI, M.N. Kajian anatomi kayu: Menentukan kesesuaian kegunaan kayu. *FRIM in Focus*, September 2014. Pp. 10–11.
40. Ong, B.K. FRIM is committed to assist the herbal industries in facing today's challenges for tomorrow's opportunities. Advertorial in *MAJALAH PERTANIAN MOA 2014* (MAHA).
41. ONG, P.T. Orchids: Portraits of the rare and threatened. *FRIM in Focus*, March 2014. Pp. 6–7.
42. PHON, C.K. & KIRTON, L.G. Road crossings: Are butterflies at risk? *Conservation Malaysia* 19. Pp. 10–12.
43. RAFIDAH, A.R. & SYAHIDA EMIZA, S. *Burmanna coelestis* D. Don. *Flora of Peninsular Malaysia Online Newsletter*: 141(12). 5 Februari 2014.
44. ROSDI, K. Agroforestry in Malaysia. *FRIM in Focus*, June 2014. Pp. 10.
45. SAIFUL ISKANDAR, K. & FARAH SHAHANIM, M.M. Hakisan tanah di kawasan berhutan. *Dewan Kosmik*, 7/2014. Pp. 23–25.
46. SHAHFIZ, M.A., KAVIARASU, M., RIZAL, M.R., JOHN, R.T., FAKHRUL, I.A.F. & FARIDATUL, N.M.R. Avifauna assemblages at Belum-Temengor Forest Reserves. *Conservation Malaysia* 19. Pp. 8–9.
47. SHAHFIZ, M.A., KAVIARASU, M., RIZAL, M.R., JOHN, R.T., FAKHRUL, I.A.F. & FARIDATUL, N.M.R. Small mammal monitoring at Belum-Temengor Forest Reserves. *Conservation Malaysia* 19. Pp. 6–7.
48. SHUKRI, M.A., SHAHFIZ, M.A. & MARDIANA, S.M. Central forest spine: An overview and how GERIK was chosen for the pilot project. *Conservation Malaysia* 19. Pp. 1–3.
49. SIK, H.S., ABDUL LATIF, M., CHOO, K.T. & WOON, W.C. Addressing Industry Need- The HTD® Way. *FRIM in Focus*, December 2014. Pp. 2–4.
50. SITI HUMEIRAH, A.G., NOR AZAH, M.A., SAIDATUL HUSNI, S. & MAILINA, J. Tranquil M, compound for health from *Aquilaria* leaves. *FRIM in Focus*, December 2014. Pp. 16.
51. SITI MUNIRAH, M.Y. & IMIN, K. *Lagerstroemia calyculata* (Lythraceae), a new record for Peninsular Malaysia. *Conservation Malaysia*.
52. SITI MUNIRAH, M.Y. Rafflesia: The making of a conservationist. *FRIM in Focus*, March 2014. Pp. 2–3.
53. SITI RAFIDAH, M., ANWAR, U.M.K., MAT YAACOB, C.W. & MOHD FAIZUL, M.S. Kemasiapan dan nilai produk kayu. *FRIM in Focus*, September 2014. Pp. 8–9.
54. SUHAIDA, M. & CHUA, L.S.L. *Hopea polyalthioides* Sym. *Flora of Peninsular Malaysia Online Newsletter*: 151(12). 24 December 2014.
55. SUHAIDA, M. & CHUA, L.S.L. *Shorea peltata* Sym. *Flora of Peninsular Malaysia Online Newsletter*: 149(10). 25 October 2014.
56. SYAHIDA EMIZA, S. & RICHARD CHUNG, C.K. Herbarium Kebangsaan Malaysia: Memelihara tumbuhan negara. *FRIM in Focus*, Mac 2014. Pp. 10–11.
57. TAN, J.P.C. *Begonia nuri*: A limestone species from Peninsular Malaysia. *The Begonia* 81: 178–183.
58. TAN, J.P.C. *Paraboea* sp. – Saving near-extinct limestone flora. *FRIM in Focus*, March 2014: 4–5.
59. TAN, J.P.C. Rafflesia: *Paraboes* sp. – Saving near extinct limestone flora. *FRIM in Focus*, March 2014. Pp. 4–5.
60. YAO, T.L. *Codonoboea malayana* (Hook.f.) Kiew. *Flora of Peninsular Malaysia Online Newsletter*: 146(7). 25 July 2014.
61. YAO, T.L. *Didymocarpus cordatus* Wall. ex DC. *Flora of Peninsular Malaysia Online Newsletter*: 148(9). 25 September 2014.
62. YAO, T.L. *Orchadocarpa lilacina* Ridl. *Flora of Peninsular Malaysia Online Newsletter*: 145(6). 25 June 2014
63. YAO, T.L. *Thottea piscodora* T.L.Yao. *Flora of Peninsular Malaysia Online Newsletter*: 143(4). 22 April 2014

LAPORAN INSTITUSI/INSTITUTIONAL REPORTS

1. ABD RAHMAN, K., MOHAMAD DANIAL, M.S. & MUHAMMAD FAIZ, K. Report on inventory of tree biomass and volume allometric equations in South East Asia. Report for the Food & Agriculture Organization of the United Nations (FAO). 49 pp.
2. ADNAN, M., AHMAD AZARUDDIN, M., AZRINA, Y. & MUHAMMAD FARID, A.R. Laporan pemeriksaan Pokok Hujan-Hujan (*Samanea saman*) di tapak cadangan pembangunan unit kediaman di atas lot 336 dan 337, Jalan Teochew Satu, MK 13, Daerah Timur Laut, Pulau Pinang. Laporan untuk UPM Consultancy & Services Sdn Bhd. 11 pp.
3. ADNAN, M., AHMAD AZARUDDIN, M.N., AZRINA, Y. & MUHAMMAD FARID, A.R. Laporan inventori dan pemeriksaan pokok tua di Majlis Perbandaran Pulau Pinang. Laporan untuk UPM Consultancy & Services Sdn Bhd.
4. AHMAD AZARUDDIN, M.N. Laporan cadangan penanaman pokok landskap di Kolej Vokasional Setapak. Laporan untuk Kolej Vokasional Setapak. 13 pp.
5. AHMAD AZARUDDIN, M.N., AZAHARI, M.Y. & SAMSOL, B. Laporan perkhidmatan mengenalpasti dan melabel pokok-pokok sedia ada di Lot 2788, Lorong Orkid, Kuang, Selangor. Laporan untuk B & A Family Holdings. 7 pp.
6. AHMAD AZARUDDIN, M.N., MOHD AFENDI, H. & MUHAMMAD AMMAR, H. Report on propose tree species for Seriemas Golf Course (1st NINE - HOLE). Report for the Seriemas Development Sdn Bhd. 14 pp.
7. AHMAD ZUHAI, Y. Laporan inventori stoking dirian jati seluas 13.30 hektar, di Blok C1 dan C2 di daerah kecil Runggu, Tawau, Sabah. Laporan untuk Royal Garden Enterprise. 4 pp.
8. AHMAD ZUHAI, Y. Report and justifications for the continuous tree planting in RHT ex-mining Lands. Report for the Rahman Hydraulic Tin Sdn Bhd. 5 pp.
9. AHMAD ZUHAI, Y. Report on afforestation of ex-mining Land, Klian Intan, Perak'. Report for the Rahman Hydraulic Tin Sdn Bhd. 5 pp.
10. FLETCHER, C. & SAMSUDIN, M. Report on flora and fauna survey report (Water supply scheme to Pengerang Integrated Petrochemical Complex (PIPC), Johor. Report for the SMHB Sdn Bhd. 95 pp.
11. GAN, K.S. Report on life cycle assessment for environmental product declaration of tropical plywood production in Malaysia and Indonesia. Report for the International Tropical Timber Organization (ITTO). 28 pp.
12. HAMDAN, O., RODZIAH, H. & ABD. RAHMAN, K. Laporan teknikal: Kuantifikasi sumber hutan KPKKT untuk perancangan dan pengurusan efisien. Laporan untuk MoA FRIM/KPKKT. 66 pp.
13. ISMAIL, P., ISMAIL, H. AZHARIZAN, M.N. & AHMAD FAUZI, M.S. Laporan kursus kajian/demo teknik pemulihan hutan paya gambut terosot. Laporan untuk Jabatan Perhutanan Semenanjung Malaysia. 12 pp.
14. KHAIRUL, A. Laporan mereka bentuk produk prototype dengan bahan kayu. Laporan untuk Arkitek Tressie Yap. 5 pp.
15. KHALI AZIZ, H., MOHD AZAHARI, F. & MOHD AFIZZUL, M. Report on forest cover and carbon mapping in the greater Mekong Subregion and Malaysia. Report for the Asia-Pacific Network for Sustainable Forest Management (APFNet). 39 pp.
16. KHALI AZIZ, H. Report on assessment of best management practices of peatlands in Malaysia. Report for the Forest Department Peninsular Malaysia (FDPM) for ASEAN IFAP Peatland Project. 231 pp.
17. KHALI AZIZ, H., MUHAMAD AFIZZUL, M. & MOHD AZAHARI, F. Forest cover and carbon mapping in the Greater Mekong Subregion and Malaysia: Technical Report. FRIM-APFNet Forest Cover and Carbon Mapping in the Greater Mekong Subregion and Malaysia Project.
18. KHALI AZIZ, H., WAN MOHD SHUKRI, W.A. & MOHD SHAFIZ. Report on management plan of the high conservation value forest in the state of Johor. Report for the Forestry Department, Johor. 199 pp.

19. KHOO, V. & NADA, B. Progress report on monitoring of the firefly population along the Selangor River, Kuala Selangor (Phase II). Report for the Lembaga Urus Air Selangor (LUAS). 30 pp.
20. KHOO, V., NADA, B. & KIRTON, L.G. Final report on habitat studies on *Pteroptyx* sp. (Fireflies) at the Chukai River, Kemaman, Terengganu for DID/NAHRIM. Report for the DID/NAHRIM. 13 pp.
21. KHOO, V., NADA, B. & KIRTON, L.G. Progress report vi: Monitoring of the firefly population along the Selangor River, Kuala Selangor (Phase II). Report for the Lembaga Urus Air Selangor (LUAS). 24 pp.
22. KHOO, V., NADA, B. & KIRTON, L.G. Progress report vii: Monitoring of the firefly population along the Selangor River, Kuala Selangor (Phase II). Report for the Lembaga Urus Air Selangor (LUAS). 14 pp.
23. LEE, S.S. Report on monitoring, diagnosis and identification of pests and diseases in Acacia Plantations, Bintulu, Sarawak. Report for the Grand Perfect Sdn Bhd. 20 pp.
24. LEE, S.S. Report on monitoring, diagnosis and identification of the various diseases in Eucalypt plantations. Report for the Syarikat Samling Timber Sdn Bhd. 12 pp.
25. MOHAMAD LOKMAL, N., MOHD ZAKI, A., FARAH FAZWA, M.A., SITI SALWANA, H. & AHMAD FAUZI, S. Report on orientation cum exposure to teak plantation innovations. Report for the Odisha Forestry Sector Development Project. 8 pp.
26. MOHD AFENDI, H. & AHMAD AZARUDDIN, M.N. Laporan penilaian pokok bagi pokok-pokok di plot 2C4, Presint 2, Putrajaya. Laporan untuk Arch Angel Capital Sdn Bhd.
27. MOHD AFENDI, H. & AHMAD AZARUDDIN, M.N. Report on tree transplanting work at PJ Sentral. Report for the Biaxis Sdn Bhd.
28. MOHD AFENDI, H. Laporan penilaian pokok bagi pokok-pokok di kawasan kediaman Tiara Damansara, Petaling Jaya. Laporan untuk Tiara Management Sdn Bhd. 52pp.
29. MOHD PARID, M. Kajian penilaian outcome program penanaman pokok bakau dan spesies-spesies yang sesuai di pesisiran pantai negara - komponen sosio-ekonomi. Laporan kepada Kementerian Sumber asli dan Alam sekitar (NRE). 46 pp.
30. MOHD PARID, M., AHMAD FAUZI, P., LIM, H.F., ISMARIAH, A., ROHANA, A.R. & NOOR AINI, Z. Report on Economic impacts of the MTDC grants under the 9th Malaysia Plan on the Malaysian economy. Report for the Malaysian Technology Development Corporation Sdn Bhd. 163 pp.
31. NADA, B. Laporan lawatan ke Hutan Simpan Kelip-kelip Daerah Larut-Matang, Taiping. Laporan kepada Jabatan Perhutanan Negeri Perak. 7 pp.
32. NOORSIHA, A. Laporan cadangan pembangunan tapak pusat pemuliharaan & interpretasi Rafflesia bagi projek kerjasama FRIM-FELDA Global Venture. Laporan kepada Lembaga Kemajuan Tanah Persekutuan(FELDA). 14 pp.
33. NOORSIHA, A. Laporan pembangunan koleksi ex-situ Flora Gunung Semenanjung Malaysia bagi projek Cameron Highlands Montane Park (CHIMP). Laporan sukuan tahun untuk Program Cameron Highlands Dreams, Kementerian Sumber Asli & Alam Sekitar (NRE). 12 pp.
34. NOORSIHA, A. Laporan penyediaan fakta Outstanding Universal Value (OUV) bagi Tapak Warisan FRIM. Laporan Sukuan Tahun untuk Program FRIM-WHS untuk Jabatan Warisan Negara. 8 pp.
35. NORUL MASLISSA, A. & WAN ZAHIRI, W.Y. Laporan penyelenggaraan Sistem eOT MARDI Tahun 2012/2013. Laporan untuk Institut Penyelidikan dan Kemajuan Pertanian Malaysia (MARDI). 1 pp.
36. NUR ZATI, A.M., PHON, C.K. & LEE, S.S. Report on ant identifications. Report for the Applied Agricultural Resources Sdn Bhd. 1 pp.
37. PHILIP, E. & C.C. TAN. Report on avoided emissions from peatlands in South East Pahang Peat Swamp Forest. Technical paper for the NER for submission to UNFCCC. 7pp.
38. PHILIP, E. & C.C. TAN. Report on avoided emissions from peat swamp forest management and Central Forest Spine (PL 4,5 & 6) – NAMA Facility. Technical Paper for the NAMA Facility. 8 pp.
39. PHILIP, E. & NOOR AZLIN, Y. Report on carbon stocks and biodiversity assessment at Tekai Forest, Pahang . Report for the Malaysia Palm Oil Board (MPOB). 10 pp.
40. PHILIP, E. & ROSMA, R. Report on national greenhouse gas inventory for LULUCF Sector: 1990–2011. Technical report for the Natural Resources and Environment (NRE). 36 pp.
41. PHILIP, E. Report on Malaysia's reference levels for sustainable management of forest for REDD+ activities. Report for the UNFCCC,COP 20. 20 pp.
42. PHILIP, E. Report on tree risk assessment at the Datai Resort, Langkawi. Report for the The Datai Resort. 9 pp.
43. PHILIP, E., ISMAIL, P., SAMSUDIN, M., EDIVALDO, X. WAN RASIDAH, W.A.K. & AZIAN, M. Voluntary carbon off set project note. Technical report for the TFBC VCOS & Malaysia Airlines (MAS). 15 pp.
44. PHILIP, E., AHMAD AZARUDIN, M.N. & NOOR AZLIN, Y. Report on tree composition, risk assessment and conservation at the Head of Villa, Datai resort, Langkawi. Report for the DRH, Langkawi. 20 pp.
45. PHON, C.K. & SAW, L.G. Report on termite problem in a private forest land in Janda Baik. Report for Mr. Teng Choon Kwang. 7 pp.
46. PUAD, E. Laporan penentuan penghasilan pellet Buloh menggunakan kemudahan R&D FRIM. Laporan untuk Biomass SP. 5 pp.
47. PUAD, E. Laporan penghasilan pellet gentian menggunakan kemudahan R&D FRIM. Laporan untuk Novapave Sdn Bhd. 4 pp.
48. PUAD, E., RAFIDAH, J. & MAHANIM, S. @ M.A. Laporan penentuan nisbah gentian perekat dalam penghasilan pellet menggunakan kemudahan R&D FRIM. Laporan untuk Novapave Sdn Bhd. 3 pp.
49. RAJA BARIZAN, R.S., WAN RASIDAH, W.K., NOR ASLINDA, A. & SUHAIMI, W.C. Laporan lawatan teknikal penilaian tapak cadangan penanaman. Laporan teknikal JTRD Bakau untuk Taman Negara Pulau Pinang, Pulau Pinang. 15 pp.
50. RAJA BARIZAN, R.S., WAN RASIDAH, W.K., NOR ASLINDA, A. & MOHAMAD FAKHRI, I. Laporan penilaian teknikal kawasan cadangan penanaman Bakau 2014 di Negeri Kedah, Perlis dan Sarawak. Laporan teknikal JTRD Bakau untuk Jabatan Perhutanan Semenanjung Malaysia dan Jabatan Hutan Sarawak. 18 pp.
51. RICHARD, C.C.K., SAW, L.G. & KAMARUDIN, S. Report on tree identification at Kota Kemuning, Shah Alam. Report for the Eco World Development Sdn Bhd. 70 pp.
52. ROSZAINI, K. Report on resistance of TNB Cables Against Subterranean Termite. Report for the Tenaga Nasional Berhad. 30 pp.
53. RUSHDAN, I. & SHARMIZA, A. Report on development of fine paper for printing. Report for the Pusat Penyelidikan Mineral, Jabatan Mineral dan Geosains. 9 pp.
54. RUSHDAN, I. Report on development of A4 Paper For Printing. Report for the Pusat Penyelidikan Mineral, Jabatan Mineral dan Geosains. 13 pp.
55. RUSHDAN, I. Report on fiber analysis. Report for the Ecobuilt Packaging (M) Sdn Bhd. 9 pp.
56. SALMIAH, U., SHAHLINNEY, L., NOR AZRIEDA, A.R. & BAHARUDIN, K. Report on efficacy of pineapple vinegar treatment on rubber wood against mold fungus. Report for the Institut Pembangunan Bioproduk, Universiti Teknologi Malaysia (UTM), Johor. 13 pp.
57. SHARMIZA, A. & MAHMUDIN, S. Report on preparation and testing of paper using 3 resins with different solid contents. Report for the Malayan Adhesives & Chemicals Sdn Bhd. 12 pp.
58. SHARMIZA, A. & MAHMUDIN, S. Report on preparation and testing of paper with 9 different resins. Report for the Malayan Adhesives & Chemicals Sdn Bhd. 14 pp.
59. SHARMIZA, A. & MAHMUDIN, S. Report on reparation and testing of paper using resins at different dosages. Report for the Malayan Adhesives & Chemicals Sdn Bhd. 15 pp.

60. SHARMIZA, A. & MAHMUDIN, S. Report on study on resin shelf life for paper products. Report for the Malayan Adhesives & Chemicals Sdn Bhd. 10 pp.
61. SHARMIZA, A. & RUSHDAN, I. Report on research collaboration on production of pulp and paper from durian rinds. Report for the Fakulti Kejuruteraan Mekanikal dan Pembuatan, Universiti Tun Hussein Onn (UTHM). 6 pp.
62. SHARMIZA, A. Report on processing of delignified kenaf pulp into food trays and paper. Report for the Industrial Biotechnology Research Centre, SIRIM Berhad. 13 pp.
63. SHAWN, C. Report on molecular-sexing of the Asian Arowana, *Scleropages Formosus* (Osteoglossidae) using a sequence-tagged-site marker. Report for the Rapid Labs Sdn Bhd. 8 pp.
64. Suhaimi, W.C., Mohamad Fakhri, I. & Wan Rasidah, W.K. Report on soil survey report for reforestation of Universiti Teknologi Malaysia (UTM), Johor.
65. WAN ASMA, I. & PUAD, E. Report on demonstration and analysis of the chipping process using mobark chipper on oil palm trunkcorelogs. Report for the Japan International Research Center for Agricultural Sciences (JIRCAS). 2 pp.
66. WAN ASMA, I. & PUAD, E. Report on demonstration and analysis of the process of extraction oil palm SAP from oil palm trunk corelogs. Report for the Japan International Research Center for Agricultural Sciences (JIRCAS). 3 pp.
67. WAN ASMA, I. & PUAD, E. Report on Malaysian renewable energy. <http://www.worldbioenergy.org/node/389>. 19 Jun 2014.
68. WAN ASMA, I., RAFIDAH, J., PUAD, E. & MAHANIM, M.S. @ M.A. Report on evaluation of the effect of pretreatment methods on the physical & chemical composition of oil palm empty fruit bunches (EFB) and fronds (OPP)'. Report for the MYBiomass Sdn Bhd. 158 pp.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
FOREST RESEARCH INSTITUTE MALAYSIA
52109 Kepong, Selangor Darul Ehsan, Malaysia
T : 603-62797000 F : 603-62731314
E : feedback@frim.gov.my

www.frim.gov.my