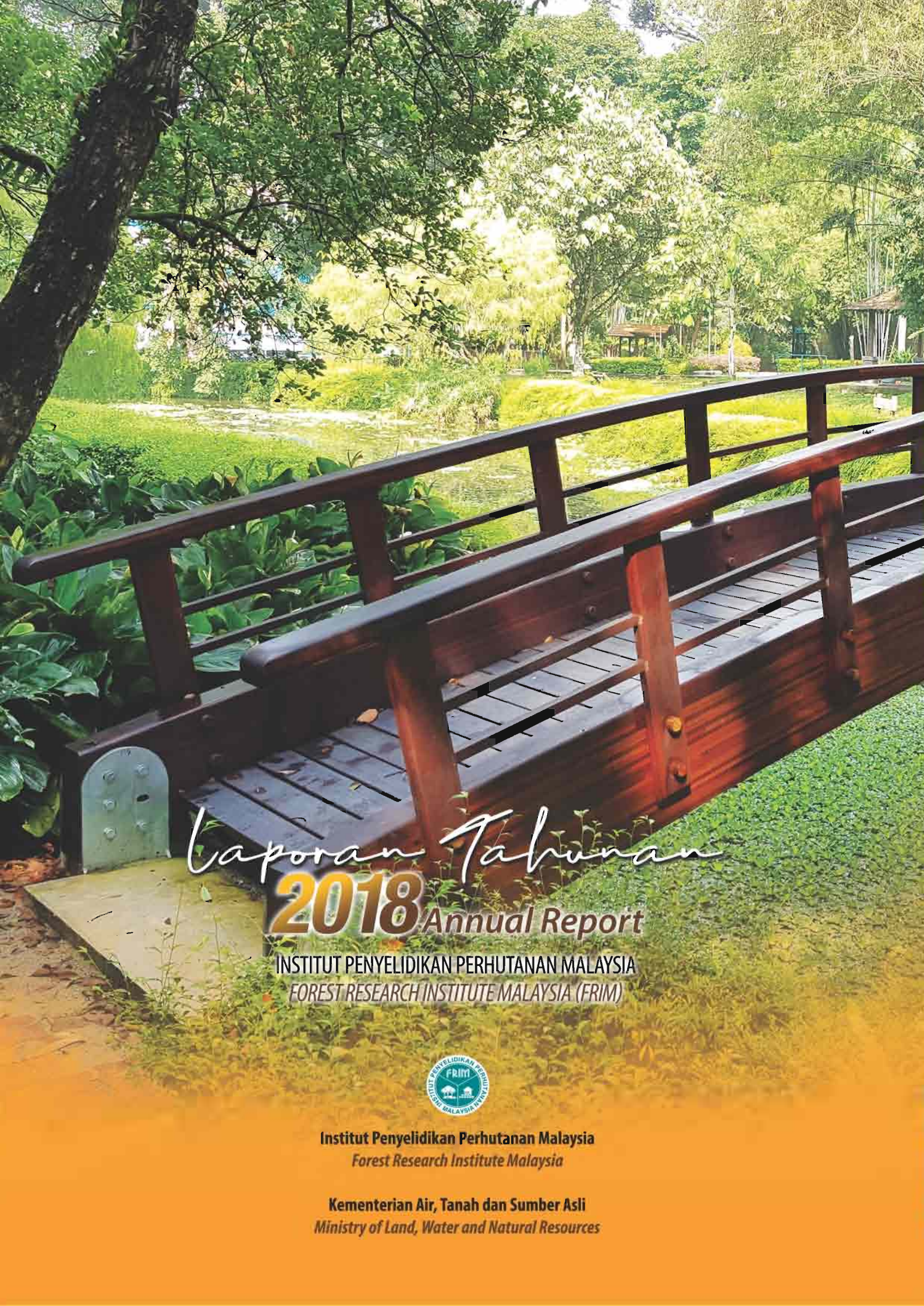

Laporan Tahunan 2018
Annual Report 2018

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
FOREST RESEARCH INSTITUTE MALAYSIA (FRIM)

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

Kementerian Air, Tanah dan Sumber Asli
Ministry of Land, Water and Natural Resources

Laporan Tahunan 2018 Annual Report

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA

FOREST RESEARCH INSTITUTE MALAYSIA (FRIM)

Institut Penyelidikan Perhutanan Malaysia

Forest Research Institute Malaysia

Kementerian Air, Tanah dan Sumber Asli

Ministry of Land, Water and Natural Resources

Dato' Dr Abd. Latif Mohmod (Penaung/Patron)
Dr Mohd. Rosli Haron (Penasihat/Advisor)
Nik Zanariah Nik Mahmood (Editor Penyelaras/Managing Editor)

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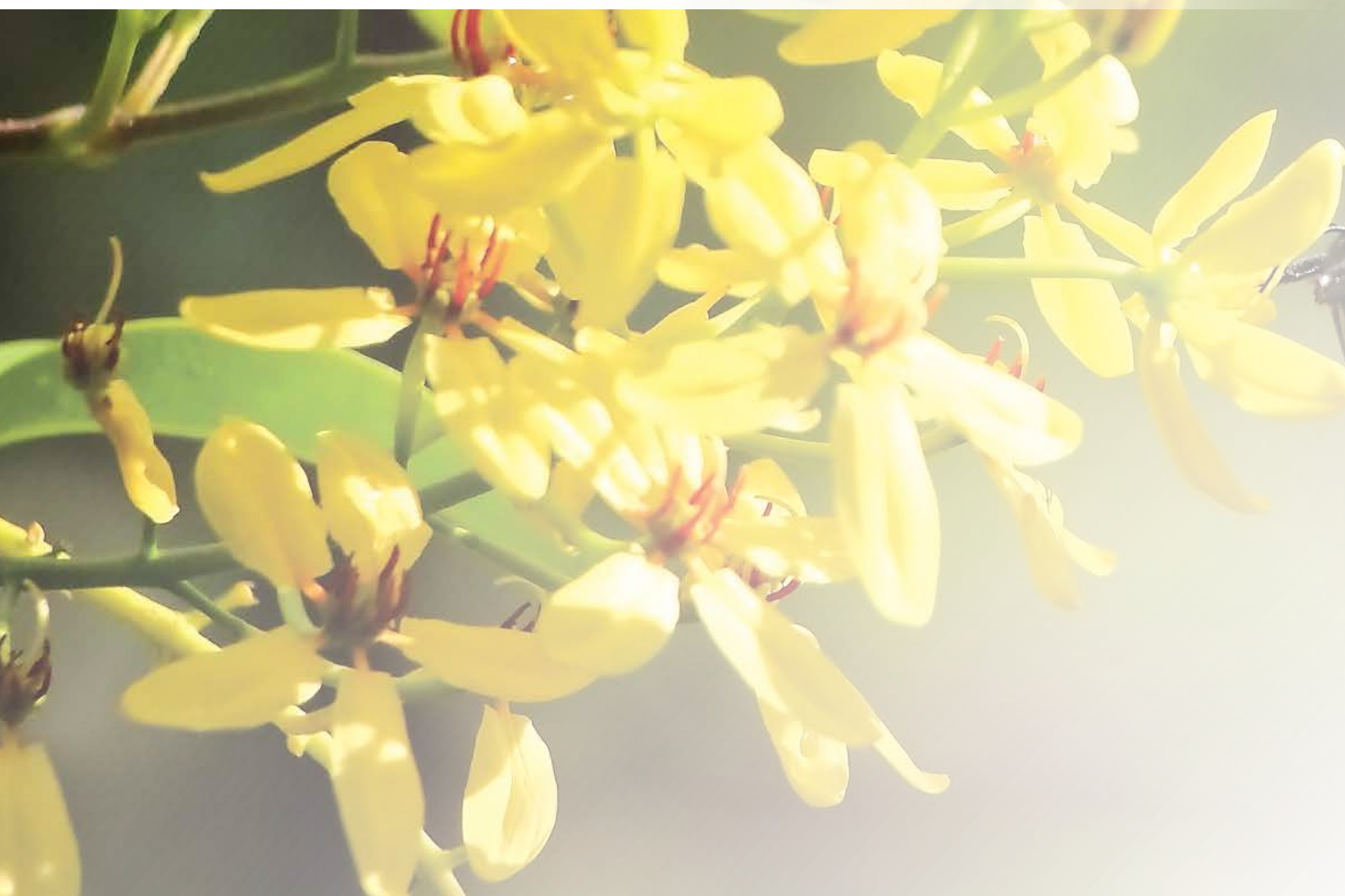
Laporan Pengerusi
Chairman's Report



DATO' DR TAN YEW CHONG
Pengerusi/Chairman

Tahun 2018 menyaksikan perubahan dalam senario politik negara selepas Pilihan Raya Umum ke-14 yang menyebabkan berlakunya peralihan pentadbiran kerajaan yang baharu. Institut Penyelidikan Perhutanan Malaysia (FRIM) diletak di bawah Kementerian Air, Tanah dan Sumber Asli (KATS) dan saya ingin menyampaikan ucapan terima kasih kepada Menteri KATS, YB Dr Xavier Jayakumar yang telah memberikan kepercayaan kepada saya untuk memikul tanggunggjawab selaku Pengerusi FRIM. Saya juga mengambil kesempatan ini untuk mengucapkan setinggi-tinggi terima kasih kepada Dato' Sri Azizan Ahmad, Pengerusi Institut sebelum ini (sehingga 30 September 2018) yang telah memimpin institut ini dengan baik sekali.

2018 has marked changes to our political scenario after the 14th General Election leading to a new government. Forest Research Institute Malaysia (FRIM) is now placed under Ministry of Water, Land and Natural Resources (KATS) and I thank Dr Xavier Jayakumar, Minister of KATS, for entrusting me to assume the position of Chairman of FRIM. I also take this opportunity to thank Dato' Sri Azizan Ahmad, immediate past Chairman (until 30 September 2018), who has led FRIM to many achievements.

Saya turut berbangga dengan pelbagai usaha dan inisiatif yang telah dilaksanakan dengan jayanya pada 2018 terutamanya ke arah komersialisasi pelbagai produk hasil penyelidikan dan pembangunan FRIM. FRIM juga telah menjalin kerjasama pintar dengan agensi luar. Di samping itu, FRIM telah menerima pelbagai anugerah dan pengiktirafan daripada pelbagai agensi dari dalam dan luar negara.

I. KERJASAMA PENYELIDIKAN (MOU/PERJANJIAN)/

Seperti tahun-tahun sebelumnya, FRIM terus menjalin kerjasama penyelidikan menerusi memorandum persefahaman (MoU) dan perjanjian dalam usaha mewujudkan pakatan strategik dengan rakan kerjasama bagi memahami serta memenuhi keperluan industri dari semasa ke semasa. Pada 2018, FRIM telah memeterai sembilan kerjasama penyelidikan dengan agensi luar iaitu enam MoU dan tiga perjanjian, antaranya ialah:

a. Perjanjian dengan Lembaga Kemajuan Johor Tenggara (KEJORA)

Perjanjian dengan Lembaga Kemajuan Johor Tenggara (KEJORA) yang dimeterai pada 6 Mei 2018 membolehkan kedua-dua pihak berkerjasama dalam kajian penanaman mengkuang di Kawasan Pertanian Kg. Tuan Seh, Mukim Sedili Besar, Johor.

KEJORA menyediakan kawasan R&D seluas 12.5 ekar dan dana manakala FRIM menawarkan kepakaran dalam membangunkan ladang mengkuang, pengujian kualiti daun mengkuang serta mengenal pasti spesies mengkuang yang sesuai. Kerjasama ini dijangka akan menyumbang kepada perspektif dan hala tuju baharu industri kraf tangan negara serta secara tidak langsung mendokong aspirasi kerajaan ke arah membudayakan perkongsian pengetahuan menerusi pemindahan teknologi. KEJORA akan membangunkan kawasan tersebut sebagai pusat agropelancongan yang berkonsepkan kraf tangan. Cadangan tersebut merangkumi penubuhan germplasma termasuk koleksi benih mengkuang yang dilengkapi pusat penghasilan produk berasaskan mengkuang serta pusat informasi.

I am proud of the various efforts and initiatives in 2018 particularly towards commercialisation of various products from research and development activities. In addition, FRIM has also actively built smart partnerships with local and international agencies.

I. RESEARCH COLLABORATIONS (MOU/AGREEMENT)

As in previous years, FRIM continues the tradition of collaborative research through memorandum of understanding (MoU) and agreement by building strategic partnerships with stakeholders in order to understand the needs of the industry. In 2018, FRIM established nine research collaborations with other agencies; six MoU and three agreements among which are:

a. Agreement with South East Johore Development Authority (KEJORA)

Agreement with the South East Johore Development Authority (KEJORA) on 6 May 2018 has enabled both parties to collaborate in research on planting *mengkuang* at Kawasan Pertanian Kg. Tuan Seh, Mukim Sedili Besar, Johor.

KEJORA has allocated a piece of land measuring 12.5 acres and provided funds for R&D while FRIM is offering expertise in establishment of *mengkuang* plantation, identification of suitable *mengkuang* species and testing of its leaf quality. The collaboration is expected to contribute towards providing a new perspective and direction for local handicraft industry while supporting the aspiration of our government to inculcate sharing of knowledge through technology transfer. KEJORA will develop the area as a handicraft-based agro-tourism centre. This includes the establishment of a germplasm including a collection of *mengkuang* seeds.

b. MoU dengan Kementerian Kesihatan Malaysia

FRIM dan Kementerian Kesihatan Malaysia (KKM) telah menandatangani MoU pada 30 Mac 2018 untuk bekerjasama dalam memastikan produk-produk tradisional atau bahan mentah herba yang dipasarkan di Malaysia berkualiti dan selamat digunakan.

FRIM bertanggungjawab memberikan pendedahan kepada industri tempatan akan kepentingan ujian kawalan kualiti terhadap bahan mentah herba sebelum digunakan sebagai bahan aktif produk tradisional; menjalankan perkhidmatan ujian dan nasihat dalam ujian kawalan kualiti terhadap produk dan bahan mentah herba serta menjalankan validasi dan verifikasi terhadap ujian kawalan kualiti yang dibangunkan.

FRIM juga memberi bimbingan kepada usahawan herba bagi menghasilkan produk yang selamat dan berkesan melalui pemindahan teknologi dalam bentuk kursus, latihan teknikal, serta perkhidmatan, khususnya pemprosesan berdasarkan amalan pengilangan baik dan perkongsian pintar melalui kerjasama dengan pihak industri, akademik atau pihak berkepentingan dari aspek teknologi piawai yang berkaitan dalam proses pengeluaran produk herba.

c. MoU dengan Golden Pharos Berhad

MoU antara FRIM dan Golden Pharos Berhad bertujuan untuk menjalin kerjasama pembangunan dan penyelidikan serta memastikan pembekalan bahan mentah khususnya bagi Program Perkhidmatan Pensijilan Produk FRIM (FRIM PCS).

Kerjasama tersebut merupakan satu usaha penting selaras dengan matlamat kerajaan dalam memacu agenda Pemerkasaan Ekonomi Bumiputera serta meningkatkan pertumbuhan ekonomi negara. Kerjasama strategik ini diadakan bagi menangani masalah kekurangan bekalan bahan mentah yang sering dihadapi oleh pengusaha perabot tempatan. Ia akan memastikan bekalan bahan mentah yang mencukupi dan berterusan, termasuk kayu bergergaji serta mana-mana bahan mentah yang bersesuaian bagi pengusaha perabot Bumiputera yang terlibat dengan Program FRIM PCS.

b. MoU with Ministry of Health

FRIM and Ministry of Health (MOH) signed a MoU on 30 March 2018 in an effort to ensure traditional products or herbal raw materials in the Malaysian market have good quality and are safe for use/ consumption.

FRIM plays a vital role in giving awareness to local industry on the importance of quality control tests on herbal raw materials prior to being used as an active compound in traditional products. In addition, FRIM provides test services and consultation on quality control tests on herbal raw materials and products as well as conducts validation and verification on quality control tests developed.

FRIM also provides guidance to entrepreneurs in the herbal industry through courses, trainings and services on producing safe and effective products. The technology transfer focuses particularly on processing in accordance to good manufacturing practices and smart sharing of technology in manufacturing herbal products via partnership with the industry, academic and other stakeholders.

c. MoU with Golden Pharos Berhad

The MoU between FRIM and Golden Pharos Berhad aims to forge collaboration in research and development besides ensuring supply of raw materials especially for FRIM Product Certification Services (FRIM PCS) Programme.

The partnership was in tandem with the goal of our government for Bumiputera Economic Empowerment (PEB) agenda and to strengthen economic growth. The strategic partnership was initiated to address the shortage of raw materials faced by local furniture producers. Thus, it ensures adequate and continuous supply of raw materials, including sawn timber, for Bumiputera furniture producers involved in the FRIM PCS Programme.

II. ANUGERAH DAN PENGIKTIRAFAN

Syabas diucapkan kepada FRIM kerana terus mendapat pelbagai anugerah dan pengiktirafan daripada agensi luar, termasuk dari luar negara, antaranya:

a. Pengerusi Jawatankuasa Eksekutif Persatuan Institusi-Institusi Penyelidikan Perhutanan Asia Pasifik

Tahniah kepada Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod yang telah dilantik semula sebagai Pengerusi Jawatankuasa Eksekutif Persatuan Institusi-Institusi Penyelidikan Perhutanan Asia Pasifik (APAFRI) mulai 2018 sehingga 2021.

b. Japanese International Award for Young Agricultural Researchers

Saya turut berbangga dengan pencapaian seorang Penyelidik FRIM, Dr Farah Fazwa Md Ariff yang telah menerima pengiktirafan "Japanese International Award for Young Agricultural Researchers" 2018 di United Nations University Tokyo, Jepun pada 6 November 2018. Anugerah tersebut diberikan oleh Kementerian Pertanian, Perhutanan dan Perikanan (MAFF) Jepun sejak tahun 2007 sebagai pengiktirafan kepada sumbangan dan pencapaian cemerlang penyelidik asing muda terhadap pembangunan teknologi demi meningkatkan bidang pertanian, perhutanan dan perikanan di negara-negara membangun.

c. Anugerah Kecemerlangan Penarafan Lima Bintang Pengurusan Kewangan Berdasarkan Indeks Akauntabiliti 2016

Tahniah juga kepada FRIM yang telah menerima Anugerah Kecemerlangan Penarafan Lima Bintang Pengurusan Kewangan Berdasarkan Indeks Akauntabiliti bagi tahun 2016 daripada Jabatan Audit Negara pada 5 Mac 2018.

d. Ekspo Teknologi Malaysia (MTE) 2018

Di samping itu, beberapa anugerah inovasi telah diterima oleh FRIM pada Ekspo Teknologi Malaysia (MTE). Projek inovasi "Modular Seating System" yang diketuai Nik Adlin Nik Mohamed Sukri dan Dr Wan Tarmeze Wan Ariffin telah memenangi anugerah "Best Invention in Design Award" daripada Japan Intellectual Property Association di MTE pada 24 Februari 2018. Kumpulan projek ini terdiri daripada Tariq Mubarak Husin, Zairul Amin Rabidin dan Khairul Masseat.

II. AWARDS AND RECOGNITION

My heartiest congratulations to FRIM for continuously receiving awards and recognition from local and international agencies. Among these are:

a. Chairman of Asia Pacific Association of Forestry Research Institutions (APAFRI)

Congratulations to Director General of FRIM, Dato' Dr Abd Latif Mohmod, for being elected again as Chairman of APAFRI from 2018 until 2021.

b. Japanese International Award for Young Agricultural Researchers

I am also proud of Dr Farah Fazwa Md Ariff for being a recipient of the "Japanese International Award for Young Agricultural Researchers 2018" at United Nations University Tokyo, Japan on 6 November 2018. The award was presented by Japanese Ministry of Agriculture, Forestry and Fishery since 2007 in recognition of contributions and excellent achievements of young foreign researchers to development of technologies for the improving agriculture, forestry and fishery in developing nations.

c. Financial Management Five Star Rating Excellence Award Based on Accountability Index

Thumbs up for FRIM for receiving the Financial Management Five Star Rating Excellence Award Based on Accountability Index for year 2016 from the National Audit Department on 5 March 2018.

d. Malaysia Technology Expo (MTE) 2018

In addition, FRIM has received several awards from MTE. Modular Seating System, an innovative project led by Nik Adlin Nik Mohamed Sukri and Dr Wan Tarmeze Wan Ariffin, received the "Best Invention in Design Award" at the MTE on 24 February 2018. The project was assisted by Tariq Mubarak Husin, Zairul Amin Rabidin and Khairul Masseat.

e. Islamic Global Innovation Festival and Talent (i-GIFT)

Para penyelidik FRIM turut memenangi satu pingat perak dan satu gangsa pada i-Inova yang diadakan sempena "Islamic Global Innovation Festival and Talent" (i-GIFT) pada 10–11 Mac 2018. Projek inovasi "PDM3: Nature Inspired Active Ingredient for an Ecofriendly Multipurpose Disinfectant" oleh Dr Mastura Mohtar, Dr Saiful Azmi Johari dan Mohd Ramdan Parman memenangi pingat perak manakala projek "CompAcc: Compost for Acclimatisation" oleh Dr Farah Fazwa Md Ariff, Dato' Dr Marzalina Mansor, Syafiqah Nabilah dan Norhayati Saffie memenangi pingat gangsa.

f. Anugerah Malaysia Book of Records

Lima pengiktirafan *Malaysia Book of Records* (MBR) yang diterima oleh Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod serta empat pengiktirafan MBR yang lain menjadikan FRIM memperoleh 37 rekod MBR sempena Ulang Tahun ke-33 FRIM pada 2018. Syabas dan tahniah! Pengiktirafan MBR merupakan antara usaha ke arah mempertingkatkan pengetahuan dan kesedaran umum tentang kepentingan FRIM sebagai sebuah institusi penyelidikan serta mempamerkan keunikan dan tarikan di FRIM. Saya dimaklumkan bahawa FRIM ialah satu-satunya jabatan kerajaan yang telah memperoleh 37 rekod, termasuk enam rekod individu yang dipegang oleh Ketua Pengarahnya. Pencapaian yang luar biasa ini sungguh membanggakan kerana jarang terdapat jabatan yang memegang lebih daripada 30 rekod.

e. Islamic Global Innovation Festival and Talent (i-GIFT)

FRIM also won a silver medal at i-Inova for project title "PDM3: Nature Inspired Active Ingredient for an Ecofriendly Multipurpose Disinfectant" by Dr Mastura Mohtar, Dr Saiful Azmi Johari and Mohd Ramdan Parman and, a bronze medal for "CompAcc: Compost for Acclimatisation" by Dr Farah Fazwa Md Ariff, Dato' Dr Marzalina Mansor, Syafiqah Nabilah and Norhayati Saffie. The event was held in conjunction with "Islamic Global Innovation Festival and Talent" (i-GIFT) on 10–11 March 2018.

f. The Malaysia Book of Records

Director General of FRIM, Dato' Dr Abd. Latif Mohmod, was awarded five Malaysia Book of Records (MBR) certificates and four other MBR certificates, totaling 37 MBR in conjunction with the 33rd Anniversary of FRIM in 2018. Well done! The MBR recognition is one of many efforts by FRIM towards enhancing knowledge and public awareness on the importance of FRIM as a research institution while featuring the uniqueness and attractions in FRIM. I was informed that FRIM is the only government agency obtaining 37 records of which six is held by the Director General. This extraordinary achievement is impressive as there are few agencies that hold more than 30 records.

g. Sijil Pengiktirafan Skim Galakan Penerbitan (CREAM) 2018

Selain itu, *Journal of Tropical Forest Science* (JTFS) terbitan FRIM telah menerima Sijil Pengiktirafan Skim Galakan Penerbitan (CREAM) 2018 bagi kategori "Jurnal Berprestasi Tinggi Diindeks dalam Web of Science (WoS)" dalam bidang "Sains, Teknologi dan Perubatan" pada 25 Oktober 2018 di Sepang, Selangor. Pengiktirafan ini bertujuan untuk meraikan jurnal-jurnal tempatan yang berprestasi cemerlang sebagai satu galakan bagi peningkatan serta visibiliti jurnal ilmiah negara di persada antarabangsa.

III. ANGGOTA INSTITUT

Mulai 1 Oktober 2018, ramai anggota Institut yang baharu telah dilantik. Saya mengucapkan terima kasih kepada semua anggota Institut (termasuk anggota silih ganti) yang telah tamat tempoh pada 30 September 2018. Mereka ialah Dato' Sr Dr Azimuddin Bahari, Dr Megat Sany Megat Ahmad Supian, Encik Imri Dolhadi Ab. Wahab, Cik Azrin Mohd Zabri, Dr Mohammad Shaharin Umar, Dato' Roslan Ariffin, Dato' Nor Akhirrudin Mahmud, Dr Lee Ying Fah, Datuk Zurinah Pawanteh, Dato' Dr Jalaluddin Harun, Puan Hjh Norchahaya Hashim, Dato' Sri Mohd Amim A. Wahab, Datuk Wira Rosli Mat Hassan, Dato' Goh Leng Chua dan Datuk Mat Noor Nawi.

g. 2018 Publishing Encouragement Scheme (CREAM) Award

Published by FRIM, Journal of Tropical Forest Science (JTFS) was granted the 2018 Publishing Encouragement Scheme (CREAM) Award for the category of High Impact Indexed Journal in Web of Science in the field of "Science, Technology and Medicine" on 25 October 2018 at Sepang, Selangor. The award is given in recognition of excellent accomplishment of local scholarly journals as an incentive to improve international visibility of these journals.

III. MEMBERS OF THE INSTITUTE

From 1 October 2018, several new members of Institute will be appointed. I would like to thank all members of Institute (including alternate members) whose appointment ended on 30 September 2018. They are Dato' Sr Dr Azimuddin Bahari, Dr Megat Sany Megat Ahmad Supian, Encik Imri Dolhadi Ab. Wahab, Cik Azrin Mohd Zabri, Dr Mohammad Shaharin Umar, Dato' Roslan Ariffin, Dato' Nor Akhirrudin Mahmud, Dr Lee Ying Fah, Datuk Zurinah Pawanteh, Dato' Dr Jalaluddin Harun, Puan Hjh Norchahaya Hashim, Dato' Sri Mohd Amim A. Wahab, Datuk Wira Rosli Mat Hassan, Dato' Goh Leng Chua and Datuk Mat Noor Nawi.

Saya juga mengalu-alukan anggota-anggota Institut yang baru dilantik (termasuk ahli silih ganti) mulai 1 Oktober 2018 dan berharap mereka ini akan bersama-sama saya untuk membawa satu dimensi baharu dalam usaha-usaha FRIM terutamanya ke arah komersialisasi hasil-hasil R&D-nya. Mereka termasuklah Dato' Suhaimi Mamat, Dato' Wan Mazlan Wan Mahmood, Encik Ahmad Kamal Wasis, Puan Norazeyan Dzul Kornain, Dato' Nadzir Hj. Sheikh Fazir, Datuk Borhanudin Arshad, Dr Robert Cyril Ong Kim Leong, Dr Arthur Chung Yaw Chyang, Encik Hamden Mohammad, Encik Mad Zaidi Mohd Karli@Sukari dan Puan Habibah Ahmad. Saya juga mengalu-alukan anggota Institut yang telah sekian lama bersama-sama sejak Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia dahulu sehingga kini iaitu Datuk Wira Sheikh Othman Sheikh Abdul Rahman. Tidak dilupakan ialah Dato' Dr Abd. Latif Mohmod yang telah mengemudikan FRIM selaku Ketua Pengarah dengan begitu cemerlang. Diharap, dengan gabungan anggota Institut yang mewakili suara para pemegang taruhnya, FRIM akan terus mengorak langkah dan terus menempa nama di mata dunia terutamanya dalam R, D, C &A bidang perhutanan tropika.

Pelbagai anugerah dan pengiktirafan yang diterima oleh FRIM pada 2018 merupakan pencapaian yang sangat membanggakan dan saya berharap ia tidak terhenti setakat ini sahaja. Semoga kejayaan demi kejayaan yang dicapai akan dijadikan pencetus semangat untuk terus merekayasakan pelbagai idea baharu yang dapat menyumbang kepada pembangunan negara. Saya juga berharap agar usaha-usaha komersialisasi yang diletakkan di bawah tanggungjawab FRIM Inc. akan mula menjana pendapatan baharu dan mampu memberdayakan R, D & C FRIM dalam penghasilan produk yang dikenali ramai dan dimanfaatkan oleh pengguna akhir.

I would like to extend a warm welcome to newly appointed members of Institute (including alternate members) from 1 October 2018 and hope that we can bring FRIM into a new paradigm in the pursuit towards commercialisation of R&D findings. The new members are Dato' Suhaimi Mamat, Dato' Wan Mazlan Wan Mahmood, Mr Ahmad Kamal Wasis, Mdm Norazeyan Dzul Kornain, Dato' Nadzir Hj. Sheikh Fazir, Datuk Borhanudin Arshad, Dr Robert Cyril Ong Kim Leong, Dr Arthur Chung Yaw Chyang, Mr Hamden Mohammad, Mr Mad Zaidi Mohd Karli@Sukari and Mdm Habibah Ahmad. I also welcome Datuk Wira Sheikh Othman Sheikh Abdul Rahman, a member of Institute who has been with us since the days of Malaysian Forestry Research and Development Board until now. I am also thankful to Dato' Dr Abd. Latif Mohmod, who has pivoted FRIM into achieving many outstanding accomplishments. With the new line of members of Institute representing different stakeholders, I am sure that FRIM will continue to pursue her quest and excel in R, D, C & A in the field of tropical forestry at local and international levels.

Having achieved various awards and recognitions in 2018, I hope that FRIM will not cease to excel in future. May these achievements further provoke more innovative ideas for the development of our country. I also hope that various efforts in commercialization under FRIM Inc. will generate new income and incorporate R, D & C of FRIM into products that are well-known and beneficial to end-users.

DATO' DR TAN YEW CHONG
Pengerusi/Chairman
Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

Anggota Institut Penyelidikan Perhutanan Malaysia
Members Of The Forest Research Institute Malaysia

Anggota dan Anggota Silih Ganti/Members and Alternate Members

Kementerian Air, Tanah dan Sumber Asli
Ministry of Water, Land and Natural Resources

(Pengerusi/Chairperson)
YBhg. Dato' Sri Azizan Ahmad
SSAP, SIMP, DSAP, DIMP, SMP
(hingga/Until 30/9/2018)

YBhg. Dato' Dr Tan Yew Chong,
DSAP, AMP, PSK (mulai/from 1/10/2018)

Kementerian Air, Tanah dan Sumber Asli
Ministry of Water, Land and Natural Resources

YBhg. Dato' Sr Dr Azimuddin Bahari
DSPN, DJN
(hingga/until 31/7/2018)

YBrs. Dr Megat Sany Megat Ahmad Supian
(Ahli Silih Ganti/Alternate Member
(hingga/until 31/7/2018)

YBhg. Dato' Suhaimi Mamat
AK, BCM, KMN, PSK, DIMP, JMW, DPSK
(mulai/from 1/10/2018)

YBhg. Dato' Wan Mazlan Wan Mahmood
DIMP
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Perbendaharaan Malaysia, Kementerian Kewangan
Treasury Malaysia, Ministry of Finance (MOF)

YBrs. Encik/Mr Imri Dolhadi Ab. Wahab

YBrs. Cik Azrin Mohd Zabri
(hingga/until 30/9/2018)

Unit Perancang Ekonomi,
Kementerian Hal Ehwal Ekonomi
Economic Planning Unit,
Ministry of Economic Affairs

YBrs. Dr Mohammed Shaharin Umar
(hingga/until 30/9/2018)

YBrs. Encik/Mr Ahmad Kamal Wasis
(mulai/from 1/10/2018)

YBrs. Puan Norazeyan Dzul Kornain
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

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

YBhg. Dato' Nor Akhirrudin Mahmud
DIMP, SMP, AAP

YBhg. Dato' Roslan Ariffin
(hingga/until 30/9/2018)

YBhg. Datuk Borhanudin Arshad
DPSM, AMS
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Jabatan Perhutanan Sabah
Sabah Forestry Department

YBrs. Dr Lee Ying Fah
ADK
(hingga/until 30/9/2018)

YBrs. Dr Robert Cyril Ong Kim Leong
ADK (mulai/from 1/10/2018)

YBrs. Dr Arthur Chung Yaw Chyang
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Jabatan Hutan Sarawak
Forest Department Sarawak

YBrs. Encik/Mr Hamden Mohammad
(mulai/from 1/10/2018)

YBrs. Encik/Mr Jack anak Liam
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Kementerian Perusahaan Utama
Ministry of Primary Industries

YBhg. Datuk Zurinah Pawanteh
PMW (hingga/until 30/9/2018)

YBrs. Encik/Mr Mad Zaidi Mohd Karli@Sukari
(mulai/from 1/10/2018)

YBrs. Puan/Ms Habibah Ahmad
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industry Board

YBhg. Dato' Dr Jalaluddin Harun
DSAP (hingga/until 31/12/2018)

YBrs. Puan/Ms Hjh Norchahaya Hashim
KMN (hingga/until 31/12/2018)

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

YBhg. Datuk Wira Sheikh Othman Sheikh Abdul Rahman
DCSM, DIMP, JP

Wakil Lantikan Menteri
Representatives appointed by the Minister

YBhg. Dato' Sri Mohd Amim A. Wahab
SSAP, DIMP
(hingga/until 30/9/2018)

YBhg. Datuk Wira Rosli Mat Hassan
DCSM, PJN, DPMT, DMSM, JMN, AMT, JP, PJK
(hingga/until 30/9/2018)

YBhg. Datuk Mat Noor Nawi
PJN, DMSM, DKSMK, KMN, AMN
(hingga/until 30/9/2018)

YBhg. Dato' Goh Leng Chua
PSBS
(hingga/until 30/9/2018)

Persatuan Pengusaha Industri Perabot Bumiputera Malaysia (PETRA)
Bumiputera Furniture Industry Entrepreneurs Association Malaysia

YBhg. Dato' Nadzir Hj. Sheikh Fazir
DIMP
(mulai/from 1/10/2018)

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

YBhg. Dato' Dr Abd. Latif Mohmod
DIMP, JSM, KMN, AMN

Anggota Institut Penyelidikan Perhutanan Malaysia
Members Of The Forest Research Institute Malaysia

Dato' Dr Tan Yew Chong

Dato' Suhaimi Mamat

Datuk Wira Sheikh Othman Sheikh Abdul Rahman

Dr Robert Cyril Ong Kim Leong

En. Hamden Mohammad

Dato' Nadzir Hj. Sheikh Fazir

Dato' Dr Jalaluddin Harun

Dato' Nor Akhirrudin Mahmud

En. Imri Dol Hadi

Mad Zaidi Mohd Karli@Sukari

En. Ahmad Kamal Wasis

Dato' Dr Abd. Latif Mohmod

Jawatankuasa Kewangan dan Perjawatan
Finance and Establishment Committee

Ahli dan Ahli Silih Ganti
Members and Alternate Members

Kementerian Air, Tanah dan Sumber Asli
Ministry of Water, Land and Natural Resources

(Pengerusi/Chairperson)

YBhg. Dato' Sri Azizan Ahmad
SSAP, SIMP, DSAP, DIMP, SMP
(hingga/Until 30/9/2018)

YBhg. Dato' Dr Tan Yew Chong
DSAP, AMP, PSK
(mulai/from 1/10/2018)

Kementerian Air, Tanah dan Sumber Asli
Ministry of Water, Land and Natural Resources

YBhg. Dato' Sr Dr Azimuddin Bahari
DSPN, DJN (hingga/until 31/7/2018)

YBrs. Dr Megat Sany Megat Ahmad Supian
(Ahli Silih Ganti/Alternate Member
(hingga/until 31/7/2018)

YBhg. Dato' Suhaimi Mamat
AK, BCM, KMN, PSK, DIMP, JMW, DPSK
(mulai/from 1/10/2018)

YBhg. Dato' Wan Mazlan Wan Mahmood
DIMP
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

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

YBhg. Dato' Nor Akhirrudin Mahmud
DIMP, SMP, AAP
(mulai/from 1/10/2018)

YBhg. Dato' Roslan Ariffin
(hingga/until 30/9/2018)

YBhg. Datuk Borhanudin Arshad
DPSM, AMS
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Perbendaharaan Malaysia, Kementerian Kewangan
Treasury Malaysia, Ministry of Finance (MOF)

YBrs. Encik/Mr Imri Dolhadi Ab. Wahab

YBrs. Cik Azrin Mohd Zabri
(hingga/until 30/9/2018)

Unit Perancang Ekonomi
Kementerian Hal Ehwal Ekonomi
Economic Planning Unit,
Ministry of Economic Affairs

YBrs. Dr Mohammed Shaharin Umar
(hingga/until 30/9/2018)

YBrs. Encik/Mr Ahmad Kamal Wasis
(mulai/from 1/10/2018)

YBrs. Puan Norazeyan Dzul Kornain
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

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

YBhg. Datuk Wira Sheikh Othman Sheikh Abdul Rahman
DCSM, DIMP, JP

Jabatan Perkhidmatan Awam
Public Service Department

YBhg. Dato' Mohtar Mohd Abd Rahman
DPMS, PMW, JSM

YBrs. Puan Hasmarulaini Omar

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia (FRIM)

YBhg. Dato' Dr Abd. Latif Mohmod
DIMP, JSM, KMN, AMN

Jawatankuasa Audit
Audit Committee

Ahli dan Ahli Silih Ganti
Members and Alternate Members

Kementerian Air, Tanah dan Sumber Asli (KATS)
Ministry of Water, Land and Natural Resources

Pengerusi/Chairman

YBrs. Dr Megat Sany Megat Ahmad Supian
(hingga/until 31/7/2018)

YBhg. Dato' Suhaimi Mamat
AK, BCM, KMN, PSK, DIMP, JMW, DPSK
(mulai/from 1/10/2018)

YBhg. Dato' Wan Mazlan Wan Mahmood
DIMP
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Perbendaharaan Malaysia, Kementerian Kewangan
Treasury Malaysia, Ministry of Finance (MOF)

YBrs. Encik/Mr Imri Dolhadi Ab Wahab

YBrs. Cik Azrin Mohd Zabri
(hingga/until 30/9/2018)

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

YBhg. Datuk Wira Sheikh Othman Sheikh Abdul Rahman
DCSM, DIMP, JP

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industry Board (MTIB)

YBhg. Dato' Dr Jalaluddin Harun
DSAP
(hingga/until 30/9/2018)

YBrs. Puan/Mdm Hjh Norchahaya Hashim
KMN
(hingga/until 30/9/2018)

Kementerian Perusahaan Utama
Ministry of Primary Industries

YBhg. Datuk Zurinah Pawanteh
PMW
(hingga/until 30/9/2018)

Jabatan Perhutanan Semenanjung Malaysia
Forestry Department of Peninsular Malaysia

YBhg. Dato' Nor Akhirrudin Mahmud
DIMP, SMP, AAP
(mulai/from 1/10/2018)

YBhg. Datuk Borhanudin Arshad
DPSM, AMS
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Unit Perancang Ekonomi,
Kementerian Hal Ehwal Ekonomi
Economic Planning Unit,
Ministry of Economic Affairs

YBrs. Encik/Mr Ahmad Kamal Wasis
(mulai/from 1/10/2018)

YBrs. Puan/Mdm Norazeyan Dzul Kornain
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Jawatankuasa Projek Kerjasama dengan Agensi Luar
Committee of Collaboration Project with External Agency

Ahli dan Ahli Silih Ganti
Members and Alternate Members

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia
Pengerusi/Chairman
YBhg. Dato' Dr Abd. Latif Mohmod
DIMP, JSM, KMN, AMN

Kementerian Air, Tanah dan Sumber Asli (KATS)
Ministry of Water, Land and Natural Resources

YBhg. Dato' Sr Dr Azimuddin Bahari
DSPN, DJN
(hingga/until 31/7/2018)

YBrs. Dr Megat Sany Megat Ahmad Supian
(Ahli Silih Ganti/Alternate Member
[hingga/until 31/7/2018])

YBhg. Dato' Suhaimi Mamat
AK, BCM, KMN, PSK, DIMP, JMW, DPSK
(mulai/from 1/10/2018)

YBhg. Dato' Wan Mazlan Wan Mahmood
DIMP
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Jabatan Perhutanan Semenanjung Malaysia
Forestry Department of Peninsular Malaysia

YBhg. Dato' Nor Akhirrudin Mahmud
DIMP, SMP, AAP
(mulai/from 1/10/2018)

YBhg. Dato' Roslan Ariffin
(hingga/until 30/9/2018)

YBhg. Datuk Borhanudin Arshad
DPSM, AMS
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

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

YBhg. Datuk Wira Sheikh Othman Sheikh Abdul Rahman
DCSM, DIMP, JP (hingga/until 30/9/2018)

Wakil Lantikan Menteri
Representative appointed by the Minister

YBhg. Dato' Goh Leng Chua
PSBS (hingga/until 30/9/2018)

Persatuan Pengusaha Perabot Bumiputera (PETRA)
Bumiputera Furniture Industry Entrepreneurs Association Malaysia

YBhg. Dato' Nadzir Hj Sheikh Fazir
DIMP
(mulai/from 1/10/2018)

Unit Perancang Ekonomi,
Kementerian Hal Ehwal Ekonomi
Economic Planning Unit,
Ministry of Economic Affairs

YBrs. Encik/Mr Ahmad Kamal Wasis
(mulai/from 1/10/2018)

YBrs. Puan/Mdm Norazeyan Dzul Kornain
(Ahli Silih Ganti/Alternate Member
[mulai/from 1/10/2018])

Jawatankuasa Komersialisasi
Commercialisation Committee

Ahli dan Ahli Silih Ganti
Members and Alternate Members

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

Pengerusi/Chairman

YBhg. Dato' Dr Abd. Latif Mohmod
DIMP, JSM, KMN, AMN
(hingga/until 30/9/2018)

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industries Board (MTIB)

Pengerusi/Chairman

YBhg. Dato' Dr Jalaluddin Harun
DSAP
(mulai/from 1/10/2018)

Wakil Lantikan Menteri
Representatives appointed by the Minister

YBhg. Dato' Sri Mohd Amim A. Wahab
SSAP, DIMP
(hingga/until 30/9/2018)

YBhg. Dato' Goh Leng Chua
PSBS
(hingga/until 30/9/2018)

YBhg. Datuk Wira Rosli Mat Hassan
DCSM, PJN, DPMT, DMSM, JMN, AMT, JP, PJK
(hingga/until 30/9/2018)

YBhg. Datuk Mat Noor Nawi
PJN, DMSM, DKSMK, KMN, AMN
(hingga/until 30/9/2018)

Unit Perancang Ekonomi,
Kementerian Hal Ehwal Ekonomi
Economic Planning Unit,
Ministry of Economic Affairs

YBrs. Dr Mohammed Shaharin Umar
(hingga/until 30/9/2018)

YBrs. Encik/Mr Ahmad Kamal Wasis
(mulai/from 1/10/2018)

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

YBrs. Dr Khali Aziz Hamzah
(mulai/from 1/10/2018)

Kementerian Air, Tanah dan Sumber Asli (KATS)
Ministry of Water, Land and Natural Resources

YBhg. Dato' Wan Mazlan Wan Mahmood
DIMP
(mulai/from 1/10/2018)

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

YBhg. Datuk Wira Sheikh Othman Sheikh Abdul Rahman
DCSM, DIMP, JP
(mulai/from 1/10/2018)

Mesyuarat Anggota Institut/Members of Institute Meetings

Bil. No.	Mesyuarat Meetings	Tarikh Date
1	Anggota Institut Members of Institute	Bil.1/2018: 13/3/2018 Bil.2/2018: 9/11/2018 Bil.3/2018: 10/12/2018 Bil.4/2018: 21/12/2018
2	Jawatankuasa Kewangan dan Perjawatan Finance and Establishment Committee	Bil.1/2018: 13/3/2018 Bil.2/2018: 10/12/2018

Laporan Ketua Pengarah FRIM
Director General's Report

Laporan Ketua Pengarah FRIM
Director General's Report

DATO' DR ABD. LATIF MOHMOD
Ketua Pengarah/Director General
FRIM

Tahun 2018 menyaksikan FRIM berada dalam dua fasa yang berbeza; sebelum Pilihan Raya Umum ke-14 (PRU 14), FRIM berada di bawah Kementerian Sumber Asli dan Alam Sekitar (NRE); manakala selepas PRU 14 NRE distruktur semula dan membentuk Kementerian Air, Tanah dan Sumber Asli (KATS).

Saya mengucapkan setinggi-tinggi tahniah kepada Dato' Dr Tan Yew Chong, Ketua Setiausaha KATS yang dipilih sebagai Pengerusi Institut yang baharu menggantikan Dato' Seri Azizan Ahmad. Walaupun berlaku perubahan Pengerusi FRIM; visi, misi serta objektif operasi FRIM tidak berubah malah tetap diteruskan bagi mengekalkan kedudukan FRIM selaku institusi penyelidikan perhutanan terunggul di dunia.

FRIM experienced two different phases in 2018; before 14th General Election (GE 14) where FRIM was placed under Ministry of Natural Resources and Environment which was restructured after the GE14 as Ministry of Water, Land and Natural Resources (KATS).

I would like to congratulate Dato' Dr Tan Yew Chong, Secretary General of KATS, for his appointment as the Chairman of Institute after Dato' Seri Azizan Ahmad. Despite these changes in chairmanship of the institute, the vision, mission and objectives of FRIM remain and will continue to be advocated to strengthen FRIM as a world reknowned forestry research institution.

FRIM INCORPORATED SDN BHD

Usaha-usaha FRIM ke arah memantapkan pengurusan komersialisasi hasil-hasil R&D, perkhidmatan kepakaran dan kemahiran termasuk latihan diperkemas menerusi penubuhan FRIM Incorporated Sdn Bhd (FRIM Inc.) pada 4 Ogos 2017 dan mula beroperasi pada September 2017. Penubuhan anak syarikat FRIM ini dapat membantu dalam menjana pendapatan kepada FRIM bagi mengurangkan kebergantungan kewangan kepada Kerajaan dan seterusnya dapat mempromosi FRIM sebagai pusat rujukan dengan pelbagai kepakaran dalam bidang perhutanan tropika.

Petunjuk Prestasi Utama (KPI) yang ditetapkan hingga 19 November 2018 menunjukkan sebanyak 75% berjaya dicapai. Pendapatan terkumpul Syarikat hingga 19 November 2018 ialah RM1,018,329 dengan pendapatan sebanyak RM1,018,329 iaitu 68% daripada sasaran pendapatan yang ditetapkan (RM1,500,00). Jumlah perbelanjaan pula ialah sebanyak RM1,907,281 iaitu melebihi 36% daripada sasaran keseluruhan perbelanjaan yang disasarkan (RM1,400,000). Kedudukan kewangan FRIM Inc. bertambah baik pada akhir suku tahun keempat dengan peningkatan dalam perolehan projek khidmat perundingan dan penjualan produk.

FRIM Inc. sedang mengusahakan kerjasama dengan beberapa syarikat dalam usahanya untuk meningkatkan pendapatan. Kerjasama dengan Felda dalam penanaman pokok meranti temak nipis sebagai satu bentuk perladangan yang mempunyai nilai komersial dijangka akan memberikan pulangan dalam penjualan anak pokok.

PENCAPAIAN PERKHIDMATAN PENSIJILAN PRODUK FRIM

Pada 2018, Perkhidmatan Pensijilan Produk FRIM (FRIM PCS) telah mempersijilkan semua kategori produk perabot dan perabot pasang siap. Dalam usaha memperkasakan industri perabot bumiputera khususnya bagi membekalkan produk berkualiti kepada pelanggan, pada 2018 FRIM PCS telah melaksanakan pensijilan produk perabot berasaskan kayu daripada 15 syarikat dengan 61 produk bagi zon-zon utara, tengah, selatan dan timur).

FRIM PCS akan memastikan industri berasaskan produk keluaran hutan memenuhi spesifikasi yang diperlukan dan standard yang ditentukan oleh pihak-pihak berkepentingan dan pengguna. Secara tidak langsung FRIM PCS membantu industri berasaskan kayu dalam pembuatan produk yang berkualiti setanding dengan jangkaan dan keperluan pelanggan.

FRIM INCORPORATED SDN BHD

FRIM Incorporated Sdn Bhd (FRIM Inc.) was established on 4 August 2017 in an effort towards empowering the commercialisation of R&D findings, consultation services and technology transfer including trainings. FRIM Inc began its operation in September 2017. This incorporation was founded to assist FRIM in income generation to reduce financial dependency on the government and subsequently to promote FRIM as a referral centre with various expertise in the field of tropical forestry.

Until 19 November 2018, 75% of the key performance indicators had been achieved with an accumulated income of RM1,018,329 or 68% of the targeted income (RM1,500,000). Total expenditure was RM1,907,281 or 36% higher than expected (RM1,400,000). The financial situation improved in the fourth quarter of the year with increased income from consultation services and sale of products.

FRIM Inc. is currently reviewing opportunities of joint venture with several companies to increase profit. Among these is partnership with Federal Land Development Authority (FELDA) to plant *Shorea roxburghii* or locally known as *meranti temak nipis* as a plantation species to generate income from sale of seedlings.

FRIM PRODUCT CERTIFICATION SERVICES

In 2018, FRIM Product Certification Services (FRIM PCS) was accredited to certify all government contract furniture products and knock-down furniture products. In order to empower bumiputera furniture industry particularly for supply of products with good quality, FRIM PCS certification had been awarded to 15 companies for wood-based furniture with 61 products (for north, center, south and east zones).

FRIM PCS will ensure that forest products-based industry adheres to relevant specifications and standards specified by stakeholders and users. Thus, FRIM PCS indirectly assists wood-based industry in manufacturing products with quality that meet the expectations and needs of customers.

SOROTAN PENCAPAIAN PENYELIDIKAN DAN PEMBANGUNAN

Kegawatan ekonomi global turut memberi kesan terhadap penerimaan dana daripada agensi kerajaan dan swasta pada 2018, namun FRIM terus mencapai pelbagai kejayaan yang menggalakkan terutamanya dalam bidang penyelidikan dan pembangunan (R&D). Di samping berjaya mengekalkan akreditasi MS ISO 9001: 2008 daripada Intertek International selama sepuluh tahun berturut-turut, FRIM berjaya memperbaharui Sijil Amalan Persekitaran Berkualiti atau 6S daripada Perbadanan Produktiviti Malaysia. Secara umumnya, FRIM terus mengekalkan 30 akreditasi dan pengiktirafan daripada badan kebangsaan dan antarabangsa seperti *Furniture Industry Research Association* (FIRA), Amalan Pengilangan Baik (GMP) dan Persijilan Halal dari Jabatan Kemajuan Islam Malaysia.

FRIM telah melaksanakan 137 projek R&D pada 2018 (berbanding 117 projek pada 2017), termasuk 35 projek baharu berjumlah kira-kira RM27.8 juta dengan dana penyelidikan daripada pelbagai agensi kerajaan dan swasta dari dalam dan luar negara. FRIM telah menghantar 50 cadangan penyelidikan bagi mendapatkan dana dari agensi-agensi luar seperti kerajaan negeri, persekutuan, Skim Geran Penyelidikan Asas, Jawatankuasa Teknikal Mengenai Penyelidikan dan Pembangunan serta Tabung Amanah Konservasi Sumber Asli Nasional serta dana di bawah Rancangan Malaysia ke-11. Secara ringkasnya, antara projek R&D yang mencapai hasil memberangsangkan pada 2018 ialah:

a. Peningkatan Kualiti Produk daripada Tumbuhan Hutan Paya Laut

Hutan paya laut adalah penting kerana ekosistemnya yang dinamik dan sangat produktif serta kaya dengan spesies yang mempunyai khasiat perubatan. Walau bagaimanapun, khasiat tumbuhan hutan paya laut ini memerlukan penyelidikan dan pembangunan (R & D) agar mutu produk yang dihasilkan dapat dipertingkatkan, mempunyai nilai saintifik, berkesan dan selamat untuk digunakan.

Jawatankuasa Teknikal Mengenai Penyelidikan dan Pembangunan Program Penanaman Bakau dan Spesies Lain yang Sesuai di Pesisiran Pantai Negara (JTRD) telah meluluskan projek "Peningkatan Kualiti Produk Terhasil daripada Tumbuhan Hutan Paya Laut" untuk membantu Persatuan Kebajikan Nelayan-nelayan Pantai Pulau Pinang (PIFWA) dalam meningkatkan kualiti produk seperti teh jeruju dan jem buah berembang di samping melihat potensi spesies paya laut yang lain.

HIGHLIGHTS OF ACHIEVEMENTS ON RESEARCH AND DEVELOPMENT

Global economic downturn in 2018 had affected funding received from government agencies and private sector. Nonetheless, FRIM continued to attain various encouraging achievements in research and development (R&D). Besides retaining MS ISO 9001:2008 certification from Intertek International for ten consecutive years, FRIM has successfully renewed Quality Environment Practice Certificate or 6S from Malaysia Productivity Corporation. In general, FRIM retained 30 accreditations and recognition from national and international bodies including *Furniture Industry Research Association* (FIRA), Good Manufacturing Practice (GMP) and Halal Certificate from Department of Islamic Development Malaysia.

FRIM carried out 137 R&D projects in 2018 (compared to 117 projects in 2017), including 35 new projects, amounting to approximately RM27.8 million with local and international research funds from both public and private sectors (Appendix 2). A total of 50 research proposals were submitted for fundings from various agencies including state and federal governments, Fundamental Research Grant Scheme, Technical Committee on Research and Development and National Conservation Trust Fund for Natural Resources under 11th Malaysia Plan. Among the R&D projects that achieved significant results in 2018 were:

a. Improving Quality of Products from Mangroves

Mangrove is an important ecosystem that is dynamic, productive and rich with plants having medicinal properties. Nevertheless, R&D on the potential medicinal benefits of mangrove is needed to improve the quality of products based on scientifically-proven results to ascertain product safety and efficacy.

National Technical Committee on Research and Development of Programme on Planting Mangrove and Other Suitable Species along the Coastlines had approved the project on "Improving Quality of Products from Mangrove" to help Penang Inshore Fishermen Welfare Association (PIFWA) to improve the quality of products like *jeruju* tea and mangrove apple fruit jam besides exploring the potentials of other mangrove species.

Jaminan kualiti ialah komponen yang penting dalam pembangunan produk kerana ia dapat meningkatkan mutu produk tersebut, menjana maklumat saintifik dan memastikan produk tempatan yang dihasilkan selamat, berkesan serta mematuhi peraturan yang ditetapkan oleh Kementerian Kesihatan Malaysia. FRIM telah berusaha bagi menentukan keselamatan produk keluaran PIFWA melalui ujian bebanan mikroorganisma dan had logam berat. Penemuan awal menunjukkan kedua-dua produk bebas daripada logam berat. Teh jeruju didapati tercemar dengan mikroorganisma, namun masih dianggap selamat dan tidak menjejaskan kesihatan kerana air panas semasa penyediaan teh dapat membunuh mikroorganisma berkenaan. Pihak PIFWA telah mengambil tindakan proaktif melalui pengeluaran teh jeruju versi kedua yang menunjukkan produk ini bebas daripada pencemaran mikroorganisma dan logam berat.

Lapan lagi spesies paya laut dikaji potensinya untuk dibangunkan sebagai produk iaitu (*Soneratia caseolaris*), jeruju putih (*Acanthus ilicifolius*), jeruju hitam (*A. ebracteatus*), api-api ludat (*Avicennia officinalis*), api-api jambu (*A. marina*), api-api putih (*A. alba*), piai lasa (*Acrostichum speciosum*) dan tumu putih (*Bruguiera sexangula*). Ekstrak berembang berpotensi dibangunkan dalam produk kosmetik dan penjagaan kulit.

b. Pensahihan *Hibiscus sabdariffa* L. (Rozel) dengan Pencirian Morfologi dan Cap Jari Kromatografi

Pensahihan merupakan isu utama dalam sektor perindustrian yang menggunakan ekstrak semula jadi. Komposisi ekstrak semula jadi yang menentukan keberkesanan, keselamatan dan kualiti produk dipengaruhi oleh faktor-faktor seperti spesies botani, asal usul geografi, penanaman, umur tumbuhan, amalan tuaian, serta proses pengekstrakan. Pertubuhan Kesihatan Sedunia (WHO), Pentadbiran Makanan dan Dadah Amerika Syarikat (USFDA) dan Agensi Ubat Eropah (EMEA) menyatakan bahawa pensahihan spesies adalah antara analisis pertama yang perlu dijalankan untuk memastikan kualiti dan diskriminasi daripada spesies yang berkaitan atau sampel yang dipalsukan. Oleh itu, pendekatan analitis yang cepat dan tepat pada dasarnya diperlukan untuk mengenal pasti penggunaan bahan permulaan yang betul.

Quality assurance is an important aspect in product development in order to improve product quality, generate scientific information and ensuring local products that are safe, effective and in accordance to regulations enforced by Minstry of Health, Malaysia. As such, FRIM assisted PIFWA in ensuring product safety through analysis of micobial load and heavy metal. Although *jeruju* tea was found to be contaminated by microorganism, it was still considered safe and did not have any health implications as hot water used for preparation of the tea was able to kill the microorganism. PIFWA has taken a proactive role by producing a second version of *jeruju* tea that was found to be free from contamination by microorganism and heavy metals.

Eight other mangrove species studied for product development were *Soneratia caseolaris*, *Acanthus ilicifolius*, *A. ebracteatus*, *A. officinalis*, *A. marina*, *A. alba*, *Acrostichum speciosum* and *Bruguiera sexangula*. Extract of *S. caseolaris* has the potential to be developed into cosmetics or skincare products.

b. Authentication of *Hibiscus sabdariffa* L. (Roselle) using Morphological Characteristics and Chromatographic Fingerprinting

Authentication is an important aspect in any industry that uses natural extracts. Composition of natural extracts that determine efficacy, safety and quality of products are affected by many factors including species, geographical origin, planting, age, harvesting practice and extraction process. World Health Organization (WHO), United States Food and Drug Administration (USFDA) and European Medicines Agency (EMEA) emphasize that authentication is one of the first analyses needed to ensure quality and discriminate from related species or adulterated samples. Therefore, rapid and accurate analysis is necessary to identify correct starting materials.

Hibiscus sabdariffa L. (rozel; Malvaceae) mempunyai pelbagai kegunaan tradisional dan berpotensi sebagai makanan, minuman herba, minuman panas dan sejuk, sebagai agen perasa dalam industri makanan dan sebagai ubatan herba. Kajian in vitro dan vivo serta beberapa ujian klinikal membuktikan bahawa ekstrak *H. sabdariffa* menunjukkan kesan antibakteria, antioksidan, perlindungan nefro dan hepato, diuretik, metabolisme lipid (antikolesterol), kencing manis dan antihipertensi.

Kajian FRIM menunjukkan kesan farmakologi yang menarik dalam keadaan obesiti yang dikaitkan dengan kehadiran beberapa derivatif asid kafeoilkuinik dalam ekstrak piawai *H. sabdariffa*. Tambahan pula, protokol cap jari komprehensif melalui pendekatan botani dan kimia telah dibangunkan untuk pensahihan dan verifikasi dua jenis *H. sabdariffa* yang ditanam sebagai sayuran (asam paya), untuk membuat teh atau jus kordial (rozel) atau sebagai hiasan. Pembangunan cap jari kimia dengan pengenalpastian secara kualitatif terhadap derivatif asid kafeoilkuinik menggunakan kromatografi lapisan tipis yang tinggi (HPTLC) dan teknik kromatografi cecair prestasi tinggi (HPLC) juga boleh digunakan untuk mengesahkan *H. sabdariffa*.

c. Merakyatkan Hasil Kajian Melalui Projek Penanaman Herba Kacip Fatimah di Kampung Sagil, Tangkak, Johor

Projek penanaman herba kacip fatimah di bawah geran Program *MOSTI Social Innovation* telah dijalankan di Bukit Gambir, Ledang, Johor dengan penglibatan ahli Persatuan Peniaga Kecil Kampung Sagil (PPKS) bagi membantu penduduk memperoleh pendapatan tambahan. Sebahagian besar penduduk merupakan peladang serta pekebun getah dan kelapa sawit. Projek ini dapat membantu apabila berlaku kejatuhan harga serta penurunan produktiviti tanaman komoditi seperti getah dan kelapa sawit yang diusahakan. Projek ini memberi impak kepada peningkatan pendapatan orang kampung yang seterusnya dapat memartabatkan taraf ekonomi negara.

Selain itu, projek ini dijalankan kerana tumbuhan herba kacip fatimah mendapat permintaan yang tinggi daripada industri berasaskan produk herba. Bekalan bahan mentah dari hutan asli tidak dapat memenuhi permintaan industri kerana sumber yang semakin berkurangan dan tidak dapat dipastikan kualitinya. Oleh itu, satu inisiatif bagi mengekalkan kelestarian pengeluaran bahan mentah herba perlu dijalankan.

Hibiscus sabdariffa L. (roselle; Malvaceae) has many traditional and potential uses as food, herbal drink, in hot or cold beverages, for flavouring and as a medicinal herb. In vitro and in vivo researches as well as several clinical trials had provided evidences that extracts of *H. sabdariffa* showed antibacterial, anti-oxidant, nephro- and hepato-protective, diuretic, lipid metabolism (anti-cholesterol), anti-diabetic and anti-hypertensive effects among others.

Research in FRIM had also demonstrated interesting pharmacological effects of *H. sabdariffa* on obesity with the presence of derivatives of caffeoylquinic acid in phytochemically characterised and well-designed standardised extract. Furthermore, comprehensive fingerprint protocol through botanical and chemical approaches had been developed for the purposes of authentication and verifcation of two types of *H. sabdariffa* which are locally grown as vegetables (asam paya), for making tea or cordial drink (roselle) or as an ornamental plant.

c. Technology Transfer through a Project on Planting Kacip Fatimah in Kampung Sagil, Tangkak, Johor

Planting of kacip fatimah herb through a grant from MOSTI Social Innovation (MSI) Programme has been carried out at Bukit Gambir, Ledang, Johor with the participation of members from Kampung Sagil Small Scale Businessman Association to improve income generation of villagers. A majority of villagers are rubber tree or oil palm farmers. This project is important when prices or productivity of commodities like rubber and palm oil drop. The project can improve the income of villagers that contributes to empowering national economy.

In addition, this project was initiated due to the high demand for kacip fatimah by herbal industry. Supply of raw materials from natural forest is not able to meet such demand as sources are depleting and quality of these sources is unknown. Thus, one such project is crucial in ensuring a sustainable supply of herbal raw material.

Melalui R&D, kumpulan penyelidik FRIM berjaya menghasilkan klon superior kacip fatimah yang mempunyai ciri pertumbuhan dan kandungan kimia aktif yang baik. FRIM juga mempunyai teknologi memperbanyak bahan tanaman superior ini melalui teknik kultur tisu menggunakan Sistem Rendaman Sementara (SRS). Projek MSI ini dijalankan oleh FRIM (pembekal teknologi) bersama-sama Malaysian Bioeconomy Development Corporation Sdn Bhd (MBDC) (sebagai match-maker), Persatuan Peniaga Kecil Kampung Sagil, Tangkak, Johor (pelaksana projek) dan Bioalpha Holdings Berhad (syarikat pembeli) bagi memastikan bekalan bahan mentah yang mampan dan berkualiti tinggi.

Objektif projek ini adalah bagi merekayasakan hasil kajian FRIM untuk memberi faedah kepada rakyat melalui usaha perladangan bahan tanaman kacip fatimah yang berkualiti di samping dapat meningkatkan penyertaan isi rumah luar bandar dalam aktiviti keusahawanan berasaskan bioteknologi.

FRIM membekalkan baka kacip fatimah berkualiti tinggi daripada kaedah kultur tisu melalui MBDC kepada komuniti di Ledang. Mereka kemudiannya dilatih tentang kaedah menanam serta membiakkan bahan tanaman yang dibangunkan oleh FRIM iaitu penjagaan dan penanaman di ladang sehingga dapat dituai oleh penduduk kampung.

Projek ini dapat memulihara serta mengurangkan tekanan ekploitasi hutan asli untuk bahan mentah herba dengan kaedah domestikasi spesies ini secara perladangan serta memastikan pihak industri mendapat bekalan bahan mentah berkualiti lagi terjamin. Di samping itu, penduduk kampung mampu menjana pendapatan tambahan hingga RM22,500 setiap satu pusingan bagi penanaman seluas 1 ha. Produk berasaskan ekstrak kacip fatimah berkualiti dari Malaysia ini berpotensi menembusi pasaran antarabangsa dalam tempoh 2–3 tahun.

d. Projek Bank Germplasma Dipterokarpa Negara

Projek bermula pada tahun 2013 dengan cadangan penubuhan bank germplasma bagi melindungi dan seterusnya mengekalkan spesies pokok dan tumbuhan tempatan yang telah dikategorikan sebagai terancam. Projek Bank Germplasma Dipterokarpa Negara telah mendapat kelulusan kewangan daripada Tabung Amanah Konservasi Sumber Asli Nasional (NCTF), NRE. Bank Germplasma Dipterokarpa Negara menggunakan

R&D by a group of researchers in FRIM had successfully produced a superior clone of kacip fatimah with good growth characteristics and desirable active compounds. This superior clone had been propagated through a tissue culture technique using Temporary Immersion System (SETIS). This MSI project was jointly carried out by FRIM (as technology provider), Malaysian Bioeconomy Development Corporation Sdn Bhd (MBDC) (as match-maker), Kampung Sagil Entrepreneurs Association (executing party) and Bioalpha Holdings Berhad (buyer) to provide a sustainable source of high quality raw material.

This project aimed to enhance research findings of FRIM in order to benefit the nation through efforts in farming high quality kacip fatimah as well as to increase the involvement of rural communities in biotechnology-based entrepreneurship.

FRIM supplies kacip fatimah with high quality traits from tissue culture technique through MBDC to community in Ledang. The villagers were given trainings on planting technique and propagation of planting material that were developed by FRIM which included from caring and planting of kacip fatimah until harvesting

This project is able to conserve and reduce pressure from exploitation of natural forests for herbal raw materials by domestication of this species through farming to ensure a promising supply of high quality raw materials. Villagers also benefited from increased income up to RM22,500 per hectare in each harvest. Products containing high quality kacip fatimah extracts from Malaysia have the potential to be marketed internationally in 2–3 years.

d. National Dipterocarp Germplasm Bank Project

This project on establishment of a germplasm bank commenced in 2013 to protect and conserve threatened or endangered native plants. The National Dipterocarp Germplasm Bank Project had obtained financial approval from the National Conservation Trust Fund for Natural Resources (NCTF), NRE. This project employs the concept of *ex-situ* conservation through collection of species with priority for lowland dipterocarp species in the endangered to least concern categories.

konsep pemuliharaan secara ex-situ dengan keutamaan kepada spesies dipterokarpa tanah pamah yang terancam sehingga risiko rendah semasa kutipan.

Projek ini akan mengetengahkan fungsi Kementerian Air, Tanah dan Sumber Asli (KATS) dalam pelaksanaan dasar, strategi dan program yang berkaitan dengan pemuliharaan dan pengurusan sumber semula jadi. Pemuliharaan bahan tanaman secara ex situ dapat mengekalkan sumber genetik spesies dipterokarpa daripada pelbagai kategori status konservasi di kawasan yang selamat dan boleh digunakan pada masa hadapan selain penerokaan bidang baharu INSTUN yang berkaitan dengan pengurusan tanah sebagai Pusat Kecemerlangan Pengurusan dan Penggunaan Tanah. Projek ini juga boleh memberi nilai tambah sebagai tempat pelancongan edupelancongan dan ekopelancongan peringkat kementerian dan negeri Perak khususnya. Projek ini melibatkan kerjasama FRIM dengan agensi-agensi lain seperti KATS, Jabatan Perhutanan Semenanjung Malaysia dan INSTUN.

e. Spesies Baharu Lycopodiaceae dan Zingiberaceae di Semenanjung Malaysia

Semakan famili yang sedang dijalankan untuk *Flora of Peninsular Malaysia* dan fokus kepada eksplorasi botani oleh kumpulan *Flora of Peninsular Malaysia* telah menemui dan menghuraikan tiga spesies baharu yang menarik dari Semenanjung Malaysia. Spesies-spesies ini ialah *Phlegmariurus iminii* (sejenis epifit di atas pokok yang tumbuh di kawasan batu kapur) dan *P. monticola* (sejenis epifit di atas pokok yang tumbuh di kawasan pergunungan bawah hingga pergunungan atas) dalam famili Lycopodiaceae dan *Scaphochlamys disticha* (sejenis tumbuhan herba yang tumbuh di kawasan hutan tanah pamah dipterokarpa) dalam famili Zingiberaceae. Kesemua spesies baharu ini endemik kepada Semenanjung Malaysia.

f. Ekologi, Populasi dan Pengurusan Anai-anai Perosak Pokok Ru di Pesisiran Pantai Semenanjung Malaysia

Pokok ru membantu menstabilkan pesisiran pantai berpasir sebagai pemecah angin, pengurangan hakisan pantai dan penstabilan tanah di samping mengindahkan dan mewujudkan kawasan pantai yang teduh. Pokok ru yang ditanam secara meluas dengan kaedah perladangan kadangkala menghadapi masalah kemerosotan kesihatan yang disebabkan pelbagai faktor biotik dan abiotik. Satu daripada anai-anai perosak yang berkepentingan ekonomi, *Coptotermes gestroi*, menyerang pokok-pokok ru di Pantai Senok, Kelantan.

The project will demonstrate the role of KATS in executing policies, strategies and programmes related to conservation and management of natural resrouces. *Ex-situ* conservation of plants will sustain the genetic sources of dipterocarp species, under all conservation status, in a safe area at National Institute of Land and Survey (INSTUN) for future plans. This project is in addition to the role of INSTUN as Center of Excellent Management and Land Use. The project involving FRIM and other agencies including KATS, INSTUN and Forestry Department Peninsular Malaysia (FDPM) can also be used as an edu-tourism or eco-tourism site for the ministry and state of Perak.

e. New Species of Lycopodiaceae and Zingiberaceae in Peninsular Malaysia

On-going revision of the Lycopodiaceae family for Flora of Peninsular Malaysia and focus of botanical exploration by Flora of Peninsular Malaysia team found and described three new interesting species. These species were *Phlegmariurus iminii* (an epiphyte on trees growing in limestone area), *P. monticola* (an epiphyte on trees growing in lower to upper montane forest) and *Scaphochlamys disticha* (a herbaceous plant growing in lowland dipterocarp forest) from Zingiberaceae family. All these new species are endemic to Peninsular Malaysia.

f. Ecology, Population and Management of Termites Attacking Casuarina Trees along Coastal Areas of Peninsular Malaysia

Casuarina helps to stabilise sandy beaches as windbreaker, reduces coastal erosion and stabilises soil besides beautifying and creating a shady beach area. Large scale planting of casuarinas in plantation can cause deterioration of tree health due to biotic and abiotic factors. One of the termites with economical importance is *Coptotermes gestroi* that attacks casuarina trees at Pantai Senok, Kelantan.

Petak kajian rawatan menggunakan teknik pengumpanan julung-julung kali diaplikasikan terhadap pokok-pokok hidup di pesisiran pantai. Umpan ini diletakkan pada batang pokok yang mempunyai galeri *C. gestroi* aktif. Perubahan populasi anai-anai ini dipantau melalui stesen umpan kayu getah yang ditanam di pangkal pokok.

Penerbitan buku panduan/manual *Ekologi, Populasi dan Pengurusan Anai-anai Perosak Pokok Ru di Pesisiran Pantai Semenanjung Malaysia* bertujuan untuk meningkatkan ilmu pengetahuan tentang biologi dan ekologi anai-anai di pesisir pantai serta pengurusannya. Dengan adanya pengetahuan ini, serangan anai-anai perosak boleh dikesan awal melalui pemantauan kesihatan pokok secara berkala serta rawatan bersesuaian.

g. Pengesanan Kepekaan Ultra Sensitif Gas Formaldehid yang Dibebaskan daripada Produk Komposit Kayu

FRIM dengan kerjasama Institut Kejuruteraan Nano Elektronik (INEE) Universiti Malaysia Perlis (UNIMAP) berjaya membangunkan kaedah untuk mengesan gas formaldehid menggunakan makmal mudah alih pada cip nanosensor dengan kepekaan ultra (had pengesanan=0.1ppm), kebolehulangan dan kebolehulangan (Sisihan Piawai Relatif (RSD)=kurang daripada 20%), julat kepekatan dinamik gas formaldehid (0.1–100 ppm), masa pengesanan (60 saat) dan tiada gangguan daripada matriks sampel dan gas-gas lain. Berat sensor yang difabrikasi adalah sekitar 500 g.

Sensor yang dibangunkan ini tidak hanya berguna untuk mengesan kepekatan gas formaldehid tetapi juga boleh diubah suai untuk mengesan gas berbahaya yang lain. Impak projek ini ialah penawaran teknologi pengesanan gas untuk kegunaan komersial seperti industri biokomposit dan resin. Untuk kelestarian alam sekitar, inovasi ini dapat membantu mengurangkan kesan pencemaran kepada alam sekitar kerana bebas daripada bahan kimia berbahaya dan hanya sedikit sampel diperlukan untuk ujian.

A treatment research plot using baiting technique was applied for the first time on surviving trees along the coast. The bait was placed on tree stem with active *C. gestroi* gallery. The changes in population of the termites were monitored through a rubberwood bait station placed at the base of the tree.

The book on Ecology, Population and Management of Termites Attacking Casuarina Trees along Coastal Areas of Peninsular Malaysia aims to improve knowledge on the biology and ecology of termites on coastal areas and their management. With this knowledge, attacks of termites can be detected at an early stage through scheduled observation on tree health and appropriate treatment can then be administered.

g. Ultra Sensitive Detection of Formaldehyde Gas Emitted by Composite Wood Product

FRIM, in collaboration with Institute of Nano Electronic Engineering of University Malaysia of Perlis succeeded in developing a method to detect formaldehyde gas using a portable lab on nanosensor chip with ultra ** (detection limit = 0.1ppm), repeatability (relative standard deviation = below 20%), dynamic concentration range of formaldehyde gas (0.1–100 ppm), detection time (60 seconds) and without disturbance from sample matrix and other gases. The fabricated sensor is about 500 g.

The sensor can be used not only for detecting formaldehyde gas but can also be modified to detect other dangerous gases. This project will make the technology on gas detection available for commercial use in biocomposite and resin industries among others. This environmentally friendly innovation uses only a small amount of sample for testing and is free from dangerous chemicals.

h. Potensi Cuka Asid Bakau sebagai Racun Serangga Mesra Alam

Kajian terhadap sisa daripada industri arang kayu bakau telah dimulakan di FRIM bagi membangunkan produk baharu bernilai tambah. Satu daripada sisa industri arang bakau yang dikaji ialah potensi cuka asid bakau sebagai racun serangga mesra alam. Cuka asid bakau merupakan hasil sampingan daripada proses pembakaran tertutup kayu bakau untuk dijadikan arang. Ia diperoleh selepas penyejukan wap yang terhasil daripada proses pembakaran tertutup tersebut.

Cuka asid bakau mengandungi tujuh komposisi kimia utama yang terdiri daripada asid asetik, keton, aldehid, ester, alkohol, benzen dan fenol. Kehadiran asid asetik yang tinggi berbanding komposisi kimia yang lain menyebabkan nilai pH cuka asid berada di sekitar 2.4–2.6. Cuka asid bakau juga mengandungi 14 elemen kimia iaitu nitrogen, karbon, fosforus, potasium, kalsium, magnesium, kuprum, selenium, zink, natrium, manganes, ferum, sulfur dan boron. Kehadiran komposisi dan elemen kimia tersebut menjadikan cuka asid bakau boleh berfungsi sebagai racun serangga mesra alam serta mikro nutrien kepada tanaman.

i. Pembangunan Nanokomposit Hijau Berkekuatan Tinggi Diperkukuh dengan Selulosa Nanokristal dan Polimer Resin Epoksi

Fokus FRIM ialah menjalankan penyelidikan terhadap bahan nanoselulosa. Teknologi penyelidikan ini dipertingkatkan lagi mulai tahun 2007 yang mana kajian penguraian selulosa kepada nano hablur dan nano fibril selulosa telah dilaksanakan. FRIM berupaya menghasilkan bahan-bahan ini. Maka usaha untuk mempromosikan penggunaan bahan ini dalam industri berasaskan keluaran hutan telah dipergiat. Oleh itu, antara bidang yang dikenal pasti mempunyai potensi penggunaan bahan nanoselulosa adalah dalam penghasilan produk biokomposit. Justeru, kajian ini telah dijalankan dengan mengaplikasikan penggunaan bahan nanohablur selulosa yang dimodifikasi dengan polimer resin epoksi bagi menghasilkan produk nanokomposit berkekuatan tinggi.

h. Potential of Mangrove Vinegar as an Environmentally Friendly Insecticide

In FRIM, research on wastes from mangrove charcoal industry had started to develop new value-added products. One of the wastes from mangrove charcoal industry studied was mangrove vinegar as an environmentally friendly insecticide. Mangrove vinegar is a by-product from burning of mangrove wood in a sealed kiln for making charcoal. It is obtained when vapour, produced from the burning, is cooled.

Mangrove vinegar contains seven main chemical constituents comprising acetic acid, ketone, aldehyde, ester, alchohol, benzene and phenol. High amount of acetic acid present compared to other chemical constituents resulted in pH of around 2.4–2.6 in the mangrove vinegar. The vinegar contains 14 elements namely nitrogen, carbon, phosphorus, potassium, calcium, magnesium, copper, selenium, zinc, sodium, manganese, iron, sulphur and boron. The presence of these constituents and elements allowed mangrove vinegar to act as an environmentally friendly insecticide and at the same time provides micro nutrients for plants.

i. Development of High Strength Green Nanocomposite Reinforced with Nanocrystaline Cellulose and Epoxy Resin Polymer

FRIM also conducts studies on nanocellulose materials. Research in this technology has been improved since 2007 where a study on decomposition of cellulose to nanocrystal and cellulose nanofibril was carried out and the materials were successfully produced. Therefore, efforts to promote the utilisation of these materials in forest produce-based industries have been intensified. One of the fields with potential of utilising nanocellulose material identified is in manufacturing of biocomposites. As such, a study was conducted on application of nanocrystalline cellulose material modified with epoxy resin polymer to produce high strength nanocomposite.

Kajian ini dijalankan oleh FRIM bersama dengan Universiti Kebangsaan Malaysia dan Plus Intervest Sdn Bhd (pengilang papan lapis). Kajian ini berjaya menghasilkan produk nanokomposit mesra alam daripada venir kayu kembang semangkuk dengan saiz ultranipis yang berketebalan kurang daripada 0.3 mm menggunakan bahan perekatan campuran nanohablur selulosa yang terubah suai dengan polimer resin epoksi.

Kaedah baharu ini berbeza dengan kaedah konvensional yang menggunakan resin berasaskan formaldehid yang mana tiada pembebasan gas formaldehid berbahaya daripada produk nanokomposit yang dihasilkan. Kekuatan mekanik bahan nanokomposit telah dipertingkatkan sebanyak 24% dibandingkan dengan bahan biokomposit tanpa nanohablur selulosa. Impak hasil kajian ini merupakan demonstrasi aplikasi penggunaan bahan berasaskan nanoselulosa yang boleh dimanfaatkan oleh pihak berkepentingan dalam bidang keluaran hutan terutama bagi penghasilan produk bernilai tambah.

vi) PEMBANGUNAN SUMBER MANUSIA

Modal insan merupakan aset sesebuah organisasi yang bertanggungjawab dalam menentukan kejayaan sesebuah organisasi. Justeru, FRIM terus memperkasakan modal insannya dengan menggalakkan penjawat awam melanjutkan pengajian hingga ke peringkat tertinggi di universiti di dalam dan di luar negara. Pada 2018, seramai enam orang pegawai berjaya menamatkan Ijazah Kedoktoran (PhD), dan enam orang mendapat Ijazah Sarjana (MSc.).

vii) KHIDMAT PERUNDINGAN DAN KOMERSIALISASI

Kepakaran FRIM terus diiktiraf oleh agensi luar dan dalam negara menerusi pelbagai khidmat perundingan. Daripada 31 projek khidmat perundingan bernilai RM1.75 juta yang ditawarkan pada 2018, 10 khidmat perundingan bernilai melebihi RM50,000. Khidmat kepakaran FRIM yang dijalankan menerusi perundingan ikhtisas, antaranya ialah Cadangan Perkhidmatan Penanaman Pokok-pokok Landskap Hutan dan Berkaitan yang sesuai di Kawasan Muzium Sultan Abu Bakar; Rancangan Pengurusan dan Kajian Analisis Kos dan Faedah Projek Ladang Hutan di Hutan Simpan Lepar, Mukim Lepar dan Penyor, Pekan, Pahang; Cadangan Pengindahan

This study was jointly carried out by FRIM, National University of Malaysia and Plus Intervest Sdn Bhd (a plywood manufacturer). This partnership successfully produced environmentally friendly nanocomposite material from *kembang semangkuk* wood veneer with ultrathin size of less than 0.3 mm in thickness using a mixed adhesive material of nanocrystalline cellulose modified with epoxy resin polymer.

This new method is different from the conventional method that uses formaldehyde-based resin whereby no harmful formaldehyde gas is emitted from the nanocomposite product produced. Mechanical strength of the nanocomposite was improved by 24% compared to biocomposite material without nanocrystalline cellulose. The improved method is expected to benefit stakeholders in the field of forest produce particularly in the production of value-added products through application of nanocellulose-based materials.

vi) HUMAN RESOURCE DEVELOPMENT

Human resource is an asset that directly contributes to the success of any organisation. Therefore, FRIM continues to empower human resource by encouraging staff to pursue further studies locally or overseas. In 2018, six officers successfully completed their degree in Doctor of Philosophy (PhD) and six others in their Masters (MSc) degree.

vii) CONSULTANCY AND COMMERCIALISATION

Expertise in FRIM has been recognised by local and international agencies through various consultancy services. 31 consultancy projects amounting to RM1.75 million were offered in 2018 of which 10 worth over RM50,000 each. Among these projects were *Cadangan Perkhidmatan Penanaman Pokok-pokok Landskap Hutan dan Berkaitan yang Sesuai di Kawasan Muzium Sultan Abu Bakar; Rancangan Pengurusan dan Kajian Analisis Kos dan Faedah Projek Ladang Hutan di Hutan Simpan Lepar, Mukim Lepar dan Penyor, Pekan, Pahang; Cadangan Pengindahan Landskap untuk 52 Unit Rumah Berkembar 2 Tingkat, Bandar Kinrara;* EIA for Genting Permai Mixed Development in Bentong, Pahang; *Penyelenggaraan*

Landskap untuk 52 Unit Rumah Berkembar 2 Tingkat, Bandar Kinrara; EIA for Genting Permai Mixed Development in Bentong, Pahang; Penyelenggaraan Pokok dan Tanaman Landskap termasuk Kawasan Wall Plants, Linear Park, Taman Permainan dan Water Fountain Bandar Kinrara Puchong, Selangor; Penilaian Perkhidmatan Ekosistem Hutan dan Kebergantungan Komuniti terhadap Hutan Simpan Ampang dan Hutan Simpan Hulu Langat, Selangor serta Perkhidmatan Establishment of Model of Ornamental Forest for the Corepark, Universiti Teknologi Petronas.

Aktiviti komersialisasi menyaksikan FRIM telah menandatangani dua pelesenan teknologi dengan FRIM Incorporated Sdn Bhd bagi Ekstrak dan Formulasi Produk Tongkat Ali [*Eurycoma longifolia* dan Rozel (*Hibiscus sabdariffa*)] serta *contract manufacturing* bagi kedua-dua herba.

FRIM juga telah membuat tiga pemfailan paten pada 2018 iaitu bagi "An Anti-Ovarian Cancer Composition" dan "An Antihypertrophic Compound for Cardiomyocite Cells," kedua-duanya oleh Dr Nurhanan Murni Yunos, serta "A Method of Drying Hardwoods" oleh Zairul Amin Rabidin.

FRIM mendaftarkan 31 pendedahan reka cipta bagi hasil penyelidikannya pada 2018 berbanding 22 pada 2017. Tiga teknologi baharu atau teknologi sedia ada yang ditambah baik bagi keperluan industri telah dihasilkan. Teknologi tersebut termasuklah peningkathasilan bahan mentah tongkat ali melalui teknologi kultur akar rerambut, peningkathasilan bahan aktif daripada basidiomiset bagi kemampanan bahan mentah ke arah penghasilan produk antibakteria (MRSA) serta penubuhan petak pengeluaran untuk spesies cucur atap bagi penghasilan bahan mentah berkualiti.

viii) PEMINDAHAN TEKNOLOGI

Dalam usahanya menyebarkan hasil-hasil R&D kepada pihak yang berkepentingan termasuklah pihak industri dan orang awam, FRIM telah menganjurkan sejumlah 69 bengkel/dialog/seminar/persidangan/ latihan termasuklah beberapa siri bengkel kesedaran pengetahuan tradisi bagi beberapa subetnik Orang Asli. Program pemindahan teknologi yang telah dijalankan sepanjang 2018, antaranya ialah:

Pokok dan Tanaman Landskap termasuk Kawasan Wall Plants, Linear Park, Taman Permainan dan Water Fountain Bandar Kinrara Puchong, Selangor; Penilaian Perkhidmatan Ekosistem Hutan dan Kebergantungan Komuniti terhadap Hutan Simpan Ampang dan Hutan Simpan Hulu Langat, Selangor and Service on the Establishment of Model of Ornamental Forest for the Corepark, Universiti Teknologi Petronas.

In view of commercialisation efforts, two technology licensing were signed with FRIM Inc. for Extract and Formulation of Tongkat Ali (*Eurycoma longifolia*) and Roselle (*Hibiscus sabdariffa*) Products and, contract manufacturing for both herbs.

FRIM also filed three patents namely "An Anti-Ovarian Cancer Composition" and "An Antihypertrophic Compound for Cardiomyocite Cells," both by Dr Nurhanan Murni Yunos, as well as "A Method of Drying Hardwoods" by Zairul Amin Rabidin.

FRIM registered 31 invention disclosures from R&D activities in 2018 compared to 22 in 2017. Three new technology or improved existing technologies were produced. These included increased production of tongkat ali raw material through hairy root culture technology, increased production of active compound from basidiomycete for sustainable supply of raw material towards production of antibacterial products (MRSA) and establishment of *Baeckea frutescens* plots for production of high quality raw material.

viii) TECHNOLOGY TRANSFER

In an effort to share outputs of R&D to stakeholders, FRIM organised a total of 69 workshops/ dialogues/ seminars/ conferences and trainings including several series or awareness workshop on traditional knowledge for a few subethnic indigenous people. Among the technology transfer programmes carried out in 2018 were:

a. Program Bicara Teknologi MyWood-ID

Institut Penyelidikan Perhutanan Malaysia (FRIM) telah menganjurkan Program Bicara Teknologi MyWood-ID pada 15 Mei 2018 di FRIM, Kepong untuk memberi penerangan yang lebih jelas tentang penggunaan aplikasi tersebut. Program ini dihadiri oleh 36 orang wakil daripada 17 agensi kerajaan yang memerlukan kemahiran pengecaman kayu dalam tugasan seperti Lembaga Perindustrian Kayu Malaysia (MTIB), Jabatan Kastam Diraja Malaysia serta Jabatan Perhutanan Semenanjung Malaysia (JPSM) dan jabatan-jabatan perhutanan negeri lain.

Diharapkan agar teknologi Aplikasi MyWood-ID ini akan dapat membantu pihak berkuasa, pihak industri perkayuan serta orang awam dalam pengecaman kayu dengan cepat dan tepat; serta membantu memperkasakan ekonomi negara dan meletakkan Malaysia antara negara yang berjaya menghasilkan teknologi terkini dalam sektor perkayuan. Aplikasi MyWood-ID yang menggunakan telefon pintar iPhone dan lensa khas ini telah dibangunkan oleh FRIM dengan kerjasama Universiti Tunku Abdul Rahman (UTAR).

b. Bengkel Eksplorasi Herba di Hujung Jari yang bertemakan, "Memperluas Jaringan Industri dan Peluang Perniagaan"

FRIM telah menganjurkan Bengkel Eksplorasi Herba di Hujung Jari yang bertemakan, "Memperluas Jaringan Industri dan Peluang Perniagaan" pada 29 Ogos 2018 di FRIM, Kepong. Tujuan program adalah untuk mempromosikan aplikasi mudah alih HerbaXpress serta mendapatkan maklum balas peserta. Aplikasi tersebut merupakan portal yang menghubungkan pemain-pemain industri herba supaya pencapaian maklumat berkaitan industri tersebut dapat diperoleh dengan lebih mudah dan cepat. Seramai 41 orang peserta yang terdiri daripada warga kerja FRIM, wakil industri herba dan agensi kerajaan telah menghadiri bengkel tersebut.

a. MyWood-ID Technology Talk Programme

MyWood-ID Technology Talk Programme was held on 15 May 2018 in FRIM to provide information on the use of this application. It was attended by 36 representatives from 17 government agencies who needed knowledge on wood identification in performing their duties for example Malaysian Timber Industry Board (MTIB), Royal Malaysian Customs Department, FDPM and state forestry departments.

MyWood-ID Application was developed by FRIM in collaboration with Universiti Tunku Abdul Rahman (UTAR). It uses iPhone and a special lense. It is hoped that this application will help relevant enforcing authorities, wood industry and the public in identifying wood quickly and accurately. Development of this application will also place Malaysia among countries that excel in technology of wood industry.

b. Workshop on Herbal Exploration at Fingertips themed "Enlarging Industrial Networking and Business Opportunities"

FRIM organised Workshop on Herbal Exploration at Fingertips themed "Enlarging Industrial Networking and Business Opportunities" on 29 August 2018 in FRIM, Kepong. The programme aimed at promoting HerbaXpress application and obtaining feedbacks from participants. The application serves as a portal to connect herbal industry players so that access information on the industry can be obtained easily and quickly. A total of 41 participants comprising FRIM staff, representatives from the herbal industry and government agencies attended the workshop.

c. Seminar Rafflesia di Malaysia 2018 bertemakan "Status Penyelidikan Rafflesia: Satu Perspektif"/ 2018

Institut Penyelidikan Perhutanan Malaysia (FRIM) telah menganjurkan Seminar Rafflesia di Malaysia 2018 yang bertemakan 'Status Penyelidikan Rafflesia: Satu Perspektif' di FRIM, Kepong pada 13 November 2018. Seminar yang julung-julung kali dianjurkan ini bertujuan berkongsi maklumat penyelidikan dan pembangunan (R&D), penemuan saintifik, teknologi serta pemuliharaan mengenai Rafflesia di Malaysia. Seminar ini merupaka anjuran bersama FRIM, Lembaga Kemajuan Tanah Persekutuan (FELDA) dan Felda Global Ventures Holdings Berhad (FGV).

Pusat Pemuliharaan dan Interpretif Rafflesia (PPIR) di kawasan FELDA Bersia Timur yang ditubuhkan bersama oleh FRIM, FGV dan FELDA dijangka disiapkan pada 2020. Ia merupakan pusat pertama di Semenanjung Malaysia yang dibangunkan untuk penyelidikan, pendidikan alam sekitar dan konservasi (in-situ dan ex-situ) Rafflesia serta berperanan memacu ekonomi setempat. Projek ini memberi fokus kepada usaha pemerkasaan industri pelancongan dengan penglibatan masyarakat Orang Asli serta mempromosikan Gerik sebagai tarikan ekopelancongan.

d. Usaha Mencapai Status Tapak Warisan Dunia (WHS) UNESCO

Pengumuman belanjawan dan sokongan kerajaan baharu mendorong FRIM meningkatkan usahanya ke arah mencapai status Tapak Warisan Dunia (WHS) UNESCO. Belanjawan yang dibentangkan mencerminkan kesungguhan kerajaan kita dalam memulihara hutan negara serta menunjukkan sokongan terhadap usaha FRIM untuk mencapai status WHS UNESCO menjelang tahun 2020. FRIM telah memulakan usaha ini sejak 2008 lagi dan menubuhkan satu pasukan untuk berusaha mencapai hasrat ini dengan sokongan Kerajaan Selangor dan Jabatan Warisan Negara (JWN). FRIM juga sedang menyediakan Dossier Lengkap bagi WHS UNESCO Paris untuk penghantaran pada 2019 dan seterusnya, proses penilaian tapak akan dibuat oleh pertubuhan International Council on Monuments and Sites (ICOMOS). FRIM juga sedang merangka rancangan pengurusan untuk memastikan kemampanan dan pemuliharaan kampus hijau serta komuniti setempat.

c. 2018 Rafflesia Seminar in Malaysia themed "Status of Rafflesia Research: A Perspective"

FRIM organised the 2018 Rafflesia Seminar in Malaysia themed "Status of Rafflesia Research: A Perspective" on 13 November 2018. The seminar was organised for the first time to share R&D information, scientific findings, technology and conservation on Rafflesia in Malaysia. It was co-organised by FRIM, FELDA and Felda Global Ventures Holdings Berhad (FGV).

Rafflesia Conservation and Interpretive Center in FELDA Bersia Timur is established by FRIM, FGV and FELDA and, is expected to be completed by 2020. It will be the first center in Peninsular Malaysia established for research, environmental education and conservation (*in-situ* and *ex-situ*) of Rafflesia as well as to enhance local economy. This project focuses on expanding tourism industry with involvement of indigenous people while promoting Gerik as an ecotourism attraction.

d. Towards Achieving World Heritage Site (WHS) UNESCO

Announcement of budget and support from the new government have driven FRIM to intensify efforts towards achieving UNESCO World Heritage Status (WHS). The budget tabled reflected on the commitment of our government in forest conservation and the support towards FRIM to achieve UNESCO WHS by 2020. The effort by FRIM has started since 2008 with the forming of a team with support from Selangor State and Natural Heritage Department. FRIM is currently preparing a complete nomination dossier for UNESCO WHS Paris for submission in 2019. Subsequently, site evaluation process will be conducted by International Council on Monuments and Sites (ICOMOS). FRIM is also designing management plan to ascertain the sustainability and conservation of a green campus and local community.

FRIM mula melaksanakan Projek WHS UNESCO pada 2013. FRIM telah menganjurkan Persidangan Tapak Warisan Negeri Selangor 2018 pada 14–15 November 2018 dengan kerjasama Jabatan Perancangan Bandar dan Desa Negeri Selangor serta JWN. Persidangan ini bertujuan untuk berkongsi penemuan saintifik yang berkaitan dengan nilai sejagat cemerlang bagi FRIM serta Permatang Kuarza Gombak Selangor. FRIM, Permatang Kuarza Gombak Selangor dan Taman Negeri Royal Belum di Gerik, Perak telah diterima dalam senarai pencalonan WHS UNESCO pada 2017.

ix) PENERBITAN

Setiap tahun, FRIM menghasilkan pelbagai siri penerbitan dalam usaha menyebarluaskan hasil dan maklumat R&D-nya kepada pihak awam serta berkepentingan. Pada 2018, antara lain, FRIM telah menerbitkan sebanyak empat jilid *Journal of Tropical Forest Science*, empat keluaran surat berita—FRIM in Focus; tujuh makalah dalam *Timber Technology Bulletin*; pelbagai laporan institusi, empat judul di bawah siri *FRIM Research Pamphlet* dan *Laporan Tahunan FRIM 2017*. FRIM juga telah menerbitkan beberapa judul buku mesra ilmu termasuklah *Setiu New Forest: A Gift from Nature, Pictorial Guide to the Flora of Tasik Chini* dan *Cantik Namun Beracun.*

Sebanyak 21 daripada 79 makalah hasil penulisan saintis FRIM telah diterbitkan dalam jurnal berfaktor impak; manakala 114 kertas saintifik dan teknikal telah dibentangkan oleh para saintis FRIM di persidangan, seminar, simposium, bengkel serta mesyuarat dan kursus-kursus di peringkat kebangsaan dan antarabangsa. FRIM turut menyebarkan maklumat-maklumat R, D & C melalui media sosial termasuk laman antara muka (Facebook) rasmi FRIM.

x) TANGGUNGJAWAB SOSIAL KORPORAT

FRIM turut melaksanakan aktiviti tanggungjawab sosial korporat (CSR) bagi mewujudkan kesedaran terhadap kepentingan dan penjagaan alam sekitar dalam kalangan komuniti setempat, orang awam mahupun badan-badan korporat. Program menanam pokok ialah aktiviti CSR yang paling popular di FRIM. Pada 2018, sebanyak 29 agensi/organisasi/ badan korporat terlibat dengan aktiviti CSR FRIM, termasuklah penanaman pokok oleh KLCC, *International Association of Professional Congress Organisers* (IAPCO) dan *Malaysia Building Society Berhad*. FRIM turut menjalankan aktiviti gotong-royong yang melibatkan agensi luar seperti KPJ Healthcare Berhad dan OMRON Electronics Sdn Bhd.

FRIM started the UNESCO WHS project since 2013. Selangor Heritage Sites Conference 2018 held on 14–15 November 2018 was co-organised by FRIM, Natural Heritage Department and the Selangor Town and Country Planning Department. The conference was organised to share scientific findings related to outstanding universal values for FRIM and Gombak Selangor Quartz Ridge. FRIM, Gombak Selangor Quartz Ridge and Royal Belum in Gerik, Perak were accepted for UNESCO WHS nomination in 2017.

ix) PUBLICATIONS

Each year, FRIM produces various publication series to disseminate R&D findings and information to stakeholders and to the general public. In 2018, FRIM had published, among others, four volumes of Journal of Tropical Forest Science; four issues of newsletter —FRIM in Focus; seven issues of Timber Technology Bulletin; various institutional reports, four titles under FRIM Research Pamphlet and FRIM Annual Report 2017. FRIM also published several coffee table books including Setiu New Forest: A Gift from Nature, Pictorial Guide to the Flora of Tasik Chini and *Cantik Namun Beracun.*

21 out of 79 articles by FRIM researchers were published in journals with impact factor while 114 scientific and technical papers were presented at national and international conferences, seminars, symposiums, workshops, meetings and trainings. FRIM also disseminated R, D & C information through social media including FRIM official Facebook page.

x) CORPORATE SOCIAL RESPONSIBILITY

FRIM also organised corporate social responsibility (CSR) activities to create awareness on the importance of protecting the environment among local communities, the general public as well as corporate bodies. Tree planting programme was the most popular programme in FRIM. In 2018, 28 agencies/ organisations/ corporate bodies took part in FRIM CSR activities including tree planting at KLCC, International Association of Professional Congress Organisers (IAPCO) and Malaysia Building Society Berhad. FRIM also carried out *gotong-royong* involving other agencies like KPJ Healthcare Berhad and OMRON Electronics Sdn Bhd.

xi) MAKALAH DALAM MEDIA

Pelbagai aktiviti berkaitan R&D dan CSR FRIM mendapat liputan meluas daripada media elektronik dan media cetak. Sehingga September 2018, sebanyak 122 makalah berkenaan R&D FRIM telah disiarkan oleh media termasuk di Sabah dan Sarawak dengan nilai perhubungan awam (PR value) berjumlah RM21.4 juta berbanding dengan RM7.6 juta pada 2017.

xii) PELAWAT

FRIM sentiasa menerima kunjungan pelawat dari pelbagai agensi kerajaan dan swasta termasuklah orang kenamaan, saintis, pelajar sekolah dan universiti serta orang awam dari dalam dan luar negara. Pada 2018, FRIM menerima kunjungan kira-kira 413 635 orang pelawat.

KESIMPULAN

Secara keseluruhannya, pada 2018 aktiviti-aktiviti utama FRIM yang merangkumi penjanaan output dan keberhasilan berkualiti daripada aktiviti penyelidikan dan pembangunan, penghasilan dan komersialisasi produk serta teknologi, pelaksanaan khidmat perundingan dan pemindahan teknologi, pembangunan sumber manusia serta penghasilan bahan penerbitan FRIM telah mencapai prestasi yang memberangsangkan. Hal ini dapat dilihat dengan jelas menerusi pencapaian pelbagai anugerah dan pengiktirafan. Aktiviti CSR yang meningkatkan kesedaran terhadap kepentingan alam sekitar serta inisiatif berkongsi maklumat dan kejayaan FRIM dengan pihak awam melalui media elektronik dan media cetak turut menyumbang kepada prestasi utama FRIM bagi 2018. Pencapaian objektif FRIM dan penghasilan output utama pada 2018 adalah seiring dengan sasaran serta aspirasi yang ditetapkan.

xi) ARTICLES IN MEDIA

Various FRIM R&D and CSR activities obtained wide coverage from electronic and print media. Until September 2018, a total of 122 articles on FRIM R&D were featured by media including in Sabah and Sarawak with PR value amounting to RM21.4 million compared to RM7.6 million in 2017.

xii) VISITORS

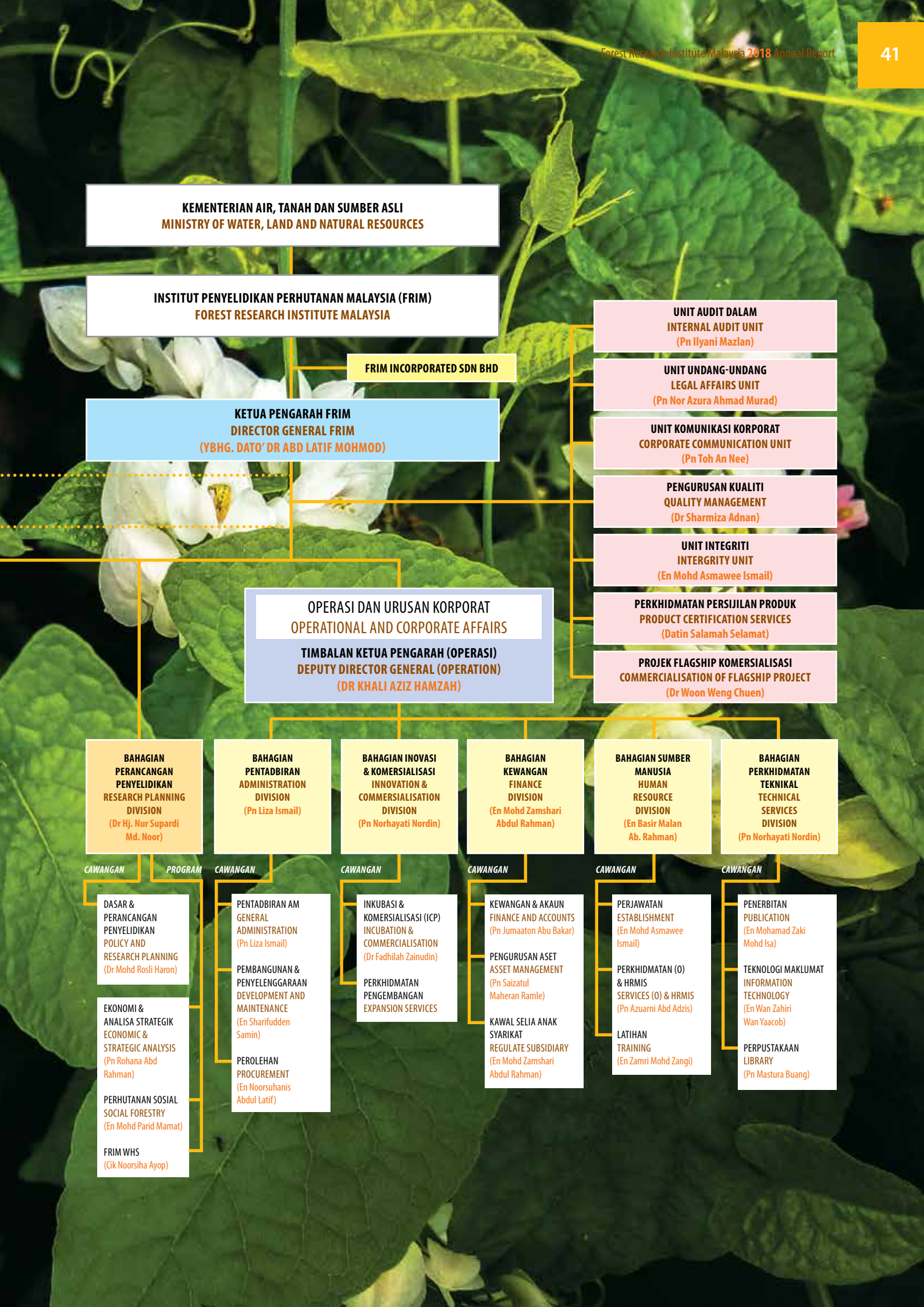
Visitors of FRIM from both public and private agencies included influential people, scientists, students and the general public from local and overseas. In 2018, there were 413 635 visitors to FRIM.

CONCLUSION

In conclusion, FRIM had attained encouraging successes this year which included generating important outputs from R&D activities, producing and commercialisation of products and technologies, conducting consultancy services and technology transfer, developing human resource as well as publishing research findings. These were evident through various awards and recognitions received. CSR activities further increased awareness on the importance of environment. Moreover, initiatives to share information and achievements of FRIM with the public through media also contributed to the many successes of FRIM in 2018. The accomplishment of FRIM objectives in 2018 was therefore in line with the targets and aspirations set.

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

CARTA ORGANISASI FRIM 2018
FRIM ORGANISATION CHART


KEMENTERIAN AIR, TANAH DAN SUMBER ASLI
MINISTRY OF WATER, LAND AND NATURAL RESOURCES
INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA (FRIM)
FOREST RESEARCH INSTITUTE MALAYSIA
FRIM INCORPORATED SDN BHD
KETUA PENGARAH FRIM
DIRECTOR GENERAL FRIM
(YBHG. DATO' DR ABD LATIF MOHMOD)
UNIT AUDIT DALAM
INTERNAL AUDIT UNIT
(Pn Ilyani Mazlan)
UNIT UNDANG-UNDANG
LEGAL AFFAIRS UNIT
(Pn Nor Azura Ahmad Murad)
UNIT KOMUNIKASI KORPORAT
CORPORATE COMMUNICATION UNIT
(Pn Toh An Nee)
PENGURUSAN KUALITI
QUALITY MANAGEMENT
(Dr Sharmiza Adnan)
UNIT INTEGRITI
INTERGRITY UNIT
(En Mohd Asmawee Ismail)
PERKHIDMATAN PERSIJILAN PRODUK
PRODUCT CERTIFICATION SERVICES
(Datin Salamah Selamat)
PROJEK FLAGSHIP KOMERSIALISASI
COMMERCIALISATION OF FLAGSHIP PROJECT
(Dr Woon Weng Chuen)
OPERASI DAN URUSAN KORPORAT
OPERATIONAL AND CORPORATE AFFAIRS
TIMBALAN KETUA PENGARAH (OPERASI)
DEPUTY DIRECTOR GENERAL (OPERATION)
(DR KHALI AZIZ HAMZAH)
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BAHAGIAN PENTADBIRAN
ADMINISTRATION DIVISION
(Pn Liza Ismail)
BAHAGIAN INOVASI & KOMERSIALISASI
INNOVATION & COMMERSIALISATION DIVISION
(Pn Norhayati Nordin)
BAHAGIAN KEWANGAN
FINANCE DIVISION
(En Mohd Zamshari Abdul Rahman)
BAHAGIAN SUMBER MANUSIA
HUMAN RESOURCE DIVISION
(En Basir Malan Ab. Rahman)
BAHAGIAN PERKHIDMATAN TEKNIKAL
TECHNICAL SERVICES DIVISION
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CAWANGAN
PROGRAM
DASAR & PERANCANGAN PENYELIDIKAN
POLICY AND RESEARCH PLANNING
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ECONOMIC & STRATEGIC ANALYSIS
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PERHUTANAN SOSIAL
SOCIAL FORESTRY
(En Mohd Parid Mamat)
FRIM WHS
(Cik Noorsiha Ayop)
CAWANGAN
PENTADBIRAN AM
GENERAL ADMINISTRATION
(Pn Liza Ismail)
PEMBANGUNAN & PENYELENGGARAAN
DEVELOPMENT AND MAINTENANCE
(En Sharifudden Samin)
PEROLEHAN
PROCUREMENT
(En Noorsuhanis Abdul Latif)
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INCUBATION & COMMERCIALISATION
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EXPANSION SERVICES
CAWANGAN
KEWANGAN & AKAUN
FINANCE AND ACCOUNTS
(Pn Jumaaton Abu Bakar)
PENGURUSAN ASET
ASSET MANAGEMENT
(Pn Saizatul Maheran Ramle)
KAWAL SELIA ANAK SYARIKAT
REGULATE SUBSIDIARY
(En Mohd Zamshari Abdul Rahman)
CAWANGAN
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ESTABLISHMENT
(En Mohd Asmawee Ismail)
PERKHIDMATAN (O) & HRMIS
SERVICES (O) & HRMIS
(Pn Azuarni Abd Adzis)
LATIHAN
TRAINING
(En Zamri Mohd Zangi)
CAWANGAN
PENERBITAN
PUBLICATION
(En Mohamad Zaki Mohd Isa)
TEKNOLOGI MAKLUMAT
INFORMATION TECHNOLOGY
(En Wan Zahiri Wan Yaacob)
PERPUSTAKAAN
LIBRARY
(Pn Mastura Buang)

Dato' Dr Hj. Abd. Latif Mohmod

Dr Ismail Harun

Dr Hj. Samsudin Musa

Dr Hj. Khali Aziz Hamzah

Dato' Dr Hjh Marzalina Mansor

Dr Gan Kee Seng

Dr Hj. Nur Supardi Md. Noor

Pengurusan Tertinggi
Top Management

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

Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)
Deputy Director General (Research and Development)
DR ISMAIL HARUN
AMK
(hingga/until 4/9/2018)

Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)
Deputy Director General (Research and Development)
DR HJ. SAMSUDIN MUSA
([memangku] mulai/from 5/9/2018)

Timbalan Ketua Pengarah (Operasi)
Deputy Director General (Operational)
DR HJ. KHALI AZIZ HAMZAH

Pengarah Bahagian Perhutanan dan Alam Sekitar
Director Forestry and Environment Division
DR HJ. SAMSUDIN MUSA
(hingga/until 4/9/2018)
DR ISMAIL HJ PARLAN
([memangku] mulai/from 5/9/2018)

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DIMP

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

Dr Lillian Chua Swee Lian

Dr Hjh. Nor Azah Mohamad Ali

Tuan Hj Mohd. Zamshari Abd. Rahman

Encik/Mr Basir Malan Ab. Rahman

Dr Ismail Hj Parlan

Puan/Mdm Hjh Norhayati Nordin

Puan/Mdm Liza Ismail

Pengarah Bahagian Sumber Manusia
Director Human Resource Division
ENCIK/MR BASIR MALAN AB. RAHMAN
AMP, AMN

Pengarah Bahagian Keluaran Hutan
Director Forest Products Division
DR GAN KEE SENG
AMN

Pengarah Bahagian Perancangan Penyelidikan
Director Research Planning Division
DR HJ. NUR SUPARDI MD. NOOR
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Pengarah Bahagian Biodiversiti Hutan
Director Forest Biodiversity Division
DR LILLIAN CHUA SWEE LIAN

Pengarah Bahagian Hasilan Semula Jadi
Director Natural Products Division
DR HJH NOR AZAH MOHAMAD ALI

Pengarah Bahagian Perkhidmatan Teknikal
Director Technical Services Division
merangkap/cum
Pengarah Bahagian Inovasi dan Komersialisasi
Director Innovation and Commercialisation Division
PUAN/MDM HJH NORHAYATI NORDIN

Pengarah Bahagian Pentadbiran
Director Administration Division
PUAN/MDM LIZA ISMAIL

Profil Korporat
Corporate Profile

Latar Belakang

Institut Penyelidikan Perhutanan Malaysia (Forest Research Institute Malaysia, FRIM) ditubuhkan pada 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 2004. Akta FRIM 2016 (Akta 782) yang diwartakan pada 30 September dan berkuat kuasa mulai 1 Oktober 2016 membolehkan FRIM mengkomersialkan hasil penyelidikan dan pembangunan (R&D) serta menubuhkan syarikat bagi menjana pendapatan sendiri untuk kelangsungan perkhidmatan serta aktiviti penyelidikan, pembangunan dan komersialisasi FRIM. Selepas Pilihan Raya Umum ke-14 pada 2018, NRE distruktur semula dan membentuk Kementerian Air, Tanah dan Sumber Asli (KATS).

Visi

Menerajui kepimpinan dalam memacu program penyelidikan, pembangunan, komersialisasi dan aplikasi R&D perhutanan tropika negara.

Misi

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

Objektif

Objektif Umum FRIM adalah untuk:

1 menjana pengetahuan saintifik bagi pemahaman, pengurusan dan penggunaan sumber hutan,
2 mencapai kecemerlangan dalam penyelidikan dan pembangunan dengan penggunaan alat saintifik terkini,
3 mengkaji kepelbagaian biologi bagi menghasilkan produk berguna melalui penyelidikan dan pembangunan yang intensif,

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. FRIM Act 2016 (Act 782), gazetted on 30 September and became effective on 1 October 2016, allows FRIM to commercialise its research and development (R&D) findings and set up a company to generate income to ensure the continuity of FRIM services as well as its R&D and commercialisation activities. After the 14th General Election in 2018, the NRE was restructured to form the Ministry of Water, Land and Natural Resources (KATS).

Vision

To provide leadership in advancing the country's tropical forestry research, development, commercialisation and application.

Mission

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

Objectives

General Objectives of FRIM are to:

1 generate scientific knowledge for the understanding, management, conservation and use of forest resources,
2 achieve excellence in research and development through the use of the latest scientific equipment,
3 study biodiversity to produce useful products through intensive research and development,

4 memajukan teknologi berkaitan bagi memenuhi keperluan industri perhutanan,
5 mempakejkan hasil penyelidikan dan pembangunan untuk disebar kepada pelanggan,
6 mengkomersialkan hasil penyelidikan dan pembangunan melalui pemindahan teknologi kepada pihak yang berminat,
7 menyediakan perkhidmatan cemerlang untuk memenuhi kepuasan pelanggan,
8 mewujudkan kerjasama strategik dengan agensi tempatan dan antarabangsa, dan
9 meningkatkan kesedaran awam terhadap kepentingan alam sekitar dan pemuliharaan kepelbagaian biologi hutan.

4 develop related technology to fulfill the needs of the forestry industry,
5 package research and development findings for dissemination to clients,
6 commercialise research and development findings through technology transfer to all interested parties,
7 provide excellent service to fulfill client needs,
8 create strategic cooperation with local and international agencies, and
9 raise public awareness regarding the importance of the environment and the conservation of forest biodiversity.

Objektif Operasi FRIM adalah untuk:

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

Operational Objectives of FRIM are to:

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

Fungsi

Fungsi utama FRIM adalah untuk:

1 merancang dan melaksanakan penyelidikan bagi pembangunan sektor perhutanan dan pemuliharaan sumber hutan,
2 memperoleh dan menyebarkan maklumat hasil penyelidikan bagi meningkatkan pengurusan hutan dan penggunaan hasil hutan, dan
3 mengadakan hubungan kerjasama penyelidikan dan pembangunan perhutanan dengan badan-badan dalam dan luar Malaysia.

Functions

The main functions of FRIM are:

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

Dasar Kualiti Korporat

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 membangunkan dan menggalakkan penggunaan sumber dan hasil hutan secara berkekalan melalui penyelidikan, pembangunan dan penggunaannya. Bagi tujuan ini, kami memberi jaminan seperti yang berikut:

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

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.

Clients' Charter

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

1 90% provision of advisory and consulting services to the customer within 14 days from the application date,
2 30% publication of journal articles in impact factor journals (Reporting at every three months),
3 Process payment for bills and invoices within 14 days receipt of complete documents,
4 95% of test results submitted to the customer within the stipulated time,
5 95% submission of test report to the clients within the stipulated period,
6 Provide feedback on customer complaints within five working days,
7 Uploading the latest information at FRIM portal within two working days,
8 Provide feedback on the application of industrial training / outboard within seven working days,
9 Provide feedback on application to rent space/ area/equipment within five working days, and
10 80% of research projects are carried out within the time frame stipulated by sponsors (reporting at six monthly intervals).

Dasar Kualiti Operasi

Kami bertanggungjawab:

1 menjalankan penyelidikan dan memberikan perkhidmatan yang berkualiti secara profesional bersesuaian dengan keperluan dan jangkaan pelanggan dalam bidang perhutanan tropika dan keluaran hutan,
2 melaksanakan sistem pengurusan kualiti (SPK) secara berkesan untuk skop perkhidmatan penyelidikan, latihan, ujian dan tentukuran, jualan, sewaan, perundingan dan khidmat nasihat yang memenuhi keperluan ISO 9001,
3 memantau keberkesanan pelaksanaan SPK melalui maklum balas yang diterima daripada pelanggan,
4 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,
5 memastikan semua prosedur dan perkhidmatan yang disediakan untuk pelanggan melalui proses penyemakan agar standard yang ditetapkan dapat dicapai,
6 memastikan sebarang kegagalan dalam mencapai standard yang ditetapkan akan disemak dan dinilai untuk digunakan sebagai rujukan dalam proses peningkatan berterusan,
7 memastikan dasar ini difahami oleh kakitangan FRIM melalui taklimat, mesyuarat dan pameran poster, dan
8 memastikan setiap kakitangan FRIM melaksanakan polisi dan prosedur dalam semua aspek perkhidmatan yang diberikan kepada pelanggan.

Operational Quality Policy

We are responsible for:

1 conducting research and providing quality professional services appropriate to the customers' needs and expectations in the tropical forestry and forest product sectors,
2 implementing quality management system (QMS) effectively within the scope of research, training, testing and calibration, selling, renting and consultancy services, in accordance to MS ISO 9001 requirements,
3 monitoring the effectiveness in the implementation of the QMS through feedback received from customers,
4 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,
5 ensuring that all procedures and services provided to customers are reviewed to meet the standard requirements,
6 ensuring that any failure towards achieving the identified standard is reviewed and evaluated to be used as a reference in the continual improvement process,
7 ensuring that the quality policy is understood by FRIM's personnel through briefings, meetings and poster exhibitions, and
8 ensuring that all personnel implement the policies and procedures in all aspects services provided to the customers.

Slogan Kualiti

Kualiti teras kecemerlangan; inovasi kunci keunggulan

Quality Slogan

Quality is the pillar for excellence; innovation is the key to preeminence

Slogan Persekitaran Berkualiti

Persekitaran berkualiti pemangkin kecemerlangan produktiviti

Quality Environment Slogan

Quality environment as catalyst to excellence in productivity

Pelan Strategik Menuju 2050

Pelan Strategik FRIM adalah berdasarkan lima teras:

1 FRIM sebagai institut penyelidikan dan pembangunan (R&D) yang terunggul di dunia dalam bidang perhutanan tropika, hasil hutan dan alam sekitar;
2 FRIM sebagai pusat rujukan utama dalam pemuliharaan dan pengurusan hutan dan alam sekitar;
3 FRIM sebagai pembekal perkhidmatan kepada pemegang taruh dalam perundingan dan projek;
4 FRIM sebagai pusat inovasi perhutanan dan hasil hutan; dan
5 FRIM sebagai destinasi rekreasi hutan yang terkenal.

Tujuh program kerja dibangunkan bagi melaksanakan teras tersebut, iaitu:

1 Pengurusan sumber manusia/pembangunan;
2 Mewujudkan bahagian perniagaan bagi penjanaan pendapatan;
3 Kesihatan, pemuliharaan dan pengurusan hutan;
4 Pemerosesan dan penggunaan hutan;
5 FRIM sebagai makmal dunia bagi sains perhutanan tropika;
6 Paradigma baharu dalam menjalankan Penyelidikan; dan
7 Membangunkan perniagaan ekopelancongan.

Stesen Penyelidikan FRIM (SPF)

FRIM menawarkan pelbagai kemudahan untuk menjalankan penyelidikan termasuk sepuluh 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, Negeri Sembilan,
2 Stesen Penyelidikan FRIM Mata Ayer, Perlis,
3 Stesen Penyelidikan FRIM Jengka, Pahang,
4 Stesen Penyelidikan FRIM Segamat, Johor,
5 Stesen Penyelidikan FRIM Setiu, Terengganu,
6 Stesen Penyelidikan FRIM Maran, Pahang,
7 Stesen Penyelidikan FRIM Bidor, Perak,
8 Stesen Penyelidikan FRIM Jeli, Kelantan,
9 Stesen Penyelidikan FRIM Selandar, Melaka, dan
10 Stesen Penyelidikan FRIM Kukup, Johor.

Strategic Plan Towards 2050

FRIM Strategic Plan are based on five thrusts:

1 FRIM as a global leading R&D institute in tropical forestry, forest products, and the environment;
2 FRIM as a premier reference centre on forest conservation and management, and the environment;
3 FRIM as a service provider to the stakeholders in terms of consultancies and projects;
4 FRIM as an innovation centre for forestry and forest products; and
5 FRIM as a renowned forest recreation destination.

Seven work programmes were designed to implement the thrust:

1 Human resource management/development;
2 Establishing a business arm for income generation;
3 Forest health, conservation, and management;
4 Forest products processing and utilisation;
5 FRIM as a global laboratory for tropical forestry science;
6 New paradigm in conducting research; and
7 Developing an eco-tourism business.

FRIM Research Stations

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

1 FRIM Research Station Pasoh, Negeri Sembilan,
2 FRIM Research Station Mata Ayer, Perlis,
3 FRIM Research Station Jengka, Pahang,
4 FRIM Research Station Segamat, Johor,
5 FRIM Research Station Setiu, Terengganu,
6 FRIM Research Station Maran, Pahang,
7 FRIM Research Station Bidor, Perak,
8 FRIM Research Station Jeli, Kelantan,
9 FRIM Research Station Selandar, Melaka, and
10 FRIM Research Station Kukup, Johor.

Objektif Kualiti
Quality Objectives

Objektif Kualiti
Quality Objectives

Bil. No.	Kenyataan Statement	Pencapaian Achievement	
		2017	2018
1	Menjalankan projek penyelidikan Conduct research projects	117	137
2	Menghasilkan penerbitan untuk keperluan pihak berkepentingan Produce publications for the need of stakeholders	1010	145
3	Menandatangani pelesenan teknologi dengan industri Sign technology licensing with the industries	3	3
4	Menjalankan khidmat perundingan ke arah penjanaan pendapatan Provide consultancy service towards income generation	48	43
5	Mengekalkan akreditasi dan pengiktirafan daripada Badan Kebangsaan dan Antarabangsa Maintain accreditations and recognitions from national and international bodies	35	31
6	Menghasilkan output penyelidikan daripada penyelidikan dan pembangunan kepelbagaian biologi. Produce research outputs from biodiversity research and development	39	40
7	Menghasilkan teknologi baharu atau menambah baik teknologi sedia ada bagi keperluan industri Produce new or improved technologies for the industries	6	3
8	Menyertai pameran bagi tujuan sebaran hasil penyelidikan dan pembangunan/Participate in exhibition for disseminating research and development achievements	27	31
9	Menghasilkan artikel dan rencana di media massa berkenaan penyelidikan dan pembangunan serta sumbangan FRIM kepada pihak berkepentingan Publish news and articles on FRIM research and development, and contributions in the mass media	197	122
10	Menganjurkan seminar, bengkel, dialog dan latihan berkaitan kepakaran FRIM kepada pelanggan Organise seminars, workshops, dialogues and trainings	126	109
11	Menghasilkan teknologi yang berpotensi untuk kegunaan industri Produce potential technologies for the industry	**	10
12	Menandatangani perjanjian pelesenan pemindahan teknologi dengan pihak industri Sign agreement for licensing of technology transfer with the industries	3	2

Bil. No.	Kenyataan Statement	Pencapaian Achievement	
		2017	2018
13	Mengemukakan pemfailan paten bagi penemuan baharu penyelidikan dan pembangunan untuk keperluan industri File patent for new discoveries on research and development for the industries	1	3
14	Menjalankan khidmat ujian yang diiktiraf oleh badan kebangsaan dan antarabangsa kepada pelanggan dalam bidang perhutanan tropika Conduct testing services recognised by the national and international bodies to customers in tropical forest	3420 bil. ujian daripada 214 jenis ujian No. of testing from 214 testing types	2116 bil. ujian daripada 197 jenis ujian No. of testing from 197 testing types
15	Menjalankan khidmat perundingan dalam bidang kepakaran FRIM kepada pihak berkepentingan Conduct consultancy services in the field of FRIM experties to stakeholders	48	11
16	Menandatangani memorandum persefahaman/perjanjian dengan agensi tempatan dan antarabangsa Sign MoUs/Agreements with national and international agencies	14	9
17	Menjalankan aktiviti CSR pemuliharaan hutan bersama-sama agensi tempatan dan antarabangsa /Conduct CSR activities on forest conservation with local and international agencies	48	29
18	Menjalankan aktiviti berkaitan pendidikan alam sekitar dan pemuliharaan hutan bersama-sama institusi pendidikan Conduct educational nature and forest conservation activities with educational institutions	50	29
19	Melahirkan saintis yang memperoleh sarjana atau doktor falsafah dalam bidang kepakaran FRIM/Produce scientists with masters or PhD in FRIM experties	11	13
20	Menghantar dokumen cadangan penyelidikan (DCP) kepada penaja luar bagi memastikan kelestarian penyelidikan dan pembangunan Submit research proposals to external funding agencies to ensure sustainability of R&D		*50
21	Menjana pendapatan daripada khidmat perundingan (Bilangan khidmat perundingan yang bernilai melebihi RM50,000) Generate income from consultancy service (Number of consultancy service worth more than RM50,000)	**48	***10

Nota/Notes:
* Diperkenalkan pada 2018/Introduced in 2018
** Bilangan semua khidmat perundingan/Number of consultancy service
*** Bilangan khidmat perundingan yang bernilai melebihi RM50,000/ Number of consultancy service worth more than RM50,000

Penyelidikan & Pembangunan
Research & Development

Penyelidikan dan Pembangunan
Research and Development (R&D)

SOROTAN PENCAPAIAN R&D

BAHAGIAN KELUARAN HUTAN

Jambatan Lengkung Glulam

Jambatan Glulam ketiga merentasi Kolam Arapaima di FRIM didirikan pada 2006 diperbuat daripada kayu merpauh. Pada tahun 2014, jambatan itu dikesan terdapat tanda-tanda kemerosotan yang dianggap tidak dapat dipulihkan dan tepat pada masanya untuk membina jambatan yang baharu. Selepas satu dekad jambatan itu digunakan akhirnya ia diturunkan pada pertengahan 2018. Bahagian Keluaran Hutan (BKH) diberi mandat untuk membina jambatan lengkung glulam yang baharu bagi menggantikan jambatan yang lama.

Projek ini bermula dengan pemilihan spesies kayu daripada kumpulan Kayu Keras Berat. Kriteria pemilihan spesies adalah berdasarkan ketahanannya dengan harapan ia dapat memanjangkan jangka hayat jambatan. Balau dan balau merah telah dipilih untuk fabrikasi semua komponen. Reka bentuk keseluruhan jambatan lengkung tetap digunakan untuk menggunakan jig sedia ada untuk pembuatannya. Setiap peringkat fabrikasi dirancang dan didokumentasikan dengan teliti untuk rujukan dan pemantauan prestasinya.

Projek itu pada mulanya dicabar oleh beberapa isu ketanggalan pelekat pada kayu keras berat. Pasukan ini bekerjasama dengan pengeluar perekat untuk memastikan bahawa isu-isu ini diselesaikan sebelum kerja laminasi sebenar dimulakan. Sementara itu, projek ini berjaya memperoleh penajaan pelekat daripada dua pengeluar pelekat terkenal, Akzo Nobel Adhesives Sdn Bhd dan JOWAT (SEA) Manufacturing Sdn Bhd. Selain itu, Tong Sim Wood Industries Sdn Bhd menaja bahan kemasiapan untuk perlindungan luaran.

Kerja-kerja laminasi dua rasuk lengkung dan pegangan tangan berjaya diselesaikan dalam bulan Februari 2018 dengan gabungan usaha daripada semua kakitangan Bahagian Keluaran Hutan. Seterusnya, persiapan pada komponen jambatan lain seperti dek, balusters, dan kemasiapan pada rasuk dipimpin oleh Suffian Hamsan, ketua tukang kayu. Dalam tempoh 31 Julai dan 2 Ogos, kakitangan dari Bahagian Keluaran Hutan sekali lagi berganding bahu untuk memindah keluar rasuk jambatan dari Makmal Laminasi Kayu, dan seterusnya ke Kolam Arapaima. Proses pengangkutan dan pemindahan ini telah dirancang dengan teliti

HIGHLIGHTS OF R&D ARCHIEVEMENTS

FOREST PRODUCTS DIVISION

Curved Glulam Bridge

The third curved glulam bridge over Arapaima Pond was erected in 2006 using merpauh timber. In 2014, the bridge was detected with signs of deterioration that was deemed beyond restoration and it was timely decided to build a replacement. After a decade long of use the bridge was finally taken down in mid-2018. Forest Products Division (BKH) was mandated to fabricate a new curved glulam bridge.

The project began with the selection of timber species from the Heavy Hardwood group. The criterion in species selection was based on its durability in hope that this would lengthen the life span of the bridge. Balau and red balau were chosen for the fabrication for all components. The overall design of the bridge was remained in order to use the existing jig for its fabrication. Each fabrication stage was carefully planned and documented for future reference and performance monitoring.

The project was initially challenged by some delamination issues of heavy hardwoods. The team worked with glue manufactures to ensure that the issues were solved before the actual lamination work. Meanwhile, the project had successfully obtained adhesive sponsorship from two renowned adhesive producers, Akzo Nobel Adhesives Sdn Bhd and JOWAT (SEA) Manufacturing Sdn Bhd. In addition, Tong Sim Wood Industries Sdn Bhd had also sponsored furnishing for exterior protection.

The glue lamination of the two curved beams and handrails were successfully completed within the month of February 2018 with the combined effort from all staff of Forest Products Division. Subsequently, preparations on the other bridge components such as decking, balusters, and furnishing on the beams were led by Mr Suffian Hamsan, the chief carpenter. Between 31 July and 2 August, staff from the Forest Products Division rolled their sleeves and working hand-in-hand to transfer the finished beams out from Wood Lamination Laboratory, and subsequently to Arapaima pond. The transportation was carefully planned to minimise any damaged to the beams

untuk mengurangkan kerosakan terhadap rasuk dan memastikan rasuk ditempatkan dengan betul pada tapak konkrit di Kolam Arapaima. Ia disusuli dengan pemasangan balusters, pegangan tangan dan pepapan dek.

Jambatan lengkung glulam yang baharu dan keempat telah dilancarkan secara rasminya oleh Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod pada 2 Oktober 2018.

and to ensure that the beams were correctly position on the concrete footing at Arapaima pond. The installation of the balusters, handrails and decking strips followed after that.

The new and 4th curved glulam bridge was officially launched by Dato' Dr Abd. Latif Mohmod on 2 October 2018.

Pemasangan komponen jambatan
Assembling of bridge components

Meraut permukaan rasuk bagi membuat kemasan dan rawatan
Routering the surface of the beam to prepare for finishing and treatments

Pelancaran rasmi jambatan lengkung glulam ke-4
Launching of the 4th arched glulam bridge

Penderia Kimia Berasaskan Komposit untuk Pengesanan Ultra Sensitif Gas Formaldehid yang Dibebaskan daripada Produk Komposit Kayu

Nanoteknologi menjadi semakin maju dengan pelbagai nanosensor yang dibangunkan telah memberikan manfaat untuk kehidupan manusia terutama dari segi kesihatan dan keselamatan. Pelbagai kajian telah dijalankan untuk membangunkan peranti sensor dengan saiz bahan terkecil untuk pelbagai aplikasi; antaranya ialah biosensor. Sensor gas biasanya terdiri daripada bahan seperti komposit yang mempunyai kebaikan seperti harga yang rendah, pengesanan ultra, kepekaan dan kebolehulangan yang tinggi.

Dalam kajian ini, FRIM dengan kerjasama Institut Kejuruteraan Nano Elektronik (INEE) Universiti Malaysia Perlis (UNIMAP) yang menyediakan kemudahan menjalankan penyelidikan, telah berjaya membangunkan satu kaedah untuk mengesan gas formaldehid menggunakan makmal mudah alih pada cip nanosensor dengan kepekaan ultra (had pengesanan=0.1 ppm), kebolehulangan dan kebolehulangan (Sisihan Piawai Relatif (RSD)=kurang daripada 20%), julat kepekatan dinamik gas formaldehid (0.1 -100 ppm), masa pengesanan (60 saat) dan tiada gangguan daripada matriks sampel dan gas-gas lain. Berat sensor yang difabrikasi ialah sekitar 500 g. Sensor yang dibangunkan ini tidak hanya berguna untuk mengesan kepekatan gas formaldehid tetapi juga boleh diubahsuai untuk

Nano Chemical Composite Sensor for Ultrasensitive Detection of Formaldehyde Gas Emissions from Composite Wood Products

Nanotechnology is becoming more advanced with various nanosensors being developed which are highly beneficial for human life in terms of health and safety. Various types of studies have been carried out to develop sensor devices with the smallest size of material for various applications such as the biosensor. Gas sensor which consists of nano material such as nano composite offers the potential for low price, ultra sensing, sensitivity and high repeatability.

In this study, FRIM with the collaboration with Institute of Nano Electronic Engineering (INEE) Universiti Malaysia Perlis (UNIMAP) which provided facilities was successfully developed a method to detect formaldehyde gas using mobile lab on chip nanosensor with ultra sensitivity (Limit of detection = 0.1 ppm), repeatability & reproducibility (Relative Standard Deviation = less than 20%), dynamic range (0.1 -100ppm), detection time (60 seconds) and no interference from samples and other gases. The weight of developed sensor is around 500 g. The developed sensors not only useful for the determination of formaldehyde gas but also can be modified further to detect other harmful gases. The impact of the projects are

mengesan gas berbahaya yang lain. Impak projek ini ialah penawaran teknologi pengesanan gas untuk kegunaan komersial seperti industri biokomposit dan resin. Untuk kelestarian alam sekitar, inovasi ini dapat membantu mengurangkan kesan pencemaran kepada alam sekitar kerana bebas daripada bahan kimia berbahaya dan hanya sedikit sampel diperlukan untuk ujian.

commercialisable gas sensor for biocomposite and resin based industries. For environmental friendliness, this innovation is helpful in reducing the effect of pollution to the environment as free from hazardous chemical substance and only a small amount of sample is needed for the test.

Pembinaan penderia kimia berasaskan komposit untuk pengesanan kepekaan ultra sensitif gas formaldehid yang dibebaskan daripada produk-produk komposit kayu
Development of nano chemical composite sensor for ultrasensitive detection of formaldehyde gas emissions from composite wood products

Nanokomposit Hijau Berkekuatan Tinggi Diperkukuh dengan Selulosa Nanokristal dan Polimer Resin Epoksi

Di peringkat global, nanoteknologi merupakan satu cabang baharu dalam bidang sains dan ia berpotensi besar kepada manusia. Manakala di peringkat Malaysia, penyelidikan strategik negara dalam bidang nanoteknologi adalah tertumpu pada dua bahan yang telah dikenal pasti mempunyai potensi besar untuk menyumbang kepada pembangunan industri dan pertumbuhan ekonomi negara iaitu graphene dan nanoselulosa.

Fokus FRIM ialah menjalankan penyelidikan ke atas bahan nanoselulosa memandangkan FRIM berpengalaman menjalankan penyelidikan dalam bidang lignoselulosa sejak tahun 1950-an lagi. Teknologi penyelidikan ini dipertingkatkan lagi mulai tahun 2007 dengan menjalankan kajian terhadap penguraian selulosa kepada nano hablur dan nano fibril selulosa. FRIM berupaya menghasilkan bahan-bahan ini. Maka usaha untuk mempromosikan penggunaan bahan ini dalam industri berasaskan keluaran hutan telah dipergiat.

High Strength Green Nanocomposite Reinforced with Nanocrystalline Cellulose and Epoxy Resin Polymer

At the global level, nanotechnology is one of the new branches of science that has a great potential for humans. Whereas at Malaysia level, the country's strategic research in the nanotechnology field focuses on two materials, namely graphene and nanocellulose, which have been identified as having a great potential to contribute to the country's industrial development and economic growth.

FRIM research focus is on nanocellulose materials as FRIM has extensive experience in conducting research in the lignocellulosic field since the 1950s. The technology for this research field has been enhanced since 2007 in which a study of the decomposition of cellulose into nanocrystal and cellulose nanofibril has been conducted. FRIM is capable of producing these materials.

Oleh yang demikian, satu daripada bidang yang dikenal pasti mempunyai potensi penggunaan bahan nanoselulosa adalah dalam penghasilan produk biokomposit. Justeru, kajian ini dijalankan dengan mengaplikasikan penggunaan bahan nanohablur selulosa yang dimodifikasi dengan polimer resin epoksi bagi menghasilkan produk nanokomposit yang berkekuatan tinggi. Kajian ini dijalankan oleh FRIM bersama-sama UKM dan Plus Intervest Sdn. Bhd (pengilang papan lapis). Kajian ini berjaya menghasilkan produk nanokomposit mesra alam daripada venir kayu kembang semangkuk dengan saiz ultranipis yang berketebalan kurang daripada 0.3 mm dengan menggunakan bahan perekatan campuran nanohablur selulosa yang terubahsuai dengan polimer resin epoksi. Kaedah baharu ini berbeza dengan kaedah konvensional yang menggunakan resin berasaskan formaldehid yang mana tiada pembebasan gas formaldehid berbahaya daripada produk nanokomposit yang dihasilkan. Kekuatan mekanik bahan nanokomposit telah dipertingkatkan sebanyak 24% dibandingkan dengan bahan biokomposit tanpa nanohablur selulosa. Impak hasil kajian ini ialah demonstrasi aplikasi penggunaan bahan berasaskan nanoselulosa yang boleh dimanfaatkan oleh pemegang taruh dalam bidang keluaran hutan terutama dalam penghasilan produk bernilai tambah.

Thus, efforts to promote the utilisation of these materials in forest produce-based industries have been intensified. In this regard, one of the areas identified as having the potential in the utilisation of nanocellulose material is in the production of biocomposites. Hence, this study was conducted by applying the use of nanocrystalline cellulose material modified with epoxy resin polymer to produce a high-strength nanocomposite. This study was jointly conducted by FRIM, UKM, and Plus Intervest Sdn Bhd (a plywood manufacturer). This study successfully produced an environmentally friendly nanocomposite product from kembang semangkok wood veneer with an ultrathin size of less than 0.3 mm in thickness by using a mixed adhesive material of nanocrystalline cellulose modified with epoxy resin polymer. This new method is different from the conventional method that uses formaldehyde-based resin, as no harmful formaldehyde gas is emitted from the nanocomposite product created. The mechanical strength of the nanocomposite material has been improved by 24% compared to the biocomposite material without nanocrystalline cellulose. The impact of this study's finding is demonstrated by the application of nanocellulose-based materials that may benefit the stakeholders in the field of forest produce particularly in the production of value-added products.

Aplikasi nanohablur selulosa termodifikasi dengan polimer resin epoksi terhadap venir kayu
Application of treated nanocrystalline cellulose with silane to veneer

Mesin ujian universal untuk ujian kekuatan tegangan
Universal testing machine for tensile strength test

Cuka Asid Bakau sebagai Racun Serangga Mesra Alam

Kajian terhadap sisa daripada industri arang kayu bakau telah dimulakan di FRIM bagi membangunkan produk baharu bernilai tambah. Satu daripada sisa industri arang bakau yang dikaji ialah potensi cuka asid bakau sebagai racun serangga mesra alam. Cuka asid bakau merupakan hasil sampingan daripada proses pembakaran tertutup kayu bakau untuk dijadikan arang. Ia diperoleh selepas penyejukan wap yang terhasil daripada proses pembakaran tertutup tersebut.

Berdasarkan kajian yang dijalankan, cuka asid bakau mengandungi tujuh komposisi kimia utama yang terdiri daripada asid asetik, keton, aldehid, ester, alkohol, benzen dan fenol. Kehadiran asid asetik yang tinggi (63.9%) berbanding komposisi kimia yang lain menyebabkan nilai pH cuka asid berada di sekitar 2.4–2.6. Selain itu, cuka asid bakau juga mengandungi 14 elemen kimia iaitu nitrogen, karbon, fosforus, potassium, kalsium, magnesium, kuprum, selenium, zink, natrium, manganes, ferum, sulfur dan boron. Kehadiran komposisi dan elemen kimia tersebut menjadikan cuka asid bakau boleh berfungsi sebagai racun serangga mesra alam dan dalam masa yang sama boleh berfungsi sebagai mikronutrien kepada tanaman.

Hal ini dapat dibuktikan apabila cuka asid bakau berkepekatan 5–15% digunakan pada anak pokok kempas yang diserang oleh serangga penghisap tumbuhan. Keputusan kajian menunjukkan dengan kekerapan rawatan tiga kali seminggu, cuka asid bakau dapat mengawal serangan *plant sucking pest*. Pucuk anak pokok kelihatan tumbuh semula dengan subur setelah serangan berjaya dikawal.

Serangan agen perosak biologi seperti *plant sucking pest* tanpa kawalan boleh menyebabkan tumbesaran anak pokok terbantut atau mati. Situasi ini secara tidak langsung akan meningkatkan kos penyelenggaraan seperti rawatan dan penanaman semula. Kawalan atau rawatan agen perosak biologi menggunakan racun serangga berasaskan kimia sintetik merupakan langkah mudah dan murah. Walau bagaimanapun ia memberi kesan negatif kepada kesihatan manusia dan alam sekitar. Selain itu, penggunaan racun kimia sintetik yang kerap dalam satu-satu masa boleh menyebabkan agen perosak biologi menjadi imun seterusnya menyukarkan kawalan. Pendekatan rawatan secara sistematik menggunakan cuka asid bakau dapat membantu mengawal serangan agen perosak biologi dengan lebih berkesan dan selamat digunakan serta murah.

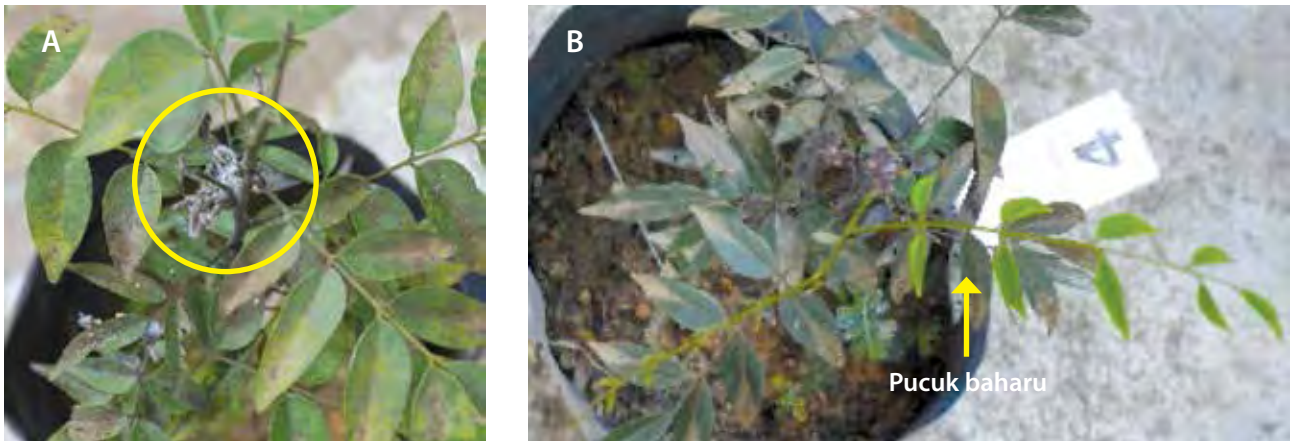
Bakau Vinegar as an Environmentally Friendly Insecticide

The study on waste from the mangrove charcoal industry has been initiated in FRIM to develop new value added products. One of the wastes from the mangrove industry that is being studied is the potential of bakau vinegar as an environmentally friendly insecticide. Bakau vinegar is a byproduct of the closed combustion of bakau wood to produce charcoal. It is obtained after the vapors from the process of the closed combustion of bakau wood turn to cool.

Based on study conducted, bakau vinegar contains seven chemical compositions which consists of acetic acid, ketones, aldehydes, esters, alcohols, benzenes and phenols. The existence of high content of acetic acid (63.9%) compared to others chemical compositions making the bakau vinegar is acidic with pH value between 2.4 to 2.6. In addition, bakau vinegar also contains 14 chemical elements which are nitrogen, carbon, phosphorus, potassium, calcium, magnesium, copper, selenium, zinc, sodium, manganese, iron, sulfur and boron. The presence of such chemical compositions and elements making bakau vinegar effective to be used as an environmentally friendly insecticide and at the same time can be function as micro nutrient to plants.

It can be proved when bakau vinegar at a concentration of 5-15% is applied to a saplings of kempas that is attacked by a plant sucking pest. The results of the study showed that with the frequency of treatment of three times a week, the bakau vinegar was able to control the plant sucking pest attack. The shoots of the kempas saplings start grow and fertile after the attack was successfully controlled.

Pests attack such as plant sucking pests without proper control will cause the growth of the saplings to become stunted or dead. This situation will indirectly increase the cost of maintenance such as treatment and replanting. Controls or treatments of pests using synthetic chemical is easy and inexpensive. However, it have negative affects to human health and the environment. Additionally, frequent use of synthetic chemical can cause pests to become immune, which in turn will make it difficult to control. Systematic treatment using bakau vinegar helps to control pest infestation more effectively, safely and inexpensively.



Anak pokok kempas yang diserang plant sucking pest (a) sebelum dan (b) selepas dirawat menggunakan cuka asid bakau
Kempas saplings attacked by plant sucking pest (a) before and (b) after treatments using bakau vinegar

BAHAGIAN BIODIVERSITI HUTAN

Ekologi, Populasi dan Pengurusan Anai-Anai Perosak Pokok Ru di Pesisiran Pantai Semenanjung Malaysia

Pokok ru membantu penstabilan pesisiran pantai berpasir dengan bertindak sebagai pemecah angin, pengurangan hakisan pantai dan penstabilan tanah di samping mengindahkan dan mewujudkan kawasan pantai yang teduh. Pokok ru yang ditanam secara meluas dengan kaedah perladangan kadangkala menghadapi masalah kemerosotan kesihatan yang disebabkan pelbagai faktor biotik dan abiotik. Satu daripada anai-anai perosak yang berkepentingan ekonomi, *Coptotermes gestroi*, telah dijumpai menyerang pokok-pokok ru di Pantai Senok, Kelantan.

Dikenali juga sebagai "Asian subterranean termite", C. *gestroi* adalah endemik di Asia Tenggara dan merupakan perosak utama di dalam bangunan dengan memakan kayu dan bahan berasaskan kayu. Spesies ini juga tersebar ke negara-negara asing melalui perdagangan dan telah menjadi perosak invasif utama pokok landskap dan pokok hutan. Serangan *C. gestroi* tidak mudah dikesan kerana serangan boleh bermula di akar, pangkal pokok atau tunggul. Anai-anai ini juga akan membina galeri tertutup pada permukaan yang terdedah seperti di batang pokok. Masalah serangan anai-anai ini boleh menyebabkan kerosakan dan kematian pokok sekiranya tidak dikawal.

Petak kajian rawatan menggunakan teknik pengumpanan ialah kali pertama diaplikasikan pada pokok-pokok hidup di pesisiran pantai. Requiem® yang diperoleh daripada syarikat Ensystex Malaysia mengandungi bahan aktif 0.1% (w/w) *chlorfluazuron*. Umpan ini diletakkan pada batang pokok yang mempunyai galeri *C. gestroi* yang aktif. Perubahan populasi anai-anai ini dipantau melalui stesen umpan kayu getah yang ditanam di pangkal pokok.

FOREST BIODIVERSITY DIVISION

Ecology, Population and Management of Pest Termite on *Casuarina* Trees in the Coastal Areas of Peninsular Malaysia

Casuarina trees help in shoreline stabilisation by functioning as a wave breaker, reduce shoreline erosion and soil stabilisation besides to beautify and provide shade at the beach. Decline of mass planted *Casuarina* trees i.e. in a plantation scale, can sometimes be caused by various biotic and abiotic factors. One of the economically important pest termites, *Coptotermes gestroi*, was found infesting *Casuarina* trees in Pantai Senok, Kelantan.

Also known as the Asian subterranean termite, *C. gestroi* is endemic to Southeast Asia and a primary pest in buildings by chewing on wooden structures and cellulose-based materials. This species has also been spread to non-native countries through trade and has become invasive pests on landscape and forest trees. Infestation by *C. gestroi* often goes unnoticed as the infestation can begin in the roots, at base of trees or stumps. This species constructs mud trails to cover their movements on exposed areas e.g. on a tree trunk. Attack by *C. gestroi* can damage and cause death to trees if left untreated.

This is a pilot study on the application of baiting technique to treat termite-infested coastal trees. Requiem® used in this study with 0.1% (w/w) chlorfluazuron as the active ingredient, was provided by Ensystex Malaysia. This bait was placed on tree trunks with active mud trails of *C. gestroi*. Changes in termite population is monitored through the rubberwood bait stake that was buried at the base of the infested tree.

Outcome

Kesan umpan *chlorfluazuron* terhadap *C. gestroi* dapat dilihat selepas lapan minggu pengumpanan dijalankan. Lebih kurang 158 g *chlorfluazuron* diperlukan untuk menghapuskan koloni anai-anai dalam petak kajian seluas 0.1 ha. Kadar kematian sesuatu koloni bergantung pada bahan aktif yang digunakan dan saiz koloni yang dirawat. Pengumpanan berasaskan *chlorfluazuron* bersifat mesra alam serta bertindak khusus terhadap anai-anai dan tidak menjejaskan haiwan lain yang bermanfaat seperti lipan.

Penerbitan buku panduan/manual "*Ekologi, Populasi dan Pengurusan Anai-anai Perosak Pokok Ru di Pesisiran Pantai Semenanjung Malaysia*" menyasarkan mereka yang bekerja dalam sektor perhutanan dan terlibat dalam penjagaan pokok hutan. Buku ini bertujuan untuk meningkatkan ilmu pengetahuan tentang biologi dan ekologi anai-anai di pesisir pantai serta pengurusannya. Dengan adanya pengetahuan ini, serangan anai-anai perosak boleh dikesan awal melalui pemantauan kesihatan pokok secara berkala dan rawatan bersesuaian diaplikasikan.

Spesies Baharu Lycopodiaceae dan Zingiberaceae di Semenanjung Malaysia

Semakan famili yang sedang dijalankan untuk Flora of Peninsular Malaysia dan fokus pada eksplorasi botani oleh kumpulan Flora of Peninsular Malaysia baru-baru ini telah menemui dan menghuraikan tiga spesies baharu yang menarik dari Semenanjung Malaysia. Spesies-spesies ini ialah *Phlegmariurus iminii* (sejenis epifit di atas pokok yang tumbuh di kawasan batu kapur) dan *P. monticola* (sejenis epifit di atas pokok yang tumbuh di kawasan pergunungan bawah hingga pergunungan atas) dalam famili Lycopodiaceae dan *Scaphochlamys disticha* (sejenis tumbuhan herba yang tumbuh di kawasan hutan tanah pamah dipterokarpa) dalam famili Zingiberaceae. Kesemua spesies baharu ini adalah endemik kepada Semenanjung Malaysia.

Phlegmariurus iminii telah ditemui hidup di atas sebatang pokok di kawasan lereng curam yang sedikit teduh berhampiran puncak Gua Gunting, Merapoh, Pahang. Spesies ini dinamakan sedemikian sebagai penghargaan kepada Imin Kamin, Pembantu Penyelidik yang bertugas mengawal selia koleksi likofit dan paku-pakis di Herbarium FRIM, yang telah menemui spesies ini. *Phlegmariurus iminii* ialah spesies yang Terancam Kritikal. Satu-satunya lokaliti yang telah disahkan bagi spesies ini ialah satu kawasan bukit batu kapur yang terletak di luar jaringan Kawasan yang Dilindungi Sepenuhnya dan diancam oleh aktiviti kuari untuk simen serta dikelilingi oleh

Outcome

The effectiveness of chlorfluazuron against *C. gestroi* can be observed eight weeks after baiting was conducted. About 158 g chlorfluazuron was used to eliminate the termite colony in the 0.1 ha study plot. Mortality rate of a colony depends on the active ingredient used and size of the colony to be treated. Chlorfluazuron based baiting is more environmentally friendly with host specificity towards termites and does not affect other beneficial organisms like the centipede.

The publication of this guidebook/manual "*Ecology, Population and Management of Pest Termites on Casuarina Trees in the Coastal Areas of Peninsular Malaysia*" targets those working in the forestry sector and involved in plant health care. It aims to increase knowledge on the biology and ecology of termites in the coastal areas including its management. With this knowledge, termite infestation can be detected early through continuous surveillance and appropriate treatment can be applied.

New Species of Lycopodiaceae and Zingiberaceae in Peninsular Malaysia

Revision of the family underway for the Flora of Peninsular Malaysia and the focus of botanical exploration by the Flora of Peninsular Malaysia team have recently brought to light and described three new interesting species from Peninsular Malaysia. These are *Phlegmariurus iminii* (an epiphyte on trees growing on limestone) and *P. monticola* (an epiphyte on trees in lower to upper montane forest) of the family Lycopodiaceae and *Scaphochlamys disticha* (a herbaceous plant growing in lowland dipterocarp forest) belonging to family Zingiberaceae. All the new species are endemic to Peninsular Malaysia.

Phlegmariurus iminii was found growing on a tree on a steep slope, slightly shaded near the summit of Gua Gunting, Merapoh, Pahang. It was named after Mr Imin Kamin, Research Assistant in-charge of the lycophyte and fern collection in the FRIM Herbarium who discovered this species. It is a Critically Endangered species. Its only confirmed locality is a single karst limestone hill that lies outside the network of Totally Protected Areas and is threatened by quarrying for cement and is surrounded by oil palm plantations that expose it to disturbance from agricultural activities, in particular by the practice of clearing vegetation by burning.

kawasan penanaman kelapa sawit yang terdedah kepada gangguan akibat daripada aktiviti pertanian, secara khususnya merujuk amalan pembersihan vegetasi dengan cara pembakaran.

Phlegmariurus monticola ditemukan di kawasan sedikit teduh, biasanya di kawasan pergunungan bawah, kadangkala di kawasan pergunungan atas, pada ketinggian 1400–2100 m di Banjaran Titiwangsa mencadangkan taburannya mungkin lebih meluas. Kawasan pergunungan di atas 1000 m adalah dilindungi kerana larangan pembersihan hutan di kawasan lereng curam. Walaupun demikian, populasi spesies ini perlu dipantau disebabkan spesies ini telah sedia untuk dijual di beberapa tapak semaian di Malaysia, Singapura dan Thailand, dengan itu pengutipan spesies ini dari hutan boleh mendatangkan ancaman. Nama latin bagi spesies *monticola* bermaksud penghuni kawasan pergunungan.

Spesies baharu ketiga, *Scaphochlamys disticha* telah ditemukan di kawasan lembah di Air Terjun Sekayu, Hutan Simpan Ulu Terengganu Tambahan, Terengganu. Nama Latin bagi spesies *disticha* merujuk brakta bunga yang tersusun secara berselang-seli dalam dua barisan yang bertentangan. Spesies ini ialah tumbuhan herba yang tumbuh di atas tanah, ditemukan di kawasan hutan dipterokarpa tanah pamah dan hidup dengan banyaknya di kawasan terang tetapi berkeadaan teduh kesan bukaan kanopi. Pencarian di kawasan sekitarnya mendapati populasi spesies ini sangat setempat, terhad kepada pertengahan curam di kawasan lembah di Air Terjun Sekayu. Spesies ini disenaraikan sebagai spesies Langka mengikut garis panduan dalam *Senarai Merah Tumbuhan Malaysia* disebabkan spesies ini dianggap jarang ditemukan tetapi tidak diancam oleh kepupusan.

Phlegmariurus monticola is found in light shade usually in lower montane forest, sometimes in upper montane forest, at 1400–2100 m elevation in the Main Range suggesting that it is likely to be more widespread. The montane forest above 1000 m is protected because of the restriction on clearing forest on steep slopes. However, its populations need to be monitored because it is readily available for sale in nurseries in Malaysia, Singapore and Thailand, so collecting of these plants from the wild may become a threat. The Latin name for species *monticola* means dweller or inhabitant in mountains.

The third new species, *Scaphochlamys disticha* was discovered in the valley of Sekayu Waterfall, Ulu Terengganu Tambahan Forest Reserve, Terengganu. The Latin name for species *disticha* refers to the distichously arranged floral bracts. The plants are terrestrial herbaceous and found in lowland dipterocarp forest growing abundantly in the bright but shady conditions provided by the canopy openings. A search of the surrounding area found the population to be highly localised, restricted to the mid slope of the valley at Sekayu Waterfall. It is listed as Rare species following the guidelines in the Malaysian Plant Red List because this species is considered rare but not threatened by extinction.

Spesimen holotip *Phlegmariurus iminii*
Holotype specimen of *Phlegmariurus iminii*

Phlegmariurus monticola

Habit *Scaphochlamys disticha*
Habit of *Scaphochlamys disticha*

Bunga *Scaphochlamys disticha*
Flower of *Scaphochlamys disticha*

BIOTEKNOLOGI PERHUTANAN

Penanaman Herba Kacip Fatimah di Kampung Sagil, Tangkak, Johor

Projek penanaman herba kacip fatimah di bawah geran Program *MOSTI Social Innovation* (MSI) telah dijalankan di Bukit Gambir, Ledang, Johor dengan penglibatan ahli Persatuan Peniaga Kecil Kampung Sagil (PPKS) bertujuan untuk membantu penduduk memperoleh pendapatan tambahan. Sebahagian besar penduduk di kawasan ini merupakan peladang serta pekebun getah dan kelapa sawit dan ini dapat membantu apabila berlaku kejatuhan harga serta penurunan produktiviti tanaman komoditi seperti getah dan kelapa sawit yang diusahakan. Projek ini boleh dikategorikan sebagai projek *touch point* kerana ia memberi impak kepada peningkatan hasil pendapatan orang kampung yang seterusnya dapat memartabatkan taraf ekonomi negara.

Selain itu, projek ini dijalankan kerana tumbuhan herba kacip fatimah mendapat permintaan yang tinggi daripada industri berasaskan produk herba. Bekalan bahan mentah dari hutan asli tidak dapat memenuhi permintaan industri kerana sumber yang semakin berkurangan dan tidak dapat dipastikan kualitinya. Sebagai contoh, kajian terkini oleh FRIM (2017) menunjukkan 87% bekalan bahan mentah kacip fatimah diperoleh dari hutan semula jadi dan hanya 17% yang diperoleh daripada perladangan. Nilai dagangan herba pada 2016 menunjukkan nilai eksport negara adalah kurang daripada 10 juta USD sedangkan nilai import melebihi 70 juta USD. Oleh itu satu inisiatif bagi mengekalkan kelestarian pengeluaran bahan mentah herba perlu dijalankan.

Melalui R&D, kumpulan penyelidik dari Bahagian Bioteknologi Perhutanan, FRIM telah berjaya

FORESTRY BIOTECHNOLOGY

Plantation of *Labisia pumila* Herbs at Kampung Sagil, Tangkak, Johor

This herbal plantation project was funded by MOSTI Social Innovation Program (MSI) and conducted at Kampung Sagil, Tangkak, Johor with the involvement of Persatuan Peniaga Kecil Kampung Sagil (PPKS) to aid the community in generating additional income. Majority of the community in this area are farmers, rubber and oil palm planters and this program would benefit them during the prices fall and reduction in productivity of the commodities such as rubber and oil palm. This project can be classified as touch point project due to its impact on the increase of community income which in turn can enhance the economic status of the country.

Other than that, this project was carried out due to the high demand of *Labisia pumila* by the herbal industry. Currently, the supply of raw materials from natural forests cannot fulfill the industry demand as the resources are depleting and uncertain quality. Recent research by FRIM (2017) found that 87% of the *Labisia pumila* raw materials supply were obtained from natural forest and only 17% were cultivated. In terms of the herbal trade value in 2016, the export value of the country is less than 10 million USD while the value of imports exceeds 70 million USD. Therefore, an initiative to sustain the production of herbal raw materials should be carried out.

Through R&D, researchers from Forestry Biotechnology Division, FRIM has succeeded in producing superior clone of *Labisia pumila* which has the good growth characteristics and high in bioactive chemical content. In addition, FRIM also has technology to reproduce this superior plant material through tissue culture

menghasilkan klon superior kacip fatimah yang mempunyai ciri pertumbuhan dan kandungan kimia aktif yang baik. Di samping itu, FRIM juga mempunyai teknologi memperbanyak bahan tanaman superior ini melalui teknik kultur tisu menggunakan Sistem Rendaman Sementara (SRS). Projek MSI ini dijalankan oleh FRIM (pembekal teknologi) bersama-sama dengan Malaysian Bioeconomy Development Corporation Sdn. Bhd (MBDC) (sebagai *match-maker*), Persatuan Peniaga Kecil Kampung Sagil, Tangkak, Johor (pelaksana projek) dan Bioalpha Holdings Berhad (syarikat pembeli) bagi memastikan bekalan bahan mentah yang mampan dan berkualiti tinggi.

Projek ini mempunyai objektif merekayasa hasil kajian FRIM untuk faedah kepada rakyat melalui usaha perladangan bahan tanaman kacip fatimah berkualiti di samping dapat meningkatkan penyertaan isi rumah luar bandar dalam aktiviti keusahawanan berasaskan bioteknologi.

FRIM membekalkan baka kacip fatimah berkualiti tinggi yang terhasil daripada kaedah kultur tisu melalui MBDC kepada komuniti di Ledang. Kemudian, mereka dilatih tentang kaedah menanam serta membiakkan bahan tanaman menggunakan teknik keratan daun serta teknologi lain yang dibangunkan oleh FRIM iaitu penjagaan dan penanaman di ladang sehinggalah dapat dituai oleh penduduk kampung.

Sebagai permulaan, seramai 10 orang kampung yang juga ahli PPKS terlibat sebagai perintis yang akan mengembangkan lagi aktiviti pembiakan dan penanaman kacip fatimah kepada penduduk lain. Hasil tanaman yang dituai dibeli oleh syarikat Bioalpha Holdings Berhad (berstatus BioNexus) melalui perjanjian belian balik yang dimeterai. Usaha ini dapat menjamin pendapatan untuk komuniti dan bekalan yang konsisten untuk syarikat tersebut. Syarikat ini kemudian memasarkan produk daripada ekstrak kacip fatimah.

Peruntukan projek yang diluluskan sebanyak RM300,000 merangkumi kos pembinaan infrastruktur, bahan tanaman, peralatan dan perkhidmatan-perkhidmatan lain.

PULANGAN (RM): Penduduk boleh meraih hasil tuaian kacip fatimah dengan berat basah antara 1500–2000 kg bagi setiap 2.5 ekar (1 ha) tanaman dengan harga sekilogram berat basah ialah RM15.00. Jumlah hasil pendapatan isi rumah ialah RM2000–2500 sebulan. Hasil yang diperoleh ini secara langsung dapat menambah pendapatan komuniti Ledang, Johor secara berterusan melalui konsep perladangan kontrak bagi aktiviti pertanian herba bernilai tinggi.

technique using Temporary Immersion System (TIS). In this MSI project, FRIM act as the technology provider to the beneficiary Persatuan Pekebun Kecil Kg. Sagil (PPKS) and Bioalpha Holdings Berhad was appointed as the anchor company. This project is supervised by Malaysian Bioeconomy Development Corporation Sdn Bhd (MBDC) to ensure sustainable supply of the high quality raw materials.

This project has the objective of engineered FRIM's research findings for the benefit of the community through the plantation of high quality *Labisia pumila* as well as enhancing the participation of rural households in biotechnology-based entrepreneurial activities.

FRIM provide the high quality clone of *Labisia pumila* which were produced through tissue culture technique via MBDC to the community in Ledang. Then, the community were trained on planting and cultivating the plants using leaf cutting techniques as well as other technologies developed by FRIM such as plantation management and harvesting techniques.

For starters, a total of 10 villagers who are members of PPKS are involved as pioneers who will further develop the breeding and cultivation activities for other villagers. The harvested crop is purchased by Bioalpha Holdings Berhad (BioNexus status) through the buyback agreement. This effort will ensure consistent income to the community and sustainable supply of raw materials to the company. The company then markets the product from the *Labisia pumila* extract.

The approved budget for this project is RM300,000, which consists the cost of infrastructure development, planting materials, tools and other services.

RETURN (RM): It is estimated that the fresh weight of *Labisia pumila* obtained from 1 ha plantation is about 1500–2000 kg with the selling price RM15 per kg. The community will gain about RM2000–RM2500 household income per month. These results directly contribute to the continued income of the Ledang community through the concept of contract farming for high value herbal.

FAEDAH PROJEK:

1 Memulihara serta mengurangkan tekanan ekploitasi hutan asli untuk bahan mentah herba dengan kaedah domestikasi spesies ini secara perladangan.
2 Memastikan pihak industri mendapat bekalan bahan mentah berkualiti lagi terjamin.
3 Penduduk kampung mampu menjana pendapatan tambahan antara RM18,000 hingga RM22,500 setiap satu pusingan (bersamaan sembilan bulan) dengan mengusahakan penanaman seluas 1 ha.
4 Produk berasaskan ekstrak kacip fatimah berkualiti dari Malaysia ini berpotensi menembusi pasaran antarabangsa dalam tempoh 2–3 tahun.

BENEFITS OF PROJECT:

1. Conserves and reduces the pressure of natural forest exploitation for herbal raw materials by the method of domestication of this species through plantation.
2. Ensuring the sustainable supply of quality raw materials to the industry is guaranteed.
3. The community are able to generate additional income between RM18,000 and RM22,500 per cycle (nine months old) with 1 ha plantation.
4. The quality *Labisia pumila* -based product from Malaysia has the potential to penetrate the international market within 2–3 years.




Program pemindahan teknologi kacip fatimah yang dijalankan secara teori dan amali
Kacip fatimah transfer of technology program which was carried out theoretically and practically


Mengajar orang kampung mengenai kaedah penanaman kacip fatimah di ladang
Training the villagers on the planting of kacip fatimah at the plantation

Pokok kacip fatimah yang dituai oleh penduduk Kampung Sagil
Kacip fatimah which is harvested by the villagers of Kampung Sagil

Projek Bank Germplasma Dipterokarpa Negara

Latar belakang Projek

Hutan diperokarpa mempunyai nilai ekonomi dan ekologi yang sangat penting. Pada masa kini, di Semenanjung Malaysia populasi dipterokarpa menurun disebabkan oleh perubahan guna tanah, penebangan dan kemerosotan mengikut masa. Penurunan kawasan dan sumber hutan mendorong kepada keperluan bagi pengurusan secara lestari. Tidak banyak data populasi dan ekologi bagi spesies dipterokarpa termasuk jenis terancam yang diketahui umum. Jika berlaku kejadian kemusnahan di habitat asal maka langkah-langkah untuk menyelamat spesies ini adalah perlu.

Pada tahun 2013, Ketua Setiausaha Kementerian Sumber Asli dan Alam Sekitar (NRE) yang kini dikenali sebagai Kementerian Air, Tanah dan Sumber Asli (KATS) telah mencadangkan penubuhan Bank Germplasma bagi melindungi dan seterusnya mengekalkan spesies pokok dan tumbuhan tempatan yang telah dikategorikan sebagai terancam.

Bank Germplasma Dipterokarpa Negara (National Dipterocarp Germplasm Bank, NDGB) ini menggunakan konsep pemuliharaan secara ex-situ dipterokarpa tanah pamah daripada spesies sangat terancam kepada yang berisiko rendah ditanam di kawasan terpilih di Institut Tanah dan Ukur Negara (INSTUN), Tanjong Malim, Perak.

National Dipterocarp Germplasm Bank

Project Background

Dipterocarp forest is one of several forest types that are of vital economic and ecological importance in Peninsular Malaysia. Currently, many populations of dipterocarps in Peninsular Malaysia are on the decline because of land use changes, unsustainable harvesting and degradation with the passage of time. Decreasing areas and forest resources led to the need for sustainable management. There is a lack of information on populations and ecological data for dipterocarps, including threatened species, for references. If the habitats of these species are under threat, necessary steps are needed to save them.

In 2013, Secretary General of Ministry of Natural Resources and Environment (NRE), now known as Ministry of Water, Land and Natural Resources (KATS), has proposed the establishment of a germplasm bank for the purpose of protecting and maintaining local plant species that have been categorized as endangered.

National Dipterocarp Germplasm Bank applied the concept of ex-situ conservation by planting dipterocarp species listed as least concern to critically endangered at the National Institute of Land and Survey (INSTUN), Tanjong Malim, Perak.

Dana Projek

Projek NDGB mendapat peruntukan kewangan daripada tabung Amanah Konservasi Sumber Asli Nasional (NCTF), KATS bagi jangka masa dua tahun (1 Januari 2017–31 Disember 2018) pada 24 November 2016 berjumlah RM 151,200 dan FRIM sebagai penaja bersama sebanyak RM128,100, dengan jumlah keseluruhan projek ialah RM 279,300.

Projek ini melibatkan 2 fasa utama iaitu:

Fasa 1 (Kutipan, penghasilan dan penjagaan bahan tanaman)

Aktiviti kutipan melibatkan kutipan bahan tanaman, sampel baucar dan data geolokasi daripada spesies-spesies dipterokarpa tanah pamah yang disenaraikan dalam Research Pamplet No. 129 *Malaysian Plant Red List Peninsular Malaysian Dipterocarpacea* yang diterbitkan oleh FRIM pada 2010.

Pada peringkat tapak semaian; biji benih disemai, ditabung mengikut amalan biasa di tapak semaian. Sementara anak liar dikutip dan dipulihkan mengikut teknik kutipan dan pemulihan yang telah dibangunkan oleh tapak semaian FRIM.

Bahan tanaman ditempatkan di tapak semaian Stesen Penyelidikan FRIM Mata Ayer, Perlis dan di FRIM Kepong.

Fasa 2 (Penanaman bahan tanaman)

Kawasan penanaman mempunyai siri tanah kuala brang—siri tanah yang sederhana dalam. Kawasan ini berkelas terain C_2–C_4 iaitu beralun hingga berbukit, berkecerunan antara 2–6° hingga 12–20°. Kawasan tersebut ialah kawasan hutan yang telah diteroka (hutan miskin). Terdapat campuran spesies seperti *Acacia mangium* dan spesies bukan dipterokarpa seperti *Endospermum macrophyllum*, *Macaranga* sp, *Eugenia* sp, *Vitex pubescens* serta buluh iaitu *Gigantocloa scortechinii* atau buluh semantan yang mendominasi sebahagian kawasan ini. Kawasan terbuka pula dipenuhi dengan resam.

Taburan hujan di kawasan Tanjung Malim, Perak ialah sebanyak 2798 mm setahun. Hujan yang paling rendah adalah pada bulan Jun iaitu 150 mm dan tertinggi pada bulan November 345 mm. Purata suhu ialah 27°C. Suhu terendah pada bulan Januari iaitu 26.5°C dan tertinggi pada bulan April iaitu 27.4°C. Ketinggian tapak projek daripada aras laut adalah antara 55–90 m (asl).

Kajian ini bertujuan untuk menilai kadar pertumbuhan 10 spesies pokok dipterokarpa di kawasan bernaungan 50% di kawasan hutan

Project Funding

The NDGB project receives funding from the National Natural Resources Conservation Trust (NCTF) Fund, KATS for a period of two years from 1 January 2017–31 December 2018 (NRE (5) 600-2 / 1/48 Jld 3 (17) November 2016 amounting to RM151,200 with Forest Research Institute Malaysia (FRIM) as a joint sponsor of RM 128,100 totaling RM 279,300.

This project involves two main phases i.e.:

Phase 1 (Collection, production and maintenance of plant material)

Collection activity involved collection of crop materials, voucher samples and geo-location data of lowland dipterocarp species listed in Research Pamphlet No. 129 *Malaysian Plant Red List Peninsular Malaysian Dipterocarpaceae* published by FRIM in 2010.

At the nursery stage, seeds are sown and nurtured according to the usual practices at the nursery. Wildings are collected, acclimatised and nurtured according to techniques developed by FRIM.

The nurseries are located at FRIM Research Station Mata Ayer, Perlis and FRIM, Kepong.

Phase 2 (Planting of seedlings)

The planting area has a soil series of Kkuala bBrang, a medium deep soil. The class terrain is C2–C4 which has a gradient of corrugated to hilly, between 2 -–6 ° to 12-–20 °. The area is categorised as a previously forested area that has already been explored (poorly stocked forest). There are mixed of species such as *Acacia mangium* and other non-dipterocarp species such as *Endospermum macrophyllum*, *Macaranga* sp., *Eugenia* sp., *Vitex pubescens* and bamboos such as *Gigantocloa scortechhinii* or semantan that dominate some of these areas. In addition, the open area are is filled with ferns.

Rainfall in Tanjung Malim, Perak was 2798 mm per year. The lowest rainfall was in June with 150 mm and the highest was in November with 345 mm. The average temperature was 27 ° C. The lowest temperature was in January at 26.5°C and the highest in April at 27.4°C. Project site altitude is from 55 to 90 meters above sea level.

This study aims to evaluate the growth rate of 10 dipterocarp species in a 50% sheltered area of cleared forest. The planting was done under tree canopy (under planting). The clearing of the planting area was done manually. Trees with diameter measuring below 10 cm were felled and cleared. Weeds were cut

yang dibersihkan. Penanaman dilakukan di bawah kanopi pokok (*under planting*). Pembersihan kawasan tanaman dilakukan secara manual iaitu pokok yang berdiameter 10 cm ke bawah ditebang dan dibersihkan menggunakan parang dan mesin gergaji berantai. Rumpai dan resam dibersihkan menggunakan mesin sandang. Pembukaan kawasan ialah mengikut keperluan pertumbuhan anak pokok dipterokarpa yang memerlukan cahaya 50 % naungan. Bahan tebangan disusun secara selari antara barisan berjarak 5 m di antara satu barisan.

Reka bentuk petak penyelidikan ialah reka bentuk blok lengkap terawak (RCBD) yang mengandungi dua blok, empat replikasi dan 10 rawatan. Rawatan petak mengandungi 25 pokok daripada 10 spesies. Jumlah bilangan pokok untuk 1 replikasi ialah 25 pokok x 10 spesies (250 pokok). Saiz dan keluasan kawasan untuk blok 1 ialah 40 m x 150 m (0.6 ha) dan untuk blok 2 ialah 75 m x 80 m (0.6 ha). Jumlah keseluruhan pokok ditanam bagi kajian ini ialah 250 pokok x 4 replikasi (1000 pokok). Jarak tanaman yang diguna pakai ialah 3 x 4 m dengan jumlah keseluruhan kawasan bertanam ialah 1.2 ha. Replikasi 1 dan 2 ialah bersebelahan manakala replikasi 3 dan 4 yang juga bersebelahan dipisahkan oleh kawasan berpaya yang berjarak 250 m.

and cleared using grass cutter machine. The openness of the area with 50% light penetration is according to the growth requirement of dipterocarp seedlings. Felled materials were arranged parallel to the rows that were 5 m apart.

This study employs a randomised complete block design (RCBD) comprising 2 blocks, 4 replicates and 10 treatments. Treatment contains 25 trees for each of the 10 species. Total number of trees for each replicate is 25 trees x 10 species (250 trees). Each block measures 40 m x 150 m (0.6 ha) and for blocks 2 is 75 m x 80 m (0.6 ha). The total number of trees planted for this study is 250 trees x 4 blocks (1000 trees). Planting distance is 3 m x 4 m with the total planted area 1.2 ha. Replicates 1 and 2 are adjacent while replicates 3 and 4 are separated by a swampy area 250 m away.

Senarai spesies yang ditanam adalah seperti berikut;
The list of species planted is as follows:

	Nama botani **Botanical name**	**Nama tempatan** **Local name**	**Status konservasi** **Conservation status**
1	*Hopea nervosa* King	Merawan jangkang	NT
2	*Shorea acuminata* Dyer	Meranti rambai daun	LC
3	*Shorea roxburghii* G. Don	Meranti temak nipis	NT
4	*Vatica odorata* (Griff.) Symington ssp. *Odorata*	Resak ranting kesat	*VU
5	*Vatica yeechongii* Saw	Resak	*CR
6	*Dipterocarpus baudii* Korth.	Keruing bulu	LC
7	*Dipterocarpus rigidus* Ridl.	Keruing cogan	*EN
8	*Shorea ovalis* (Korth.) Blume ssp. *ovalis*	Meranti kepong	NT
9	*Shorea glauca* king	Balau laut	LC
10	*Neobalanocarpus heimii* (King) PS Ashton	Cengal	NT

* Spesies terancam mengikut Chua, Suhaida, Hamidah & Saw (2010). *Malaysia Plant Red List: Peninsular Malaysian Dipterocarpaceae*. Forest Research Institute Malaysia (FRIM) & Ministry of Natural Resources and Environment Malaysia, Malaysia.

* Endangered species according to Chua, Suhaida, Hamidah & Saw (2010). Malaysia Plant Red List: Peninsular Malaysian Dipterocarpaceae. Forest Research Institute Malaysia (FRIM) & Ministry of Natural Resources and Environment Malaysia, Malaysia. pp. 73, 146

	Status konservasi /Conservation status
CR	Sangat terancam/Critically Endangered
EN	Terancam/Endangered
VU	Rentan/Vulnerable
NT	Hampir terancam/Near Threatened
LC	Risiko rendah/Least Concern

Output Projek

Penubuhan Petak Bank Germplasma Dipterokarpa yang terdiri daripada 10 spesies (1000 pokok) dipterokarpa tanah pamah mengikut status konservasi spesies bahaya kritikal (*Critically Endangered*) sehingga risiko rendah (*Least concern*). Sebanyak 24 baucar dan data geolokasi spesies dipterokarpa tanah pamah direkodkan bagi tujuan rujukan.

Faedah Projek:

Projek ini akan mengetengahkan fungsi KATS dalam pelaksanaan dasar, strategi dan program yang berkaitan dengan pemuliharaan dan pengurusan sumber semula jadi. Pemuliharaan bahan tanaman secara *ex-situ* akan dapat mengekalkan sumber genetik spesies dipterokarpa daripada pelbagai kategori status konservasi di kawasan yang selamat dan boleh digunakan pada masa hadapan.

Ia juga merupakan penerokaan bidang baharu INSTUN yang berkaitan dengan pengurusan tanah sebagai Pusat Kecemerlangan Pengurusan dan Penggunaan Tanah.

Projek ini boleh juga untuk masa hadapan, boleh memberi nilai tambah sebagai tempat edupelancongan dan ekopelancongan untuk peringkat kementerian dan negeri Perak khususnya.

Kerjasama Projek

Projek ini melibatkan kerjasama FRIM dengan agensi-agensi lain seperti Kementerian Air, Tanah dan Sumber Asli, Jabatan Perhutanan Semenanjung Malaysia dan INSTUN.

Project Output

A National Dipterocarp Germplasm Bank consisting of 10 species (1000 trees) of lowland dipterocarps according to the conservation status of Chua *et al*. (2010). A total of 24 vouchers and geo-location data of lowland dipterocarp species were recorded for reference.

Project Benefits:

This project will highlight KATS's role in implementing policies, strategies and programs related to conservation and management of natural resources. Ex-situ plant conservation will preserve the genetic resources of dipterocarp species from various categories of conservation status in a safe area for reference in the future.

Enhancement of INSTUN's role in land management as a Center for Excellence in Land Management and Use.

The project can also be used for an edu-tourism and eco-tourism site for the ministry and state of Perak, in particular.

Project Cooperation

This project involves the cooperation of FRIM with KATS, Forestry Department of Peninsular Malaysia and INSTUN.

Lokasi Projek/Project location:

Institut Tanah dan Ukur Negara (INSTUN), Kementerian Sumber Asli dan Alam Sekitar, Behrang, 35950 Tanjong Malim, Perak Darul Ridzuan, Malaysia
Institute of Land and Survey (INSTUN), Behrang, 35950 Tanjong Malim, Perak Darul Ridzuan, Malaysia

Fasa 1 (Kutipan, penghasilan dan penjagaan bahan tanaman)
Phase 1 (Collection, production and maintenance of plant materials)

Kutipan bahan tanaman (biji benih) dilakukan dengan kaedah melastik dan menggoncangkan dahan pokok *Dipterocarpus rigidus* di HS Mata Ayer, Perlis
Collection of *Dipterocarpus rigidus* seeds using catapult and shaking of branches at Mata Ayer Forest Reserve in Perlis

Penyediaan baucar sampel spesimen untuk rujukan
Preparation of specimen vouchers for reference

Anak benih *Neobalanocarpus heimii* mulai bercambah dalam masa seminggu setelah disemai
Neobalanocarpus heimii seedlings began to germinate within a week after sowing

Anak liar *Shorea glauca* diletakkan dalam rumah pengikliman selama 3 bulan bagi menjalani proses pemulihan sebelum dipindahkan ke batas ubah
Shorea glauca wildings were placed in the acclimatisation house for recovery within 3 months period before moving to nursery beds.

Fasa 2 (Penanaman bahan tanaman)
Phase 2 (Planting of planting materials)

Aktiviti penanaman di Blok 1
Planting activities in Block 1

Blok 1, Replikasi 1 & 2 yang ditanam sebanyak 500 batang pokok
Block 1, Replicates 1 and 2 with a total of 500 seedlings planted.

Aktiviti penanaman di Blok 2
Planting activities in Block 2

Penanaman di kawasan curam di Blok 2, Replikasi 3 dan 4
Replicates 3 and 4 in Block 2 established on a slope

Kawasan penanaman di Blok 2, Replikasi 3 & 4
A view of Block 2, replicates 3 and 4

Kebun Biji Benih Meranti Tembaga (*Shorea Leprosula*)

Pada awal tahun 1990-an, kajian kesesuaian spesies di kawasan bekas lombong dan kawasan tanah BRIS (beach ridges intersperse with swales) banyak menggunakan spesies *Eusideroxylon zwageri*, *Hevea brasiliensis, Casuarina equisetifolia, Fagraea fragrans, Intsia palembanica* dan *Palaqium gutta*. Namun, kadar tumbesarannya adalah rendah (FAO 2002). Sebagai alternatif, spesies *Shorea leprosula* telah terpilih sebagai satu daripada spesies yang berpotensi untuk kajian seterusnya (Hashim *et al*. 1992). Spesies ini dipilih berdasarkan taburannya yang meluas atau dikenali sebagai spesies indigenous, mempunyai sifat pertumbuhan yang baik, berupaya menghasilkan biji benih yang berterusan, mempunyai jaminan pasaran yang baik dan kesesuaian untuk pelbagai guna (Choo & Lim 1983).

Sehubungan dengan itu, pada tahun 1997, FRIM telah menyenaraikan 14 spesies untuk diberi keutamaan dalam bidang kajian, iaitu *Hevea brasiliensis*, *Acacia* spp., *Khaya ivorensis*, *Tectona grandis*, *Azadirachta excelsa*, *Dyera costulata*, *Drybalanops aromatica*, *Hopea odorata*, *Shorea leprosula*, *S. parvifolia*, *S. platyclados*, *Palaquium* spp., *Endorspermum malaccense* dan *Hibiscus cannabinus* (Baskaran 1997).

Sebagai langkah permulaan untuk penghasilan sumber bahan tanaman yang terjamin dari segi kualiti (berkualiti dari segi genetik dan fisiologinya) dan kuantiti (berterusan) maka petak ujian progeni telah ditubuhkan di Hutan Simpan (HS) Ulu Sedili, Johor dan HS Kemasul, Pahang pada bulan November 1997. Ia merupakan petak ujian progeni yang pertama ke atas famili dipterokarpa di negara ini. Projek ini merupakan kerjasama antara FRIM dengan Jabatan Perhutanan Semenanjung Malaysia (JPSM).

Kajian ini melibatkan pengutipan biji benih daripada 40 separa sib famili (pokok induk) terpilih yang terletak di lima hutan simpan di Semenanjung Malaysia iaitu di HS Sungai Menyala, HS Bukit Rengit, HS Bangi, HS Gombak dan HS Tranggun. Pemilihan pokok induk ini bersandarkan ciri rupa bentuk yang dinilai atau dilihat secara mata kasar yang dikenali sebagai kaedah fenotipik.

Petak kajian di Hutan Simpan (HS) Ulu Sedili, Johor mengandungi dirian sebanyak 1280 pokok (jumlah asal yang ditanam) dan berkeluasan 4.5 ha. Pada umur dirian 20 tahun, julat tumbesaran bagi ketinggian pokok ialah 17.2–25.7 m, manakala bagi tumbesaran diameter aras dada ialah 21.5 hingga 27.4 cm. Kajian hubungan genetik, analisis dilakukan oleh Makmal Genetik FRIM. Analisis pertumbuhan dan hubungan genetik adalah untuk menentukan pokok induk yang mana perlu ditebang dan ditinggalkan;

Seedling Seed Orchard of *Shorea leprosula* (Meranti Tembaga)

In the early 1990s, research on the plant species conformity in the areas such as Beach Ridges Intersperse with Swales (BRIS) soils and former mines area, utilised many species such as *Eusideroxylon zwageri*, *Hevea brasiliensis, Casuarina equisetifolia, Fagraea fragrans, Instia palembanica* and *Palaquium gutta*. However, the study found that the mentioned species had a slow growth rate when planted in such areas (FAO 2002). As an alternative, *Shorea leprosula* has been selected as one of the most potential species for further study (Hashim et al., 1992). This species was selected because of its wide distribution and an indigenous species to Malaysia, it has good growth performance and bears fruit all year round, and the species also has good market assurance and multipurpose usage (Choo & Lim 1983).

On the other hand, Forest Research Institute Malaysia (FRIM) has also listed *S. leprosula* among the 14 species selected to be given a priority in the research, other species were; *Hevea brasiliensis*, *Acacia* spp., *Khaya ivorensis*, *Tectona grandis*, *Azadirachta excelsa*, *Dyera costulata*, *Drybalanops aromatica*, *Hopea odorata*, *S. parvifolia*, *S. platyclados*, *Palaquium* spp., *Endorspermum malaccense* dan *Hibiscus cannabinus* (Baskaran 1997).

As a preliminary step towards the production of high-quality planting materials, in terms of quality (genetic and physiology) and quantity (continuous supply), a progeny trial plot of *S. leprosula* was established at Ulu Sedili Forest Reserve, Johor and Kemasul Forest Reserve, Pahang in November 1997. This was the first progeny trial plot of Dipterocarp species in this country. This project is a collaboration between FRIM and the Forestry Department of Peninsular Malaysia (FDPM).

This study involved seedlings collection from 40 half-sib families in five forest reserves areas in Peninsular Malaysia which were Sungai Menyala Forest Reserve, Bukit Rengit Forest Reserve, Bangi Forest Reserve, Gombak Forest Reserve and Tranum Forest Reserve. The selection of the mother trees was made based on the physical characteristics which were assessed following the tree grading system, which is also known as a phenotypic method.

The progeny trial plot at Ulu Sedili Forest Reserve consists of a total of 1280 trees (the original trees planted) and encompassing of an area of 2.05 hectares. At the age of 20 years, the growth performance's range for the height (HT) of the trees is 17.2 to 25.7m, while for the diameter at breast height (DBH) is 21.5

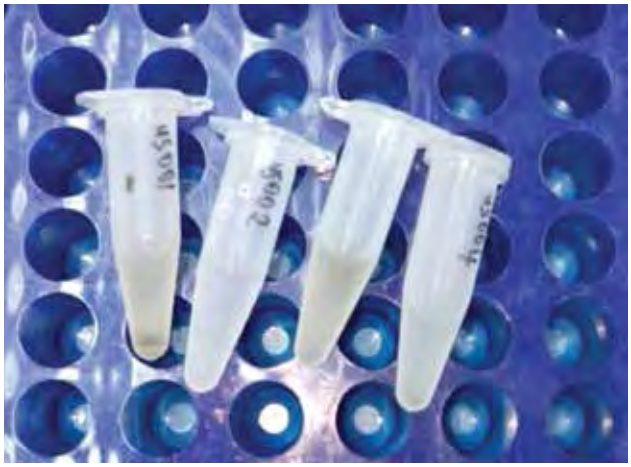
dikenali sebagai penjarangan genetik. Kacukan pendebungaan terbuka antara dirian yang tinggal (dirian terbaik) berupaya menghasilkan kualiti biji benih pada masa akan datang. Kebun biji benih ini perlu diselenggarakan mengikut amalan silvikultur supaya berupaya menghasilkan kuantiti biji benih yang banyak dan berterusan.

to 27.4cm. Additionally, the study of genetic diversity and relationships were conducted by the FRIM Genetic Laboratory. Selection of the individual trees to be cut down for genetic thinning will be conducted based on the findings of the growth performances and genetic relationship among the 40 half-sib families of *S. leprosula*. Open pollination between the remaining trees (the best possible) will be able to produce high-quality seeds in the future. The seeds of the selected progenies should be maintained in accordance with the silvicultural practices in order to produce abundant and high-quality seeds.

Dirian meranti tembaga berumur 20 tahun di HS Ulu Sedili, Johor
Twenty-year-old meranti tembaga stand at Ulu Sedili FR, Johore

Pengambilan data tumbesaran pokok
Data collection on tree growth

Pensampelan daun
Leaves sampling



Contoh DNA yang telah diekstrak
Samples of the extracted DNA

HASILAN SEMULA JADI

Pensahihan *Hibiscus sabdariffa* L. (Rozel) dengan Pencirian Morfologi dan Cap Jari Kromatografi

Pensahihan merupakan isu utama dalam sektor perindustrian yang menggunakan ekstrak semula jadi. Komposisi ekstrak semula jadi yang menentukan keberkesanan, keselamatan dan kualiti produk dipengaruhi oleh faktor-faktor seperti spesies botani, asal-usul geografi, penanaman, umur tumbuhan, amalan tuaian, serta proses pengekstrakan. Pertubuhan Kesihatan Sedunia (WHO), Pentadbiran Makanan dan Dadah Amerika Syarikat (USFDA) dan Agensi Ubat Eropah (EMEA) telah menyatakan bahawa pensahihan spesies adalah antara analisis pertama yang perlu dijalankan untuk memastikan kualiti dan diskriminasi daripada spesies yang berkaitan atau sampel yang dipalsukan. Oleh itu, pendekatan analitik yang cepat dan tepat pada dasarnya diperlukan untuk mengenal pasti penggunaan bahan permulaan yang betul.

Hibiscus sabdariffa L. (rozel; Malvaceae) mempunyai pelbagai kegunaan tradisional dan berpotensi sebagai makanan, minuman herba, minuman panas dan sejuk, sebagai agen perasa dalam industri makanan dan sebagai ubatan herba. Kajian in vitro dan vivo serta beberapa ujian klinikal telah membuktikan bahawa ekstrak *H. sabdariffa* menunjukkan kesan, antaranya antibakteria, antioksidan, perlindungan nefro dan hepato, diuretik, metabolisme lipid (antikolesterol), kencing manis dan antihipertensi. Kumpulan sebatian asid fenolik, asid organik dan antosianin mungkin menyumbang kepada kesan yang dilaporkan. Secara umum, *H. sabdariffa* mempunyai rekod keselamatan dan toleransi yang sangat baik. Walau bagaimanapun, data tersedia yang mengaitkan penggunaan terapeutik *H. sabdariffa* dan profil kimia ekstrak yang digunakan adalah terhad. Kebanyakan kajian yang dilaporkan hanya mengenal pasti jenis ekstrak dan bahagian tumbuhan yang digunakan, tetapi tidak mengaitkannya dengan sebatian yang terdapat dalam ekstrak secara kualitatif dan kuantitatif.

Kajian di FRIM telah menunjukkan kesan farmakologi yang menarik dalam keadaan obesiti yang dikaitkan dengan kehadiran beberapa derivatif asid caffeoylquinic dalam ekstrak piawai *H. sabdariffa*. Di samping itu, protokol cap jari komprehensif melalui pendekatan botani dan kimia telah dibangunkan untuk pensahihan dan verifikasi dua jenis *H. sabdariffa* yang ditanam sebagai sayuran (asam paya), untuk membuat teh atau jus kordial (rozel) atau sebagai hiasan. Perbezaan botani secara makroskopi antara kedua-dua jenis ini dapat diperhatikan pada bentuk dan margin daun, saiz dan tekstur kaliks buah atau bunga serta bentuk batang apabila kering, sementara perbezaan ciri mikroskopi diperhatikan menerusi

NATURAL PRODUCTS

Authentication of *Hibiscus sabdariffa* L. (Roselle) by Morphological Characterisation and Chromatographic Fingerprinting

Authentication is a major issue in the industrial sectors working with natural extracts. The compositions of the natural extracts which determine the product efficacy, safety and quality are affected by factors such as botanical species, geographical origins, cultivation, age and harvest practices, as well as extraction processes. The World Health Organisation (WHO), United States Food and Drug Administration (USFDA) and the European Medicines Agency (EMEA) have stated that species authentication is one of the first analyses that should be conducted to ensure their quality and discriminate from related species or adulterated samples. Therefore, rapid and accurate analytical approaches are essentially required for the identification of the correct starting materials.

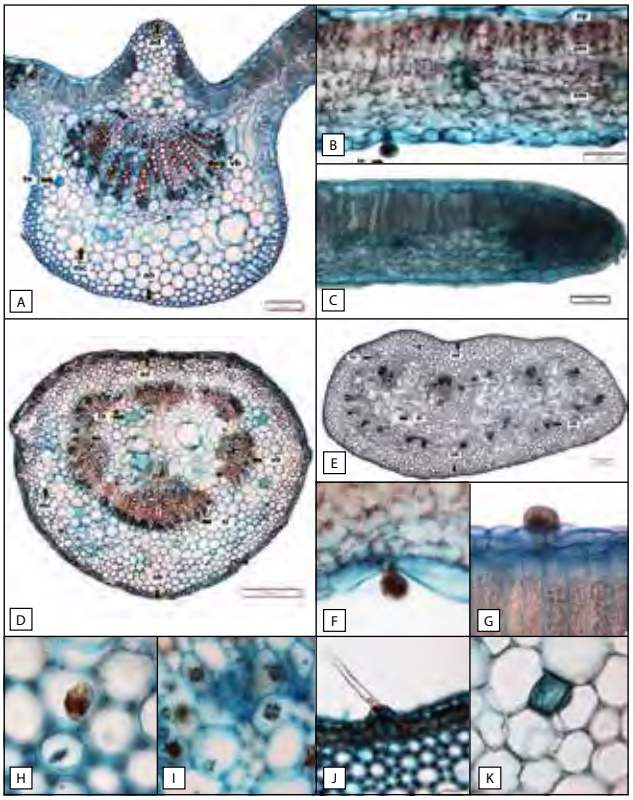
Hibiscus sabdariffa L. (roselle; Malvaceae) has a wide range of traditional and potential uses as a food, in herbal drinks, in hot and cold beverages, as a flavouring agent in the food industry and as a herbal medicine. In vitro and in vivo studies as well as some clinical trials provide some evidence for the extracts that showed antibacterial, anti-oxidant, nephro- and hepato-protective, diuretic, lipid metabolism (anti-cholesterol), anti-diabetic and anti-hypertensive effects among others. Phenolic acids, organic acids and anthocyanins are likely to contribute to the reported effects. In general, *H. sabdariffa* has an excellent safety and tolerability record. However, limited data is available that correlates the therapeutic uses of *H. sabdariffa* and the chemical profile of the extracts being used. Most of the studies reported only identify the type of extract and part of plant used, but do not quantify the compounds present in the extract.

Recent studies in FRIM have demonstrated interesting pharmacological effects for *H. sabdariffa* in obesity condition which is associated with derivatives of caffeoylquinic acid in phytochemically characterized and well-designed standardized extract. Further to that, a comprehensive fingerprint protocol through botanical and chemical approaches was developed for the authentication and verifcation of two types of *H. sabdariffa* that are locally grown as vegetables (asam paya), for making tea or cordial juices (roselle) or even as ornamental. The macroscopic botanical differences observed between the two types were in the shape and margin of the leaves, the size and texture of the fruits or flower calyxes and shape of stem when dried whilst differences in microscopic characters were observed in the cross sections done on the leaf by the presence or absence of the trichomes and type of crystals and the outline

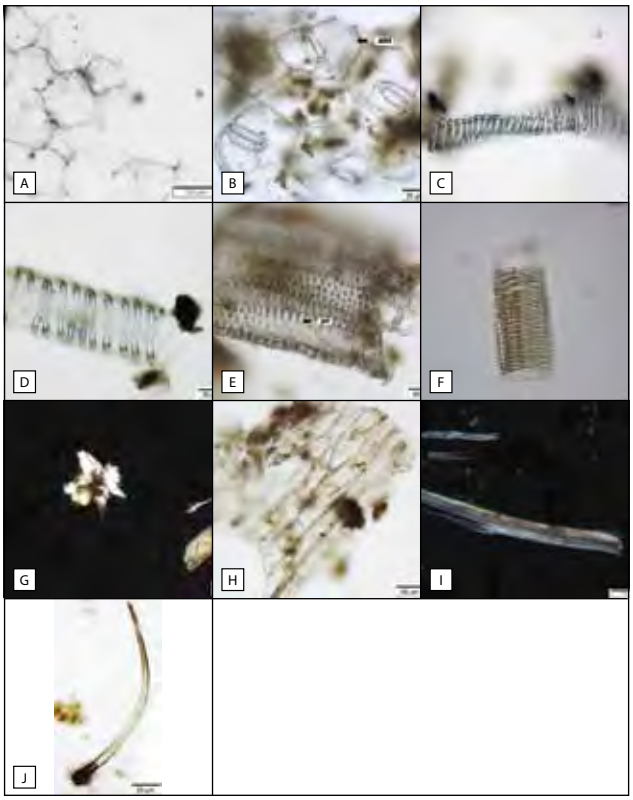
keratan rentas daun yang dilakukan dengan mengenal pasti kehadiran atau ketidakhadiran struktur trikom dan jenis kristal serta bentuk permukaan dan susunan berkas vaskular pada keratan rentas petiol daun. Pembangunan cap jari kimia dengan pengenalpastian secara kualitatif terhadap derivatif asid caffeoylquinic menggunakan kromatografi lapisan tipis yang tinggi (HPTLC) dan teknik kromatografi cecair prestasi tinggi (HPLC) juga boleh digunakan untuk mengesahkan *H. sabdariffa*. Walau bagaimanapun, profil ini tidak memberikan sebarang perbezaan jelas antara daun daripada dua jenis *H. sabdariffa* yang menunjukkan bahawa komposisi kimianya adalah serupa.

and vascular bundles arrangement on the petiole cross section. The chemical fingerprinting with qualitative identification of the caffeolquinic acid derivatives using high performance thin layer chromatography (HPTLC) and high performance liquid chromatography (HPLC) techniques could be used to authenticate *H. sabdariffa* but did not reveal any obvious differences between the two types of leaves indicating that their chemical compostions are similar.

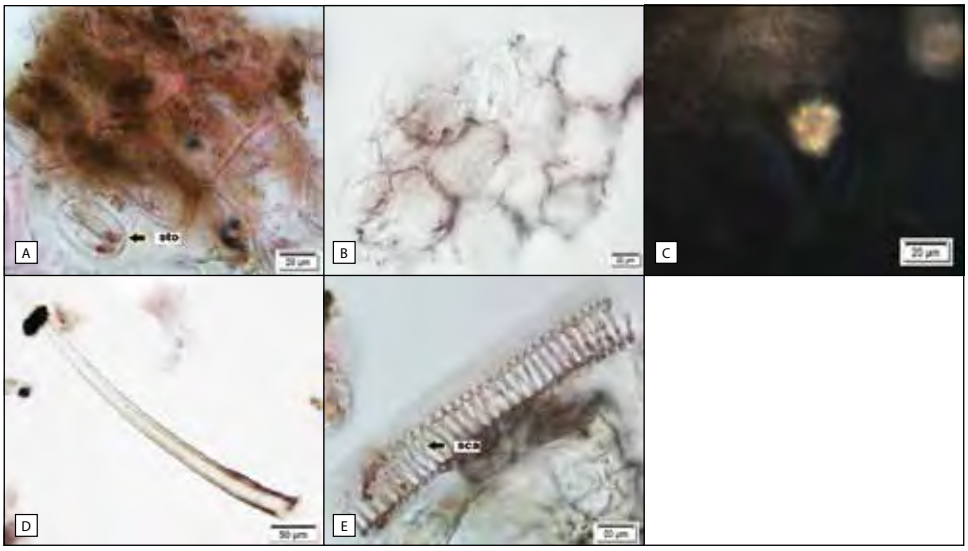
Tumbuhan *Hibiscus sabdariffa* (i), bunga (ii), buah (iii), kaliks buah segar (iv) dan kering (v).
Hibiscus sabdariffa plant (i), flowers (ii), fruits (iii), fresh (iv) and dried (v) fruit calyx.



(i)

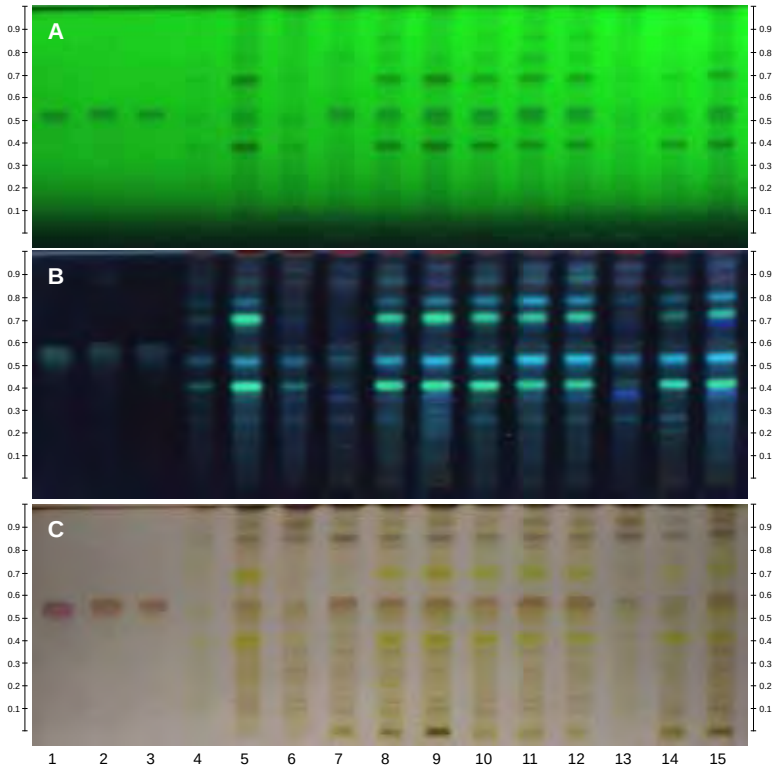


(ii)

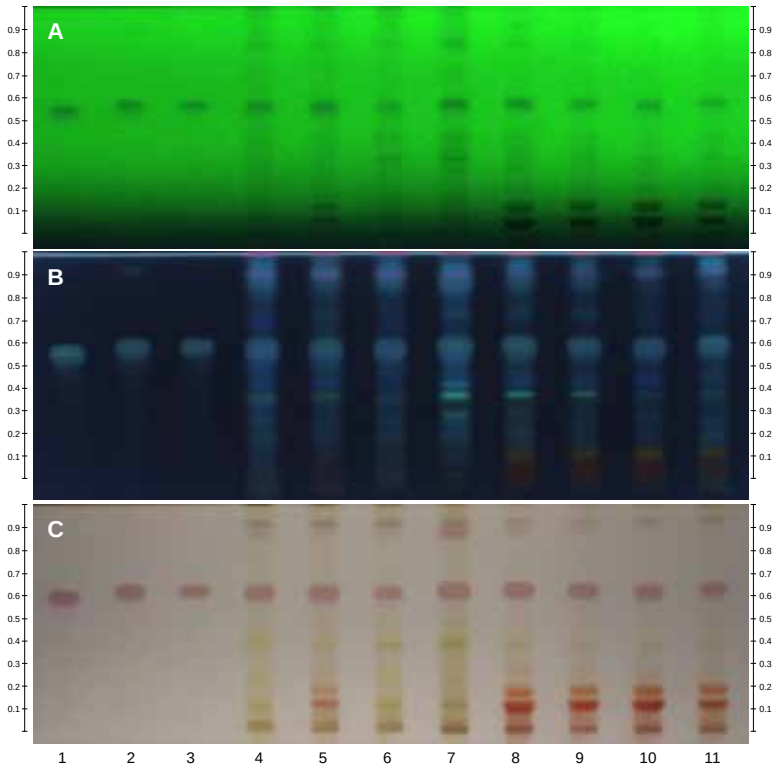


(iii)

Hibiscus sabdariffa. (i) Keratan rentas daun dan kaliks buah. (ii) Ciri-ciri mikroskopi serbuk daun. (iii) Ciri-ciri mikroskopi serbuk kaliks buah.
Hibiscus sabdariffa. (i) Transverse sections of leaves. (ii) Microscopic characteristics of leaf powder. (iii) Microscopic characteristics of fruit calyx powder



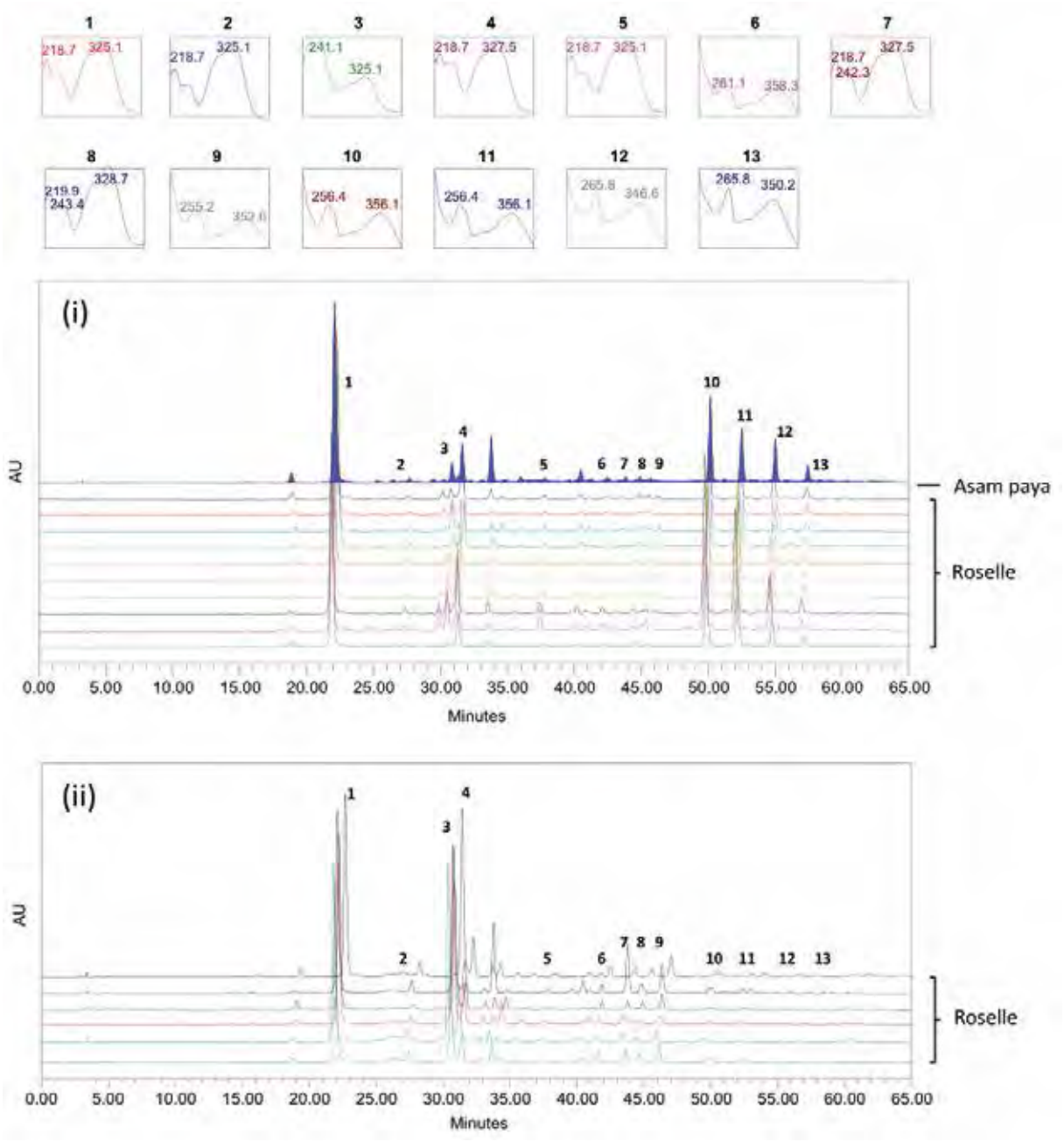
(i)

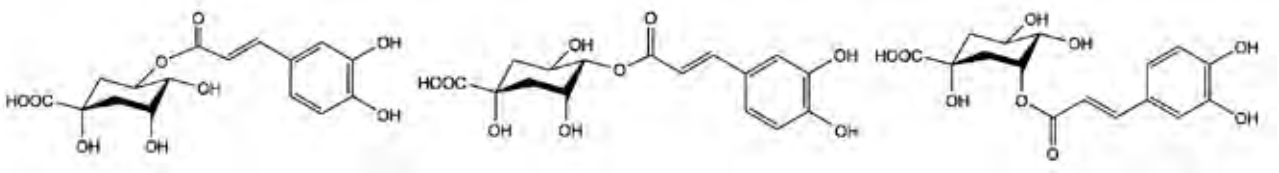


(ii)

Cap jari HPTLC daun (i) dan kelopak buah (ii) *Hibiscus sabdariffa* diperoleh dari pelbagai lokasi selepas derivatisasi dengan 10% asid sulfuric. (A) cahaya UV pada 254 nm; (B) cahaya UV pada 365 nm dan (C) cahaya nampak. Trek 1-3, 3-O-caffeoylquinic acid, 4-O-caffeoylquinic acid and 5-O-caffeoylquinic acid. (i) Trek 4-14, rosel; Trek 15, asam paya. (ii) Trek 4-11, rosel.

HPTLC fingerprints of *Hibiscus sabdariffa* leaves (i) and calyx (ii) obtained from different locations after derivatization with 10% sulfuric acid. (A) UV light at 254 nm; (B) UV light at 365 nm and (C) visible light. Track 1-3, 3-O-caffeoylquinic acid, 4-O-caffeoylquinic acid and 5-O-caffeoylquinic acid. (i) Track 4-14, roselle; Track 15, asam paya. (ii) Track 4-11, roselle.





Peak 1
(5-*O*-caffeoylquinic acid)

Peak 3
(4-*O*-caffeoylquinic acid)

Peak 4
(3-*O*-caffeoylquinic acid)

Cap jari HPLC daun (i) dan kelopak buah (ii) *Hibiscus sabdariffa* diperoleh dari pelbagai lokasi dengan pengenalpastian secara kualitatif kehadiran 5-O-caffeoylquinic acid (puncak 1), 4-O-caffeoylquinic acid (puncak 3) and 3-O-caffeoylquinic acid (puncak 4).

HPLC fingerprints of *Hibiscus sabdariffa* leaves (i) and calyx (ii) obtained from different locations with qualitative identification of 5-O-caffeoylquinic acid (peak 1), 4-O-caffeoylquinic acid (peak 3) and 3-O-caffeoylquinic acid (peak 4).

Peningkatan Kualiti Produk daripada Tumbuhan Hutan Paya Laut

Hutan paya laut atau hutan paya bakau adalah penting kerana ekosistemnya yang dinamik dan sangat produktif. Ia bukan sahaja memainkan pelbagai fungsi ekologi untuk habitat sekitarnya dalam membentuk kestabilan alam bahkan sebagai sumber makanan dan pendapatan kepada komuniti pesisir pantai. Hutan paya laut juga kaya dengan spesies yang mempunyai khasiat perubatan. Walau bagaimanapun, khasiat tumbuhan hutan paya laut ini memerlukan penyelidikan, pembangunan dan komersialisasi (R, D & C) agar mutu produk yang dihasilkan itu dapat dipertingkatkan, mempunyai nilai saintifik, berkesan dan selamat untuk digunakan.

Sebagai sebuah institut penyelidikan perhutanan, FRIM sentiasa berusaha untuk menghasilkan kajian dan produk yang berupaya membantu memajukan lagi industri negara yang berasaskan sumber hutan yang mempunyai nilai perubatan tinggi. Maka, Jawatankuasa Teknikal Mengenai Penyelidikan dan Pembangunan Program Penanaman Bakau dan Spesies Lain yang Sesuai di Persisiran Pantai Negara (JTRD) telah meluluskan projek "Peningkatan Kualiti Produk Terhasil daripada Tumbuhan Hutan Paya Laut" untuk membantu Persatuan Kebajikan Nelayan-Nelayan Pantai Pulau Pinang atau lebih dikenali sebagai PIFWA dalam meningkatkan kualiti produk-produk mereka seperti teh jeruju dan jem buah berembang serta melihat potensi spesies paya laut yang lain. Jaminan kualiti ialah komponen penting dalam pembangunan produk. Ia dapat meningkatkan mutu produk tersebut, menjana maklumat saintifik dan memastikan produk tempatan yang dihasilkan adalah selamat, berkesan serta mematuhi peraturan yang ditetapkan oleh Kementerian Kesihatan Malaysia.

Antara usaha yang telah FRIM lakukan ialah menentukan keselamatan produk keluaran PIFWA melalui ujian bebanan mikroorganisma dan had logam berat. Penemuan awal menunjukkan kedua-dua produk adalah bebas daripada logam berat. Walau bagaimanapun, produk teh jeruju didapati tercemar dengan mikrorganisma. Namun, produk tersebut masih dianggap selamat dan tidak menjejaskan kesihatan kerana air panas semasa penyediaan teh dapat membunuh mikroorganisma berkenaan. Hasil maklumat tersebut, pihak PIFWA telah mengambil tindakan proaktif memperbaiki produk teh jeruju melalui pengeluaran teh jeruju versi kedua yang bebas daripada pencemaran mikroorganisma dan logam berat.

Enhancement of Product Quality from Mangrove Forest Plants

Mangrove forests or swampy forests are important for their dynamic and highly productive ecosystems. It plays various ecological functions for the surrounding habitat in shaping the stability of the environment and provide sources of food as well income to the coastal communities. It is also rich in medicinal properties. Although the benefits of mangrove forest plant have long been known by the local comunities, research, development and commercialisation (R, D & C) studies need to be done to ensure that the quality of the product is enhanced, has scientific value, efficacious and safe to be use.

As a forest research institute, FRIM is constantly striving to produce research and products that are capable of assisting in developing the national forest resources industry based which have high medicinal value. Therefore, the Technical Committee on Research and Development of Planting Mangrove Species and Other Species in Coastal Area (JTRD) has approved the project on "Improvement of Product Quality from Mangrove Forest Plants" in assisting the Penang Inshore Fisherman Welfare Association or better known as PIFWA in enhancing the quality of their products such as jeruju tea and berembang fruit jam, as well to investigate potential of other mangrove species. Quality assurance is a crucial component in the product development, it can improve the product's quality and generating scientific information that can be used to ensure that local products are safe, effective and comply to Malaysian Ministry of Health regulation.

As part of FRIM concerted efforts in determining the safety of PIFWA products, microbial load and heavy metal tests were carried out on the products. Preliminary results showed that both products are free of heavy metals. However, the jeruju tea product was found to be contaminated with microorganisms but the product is still considered as safe and not detrimental to health due to the usage of boiling water in tea preparation that can kill microorganisms. By using the information from FRIM, PIFWA has taken proactive actions to improve the jeruju tea product through production of the second version of jeruju tea. The test results for the second version of the tea product indicated that it is free from microorganisms and heavy metals contamination.

Di samping itu, lapan spesies paya laut telah dikaji untuk melihat potensinya dibangunkan sebagai produk, antaranya berembang (*Soneratia caseolaris*), jeruju putih (*Acanthus ilicifolius*), jeruju hitam (*A.ebracteatus*), api-api ludat (*A. officinalis*), api-api jambu (*A. marina*), Api-api putih (*A. alba)*, piai lasa (*Acrostichum speciosum*) dan tumu putih (*Bruguiera sexangula*). Spesies-spesies ini telah melalui proses penyaringan fitokimia dan aktiviti biologi terpilih seperti antioksidan dan antimikrob. Hasil uji kaji mendapati kebanyakan tumbuhan mengandungi flavonoid. Penilaian antioksidan menunjukkan bahawa beberapa spesies tumbuhan seperti berembang, piai lasa dan tumu putih mempunyai aktiviti perencatan radikal bebas yang tinggi. Walau bagaimanapun yang menariknya, ekstrak berembang didapati mempunyai aktiviti antioksidan yang tinggi melalui asai perencatan enzim elastase. Aktiviti yang tinggi ini menyatakan potensi ekstrak berembang boleh menegangkan kulit. Ujian antimikrob pula menunjukkan ekstrak berembang mempamerkan kadar perencatan yang baik terhadap mikroorganisma terpilih, *Staphylococcus aureus* ATCC 33591 dan *Escherichia coli* ATTC 35218. Berdasarkan kajian-kajian ini, ekstrak berembang berpotensi dibangunkan dalam produk kosmetik dan penjagaan kulit.

FRIM juga telah menganjurkan satu Program Kesedaran Herba bersama komuniti PIWFA. Penganjuran kursus seumpama ini merupakan sebahagian daripada aktiviti rutin FRIM dalam membantu pembangunan dan pemerkasaan industri herba negara. Objektif program ini adalah untuk mempertingkatkan pengetahuan dan kesedaran peserta melalui perkongsian teknologi pemprosesan dan pembangunan produk herba**;** termasuk memberi pendedahan tentang pengunaan spesies daripada paya laut, proses kawalan kualiti dalam produk herba, pemprosesan minyak pati dan formulasi produk kosmetik. Peserta program turut diberikan peluang mengikuti amali penyulingan minyak pati menggunakan spesies tumbuhan di persekitaran persisiran pantai. Selain itu, mereka juga mempelajari dan cuba memformulasikan sendiri produk kosmetik (krim, gel dan minyak urut) menggunakan minyak pati sebagai satu daripada ramuan aktif.

Maklum balas yang baik dari peserta program memberi gambaran positif bahawa R, D & C yang melibatkan spesies dan produk hutan paya laut adalah relevan untuk diketengahkan dan dikembangkan. Input dan maklum balas ini amat berharga untuk menangani isu berkaitan serta mempertingkatkan keupayaan FRIM untuk menguruskan khazanah negara yang sangat bernilai ini.

In addition, a total of 8 mangroves species have been explored and studied to see the potential to be developed as a product, among of them are berembang (*Soneratia caseolaris*), jeruju (*Acanthus ilicifolius*), jeruju hitam (*A. ebracteatus*), api-api ludat (*A. officinalis*), api-api jambu (*A. marina*), api-api putih (*A. alba*), piai lasa (*Acrostichum speciosum*) and tumu putih (*Bruguiera sexangula*). These species have undergone phytochemical screening and selected biological activities such as anti-oxidants and anti-microbes. The results of the experiments carried out showed most of the plant contain flavonoids. Antioxidant evaluation shown that some plant species such as berembang, piai lasa and tumu putih have high free radical inhibition activity. However, it is interesting that berembang extract was found to have high antioxidant activity through elastase enzyme inhibition assay. This high activity demonstrates that berembang extract has potential to tighten up skin. From antimicrobial testing, the berembang extract has shown good inhibition rate against selected microorganism, *Staphylococcus aureus* and *Escherichia coli* ATCC 33591 and ATTC 35218. Based on the results, berembang extracts has potential to be developed into cosmetic and skin care products.

FRIM has also organised an Herbal Awareness Program with the PIWFA community. Organising such courses is part of FRIM's routine activities in assisting the development and empowerment of the national herbs industry. The objective of the program is to enhance the knowledge and awareness of the participants through the sharing of processing technology and development of herbal products. This includes providing an insight into the use of mangrove species, quality control processes in herbal products, essential oil processing and cosmetic product formulations. Participants were also given opportunities to attend practical of essential oil distillation extraction using plant species in the coastal environment. In addition, they also learnt and tried to formulate their own cosmetic products (cream, gel and massage oil) using essential oil as one of the active ingredients.

The good response from the participants gave a positive picture that R, D and C involving mangroves forest based products is relevant to be highlighted and developed. These inputs and feedback are valuable to address all related issues and enhancing FRIM's ability to manage this highly valuable national treasure.

Pengumpulan sampel di Sungai Aceh Pulau Pinang
Sample collection at Sungai Aceh, Pulau Pinang

Berembang
(Sonneratia caseolaris)

Jeruju
(Acanthus ilicifolius)

Latihan penyulingan minyak pati
Training on essential oils distillation

Amali formulasi produk kosmetik
Practical on cosmetic product formulation

Sorotan Pengurusan R&D
Highlights of R&D Management

Sehingga 31 Disember 2018, sebanyak 35 projek penyelidikan telah diluluskan (32 penaja luar; 3 geran dalaman) dengan nilai RM27,795,344.70.
As at 31 December 2018, a total of 35 research projects was approved (32 from the external funding agencies, 3 internal grants) of RM27,795,344.70.

Senarai projek penyelidikan yang diluluskan/List of approved projects:

No. Bil.	Penaja Funder	Ketua projek Project leader	Tajuk projek Project title	Jumlah peruntukan diterima/ Total fund (RM)
1	RMK	Dato Dr Marzalina Hj Mansor	Pengukuhan Bank Germplasma serta Pembangunan Produk Berkualiti dan Berakreditasi untuk Memperkasakan Industri Perhutanan dan Herba Negara	5,000,000.00
2	RMK	Noorsiha Ayop	Pertumbuhan Hijau Berteraskan Pemuliharaan Flora Paling Unik Dunia (Rafflesia) bagi Memperkasakan Industri Eko-Pelancongan Wilayah Ekonomi Koridor Utara (NCER)	1,500,000.00
3	RMK	Noorsiha Ayop	Program Pemuliharaan Biodiversiti ke Arah Pertumbuhan Hijau Kawasan Tanah Tinggi bagi Memperkasakan Industri Eko-Pelancongan Semenanjung Malaysia	4,500,000.00
4	RMK	Dr Samsudin Musa	Memperkasakan Penyelidikan dan Peningkatan Integriti Ekosistem Pengurusan Hutan Secara Lestari	2,000,000.00
5	RMK	Dr Gan Kee Seng	Peningkatan Kualiti Serta Ketahanan Bahan dan Hayat Perkhidmatan Sumber Kayu Lestari ke Arah Memperkasakan Daya Saing Produk Berasaskan Kayu Negara di Pasaran Antarabangsa	1,122,000.00
6	RMK	Dr Richard Chung Cheng Kong	Dokumentasi dan Konservasi Biodiversiti Demi Kesejahteraan Hutan dan Kemampanan Sumber Semula Jadi (Fasa 1)	4,000,000.00
7	RMK	Dr Fadhilah Zainudin	Mengukuhkan Pendorong Pertumbuhan Ekonomi Negara melalui Pengkomersialan Teknologi ke Arah Pencapaian Peningkatan Pendapatan Tinggi	3,000,000.00

No. Bil.	Penaja Funder	Ketua projek Project leader	Tajuk projek Project title	Jumlah peruntukan diterima/ Total fund (RM)
8	RMK	Noorsiha Ayop	Memperkasakan Penyelidkan dan Pemuliharaan Kampus FRIM sebagai Tapak Warisan Semula Jadi dan Dunia	760,000.00
9	Persekutuan Federal	Dr Lee Soon Leong	*DNA Barcoding of Major Timbers and Cites Listed Plant Species in Malaysia*	200,000.00
10	Persekutuan Federal	Norsham Suhaina Yaakob	Kajian Koleksi Hidup Tumbuhan Endemik dan Terancam di Lembangan Chini untuk Pemuliharaan Ex-Situ Khazanah Negara	60,000.00
11	Persekutuan Federal	Norsham Suhaina Yaakob	Kajian Inventori Kepelbagaian Diversiti Amfibia di Lembangan Chini	30,000.00
12	Persekutuan Federal	Mohd Ghazali Hassan	Penghasilan Kaedah Mempercepat Tumbesaran Tumbuhan Bakau untuk Konservasi Hutan Paya Laut di Tg Piai, Johor	50,000.00
13	Persekutuan Federal	Dr Ismail Parlan	Pengemaskinian dan Penerbitan Dokumen "An Overview on Wetlands In Malaysia"	50,000.00
14	Persekutuan Federal	Tariq Mubarak Husin	Kajian Direktori Kawasan Tanah Lembap di Semanjung Malaysia	100,000.00
15	RPP	Mohd Ghazali Hassan	Konservasi Tumbuhan Teratai Secara Lestari di Tasik Chini	10,000.00
16	Persekutuan Federal	Mohd Ghazali Hassan	Kajian Pengurusan dan Pemuliharaan Hutan Simpan Paya Gambut bagi Negeri Selangor	451,000.00
17	Antarabangsa International	Mohd Parid Mamat	*Conservation and Consumption Goods and Nature-based Recreation: A Community-Based Ecotourism Project in Malaysia*	97,162.50
18	Negeri State	Dr Raja Barizan Raja Sulaiman	Germplasma Warisan Hutan Bakau di Bagan Datuk	3,000,000.00
19	Persekutuan Federal	Dr Noor Azlin Yahya	*Assessment of Biodiversity Programme Involvement by Civil Societies in Malaysia*	100,000.00
20	Persekutuan Federal	Dr Sik Huei Shing	Pengoptimasian Kaedah *High Temperature Drying* (HTD) bagi Spesies Kayu Hutan Ladang Fasa Ke-2	117,215.82

No. Bil.	Penaja Funder	Ketua projek Project leader	Tajuk projek Project title	Jumlah peruntukan diterima/ Total fund (RM)
21	RPP	Abd Majid Jalil	*Biomass Distribution and Carbon Storage of Aquilaria malaccensis at SPF Maran Pahang*	20,000.00
22	Persekutuan Federal	Mohd Parid Mamat	Kajian Penyediaan Dokumen Pelan Strategik Perhutanan Sosial Malaysia, 2018-2016	65,000.00
23	TL	Rohana Abd Rahman	*Appraisal on Land Use Activities and Its Impact to FRIM Heritage Site*	40,000.00
24	Antarabangsa International I	Dr Gan Kee Seng	*Equivalent Timber Names in ASEAN*	239,422.64
25	JTRD	Dr Mohd Zaki Abdullah	Pembiakan Vegetatif Secara Makro dan Mikro Propagasi untuk Spesies *Xylocarpus rumphii* (Nyirih Pasir)	45,000.00
26	JTRD	Veronica Khoo Swee Imm	Penilaian Keperluan Habitat Serta Langkah-Langkah Pemeliharaan Kelestarian Populasi Kelip-Kelip di Sungai Rembau-Linggi, Negeri Sembilan	35,000.00
27	JTRD	Hyrul Izwan Mohd Husin	Kajian Berkenaan Faktor Kesesuaian Spesies untuk Ditanam di Kawasan Berpasir yang Bersesuaian dengan Penyu untuk Mendarat dan Bertelur	30,000.00
28	Persekutuan Federal	Dr Elizabeth Philip	Inventori GHG bagi Sektor LULUCF untuk BUR3	100,000.00
29	Swasta Private	Dr Farah Fazwa Mohd Ariff	Potensi Penanaman Selingan Dari Spesies-Spesies Herba Terpilih Di Dalam Perladangan Komoditi	97,500.00
30	Persekutuan Federal	Dr Norwati Muhammad	The Development of Detection Method for Genetically Modified Brinjal (*Solanum melongena* L.)	190,000.00
31	Antarabangsa International	Mohd Azahari Faidi	*Regional Forest Observations for Sustainable Forest Management in Malaysia*	145,530.00
32	FRGS	Getha R. Krishnasamy	*Elucidation of Anti-MRSA Activity of a Dimeric Sesquiterpene in Combination with Other Antibiotics and in the Presence of Plasma, and its In Vivo Efficacy Using Wound Infection Model*	141,700.00

No. Bil.	Penaja Funder	Ketua projek Project leader	Tajuk projek Project title	Jumlah peruntukan diterima/ Total fund (RM)
33	FRGS	Mailina Jamil	*Discriminative Analysis of Volatile Constituents in Various Citronella Oils/ Extracts and Evaluation of their Toxicity Level*	104,100.00
34	FRGS	Dr Mohd Khairun Anwar Uyup	*The Sorption Behaviour of Batai (Paraserianthes falcataria) Modified with Phenolic Resin*	89,200.00
35	Swasta Private	Dr Noor Azlin Yahya	Kajian Inventori, Pemetaan dan Pemeriksaan Pokok-Pokok Teduhan bagi Sistem Inventori dan Pengurusan Pokok (SIPP) Putrajaya	329,456.00
Jumlah Besar/Grand Total				**27,795,344.70**

Penaja/Funding agency	Bil./No.	Jumlah/Total
RMK-11	8	21,882,000.00
FRGS	3	335,000.00
Persekutuan/Federal	12	1,513,215.82
Antarabangsa/International	3	458,172.88
Negeri/State	1	3,000,000.00
Swasta/Private	2	426,956.00
RPP	2	30,000.00
Tabung Lembaga/Internal Fund	1	40,000.00
JTRD	3	110,000.00
Jumlah Besar/Grand Total	**35 (72)**	**27,795,344.70**

Nota/Notes:

JTRD: Jawatankuasa Teknikal Mengenai Penyelidikan dan Pembangunan/ Technical Committee on Research and Development
FRGS: Skim Geran Penyelidikan Asas/Fundamental Research Grant Scheme
RMK-11/Eleventh Malaysia Plan
RPP: Penyelidikan, Prekomersialisasi & Penerbitan/ Research, Pre-commercialisation & Publication
TL: Tabung Lembaga/ Internal fund

Kerjasama Penyelidikan
Research Collaborations

Kerjasama Penyelidikan
Research Collaborations

Sebanyak sembilan kerjasama dalam penyelidikan dan pembangunan (R&D) terdiri daripada lapan memorandum persefahaman (MoU) dan satu perjanjian/ kontrak penyelidikan telah dimeterai antara FRIM dan pelbagai pihak yang berkepentingan bagi memperkasakan keupayaan R&D FRIM serta memenuhi kehendak pasaran semasa dan keperluan pelanggan.

A total of nine collaborations in research and development(R&D) including eight MoUs and one agreement/research contract were signed by FRIM and various stakeholders to further strengthen R&D capacities in FRIM and meet current market demands as well as the needs of stakeholders.

Senarai kerjasama penyelidikan/List of research collaborations:

Bil. No.	Rakan kerjasama Collaborators	Jenis kerjasama Type of collaboration	Pegawai bertanggungjawab Officer in-charge	Tarikh meterai Signing date
1	Universiti Sains Malaysia (USM)	MoU	Dr Nor Azah Mohamad Ali	19/2/2018
2	Golden Pharos Berhad	MoU	Haliyan Tan Shilan	7/3/2018
3	Yayasan Kemanusiaan Muslim Aid Malaysia (YKMAM)	Agreement/ Contract Research	Dr Raja Barizan Raja Sulaiman/Nur Cahaya Khairani	29/3/2018
4	National Pharmaceutical Regulatory Agency (NPRA)	MoU	Ong Boo Kean	30/3/2018
5	Felcra Berhad	MoU	Dr Farah Fazwa Mohd Arif	10/4/2018
6	Malaysian Nature Society	MoU	Nik Azyyati Abd Kadir/ Dr Noor Azlin Yahya	1/8/2018
7	Jabatan Hutan Sabah	MoU	Dr Hamdan Omar	17/9/2018
8	Pusat Perubatan Universiti Kebangsaan Malaysia (UKM)	MoU	Dr Nurhanan Murni Yunos	16/11/2018

Memorandum Persefahaman dengan Golden Pharos Bhd

Institut Penyelidikan Perhutanan Malaysia (FRIM) dan Golden Pharos Berhad (GPB) telah menandatangani Memorandum Persefahaman (MoU) untuk melaksanakan kerjasama pembangunan dan penyelidikan serta memastikan pembekalan bahan mentah khususnya bagi Program Perkhidmatan Pensijilan Produk FRIM (FRIM PCS).

Memorandum of Understanding with Golden Pharos Bhd

Forest Research Institute Malaysia (FRIM) and Golden Pharos Berhad (GPB) signed a Memorandum of Understanding (MoU) to collaborate in research and development as well as in sufficient supply of raw materials, especially for the FRIM Product Certification Services Programme (FRIM PCS).

Majlis yang diadakan di Wisma Darul Imam, Kuala Terengganu pada 7 Mac 2018 disaksikan oleh Menteri Besar Terengganu, YAB Dato' Seri Ahmad Razif Abd Rahman. Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod mewakili FRIM manakala GPB diwakili oleh Ketua Pegawai Eksekutif, Dato' Ahmad Nadzarudin Abdul Razak manakala Tn Hj. Mohd Zamshari Abdul Rahman, Pengarah Urusan FRIM PCS yang juga Pengarah Kewangan FRIM serta Zulkifli Omar, Pengurus Kanan Perkhidmatan Korporat GPB bertindak sebagai saksi.

Kerjasama tersebut merupakan satu usaha penting selaras dengan matlamat kerajaan dalam memacu agenda Pemerkasaan Ekonomi Bumiputera (PEB) serta meningkatkan pertumbuhan ekonomi negara. Kerjasama strategik ini diadakan bagi menangani masalah kekurangan bekalan bahan mentah yang sering dihadapi oleh pengusaha perabot tempatan. Ia akan memastikan bekalan bahan mentah adalah mencukupi dan berterusan, termasuk kayu bergergaji serta mana-mana bahan mentah yang bersesuaian bagi pengusaha perabot Bumiputera yang terlibat dengan Program FRIM PCS.

The ceremony held on 7 March at Wisma Darul Imam, Kuala Terengganu was witnessed by Terengganu Menteri Besar Dato' Seri Ahmad Razif Abd Rahman. FRIM Director General Dato' Dr Abd. Latif Mohmod represented FRIM in signing the MoU while GPB by Chief Executive Officer Dato' Ahmad Nadzarudin Abdul Razak. FRIM Finance Director, also FRIM PCS Managing Director, Mohd Zamshari Abdul Rahman and GPB Corporate Services Senior Manager Zulkifli Omar signed as witnesses.

The collaboration is an important effort in line with the government's goal for the Bumiputera Economic Empowerment (PEB) agenda and the strenghtening of the country's economic growth. This strategic partnership was held to address shortage of raw materials faced by local furniture producers. It will ensure adequate and continuous supply of materials, including sawn timber as well as others for the Bumiputera entrepreneurs involved in the FRIM PCS Programme.

Dari kiri/From left: Mohd Zamshari, Mohd Amim, Rosli, Abd Latif, Mohd Zubir, Ahmad Razif, Muhammad Pehemi, Ahmad Nadzarudin, Ahmad Fadzil dan/and Zulkifli

Memorandum Persefahaman dengan Kementerian Kesihatan Malaysia

Institut Penyelidikan Perhutanan Malaysia (FRIM) dan Kementerian Kesihatan Malaysia (KKM) telah menandatangani MoU pada 30 Mac 2018 untuk bekerjasama dalam memastikan produk-produk tradisional atau bahan mentah herba yang dipasarkan di Malaysia berkualiti dan selamat digunakan.

Ketua Pengarah (KP), Dato' Dr Abd Latif Mohmod mewakili FRIM manakala KKM pula diwakili oleh KP Kesihatan, Datuk Dr Noor Hisham Abdullah.

FRIM bertanggungjawab memberikan pendedahan kepada industri tempatan akan kepentingan ujian kawalan kualiti atas bahan mentah herba sebelum digunakan sebagai bahan aktif produk tradisional; menjalankan perkhidmatan ujian dan nasihat dalam ujian kawalan kualiti ke atas produk serta bahan mentah herba dan juga menjalankan validasi serta verifikasi terhadap ujian kawalan kualiti yang dibangunkan.

FRIM berusaha memberi bimbingan kepada usahawan herba bagi menghasilkan produk yang selamat dan berkesan melalui pemindahan teknologi dalam bentuk kursus, latihan teknikal, serta perkhidmatan; khususnya pemprosesan berdasarkan amalan pengilangan baik (GMP) dan perkongsian pintar melalui kolaborasi dengan pihak industri, akademik atau pihak berkepentingan daripada aspek teknologi piawai yang berkaitan dari peringkat huluan ke hiliran dalam proses pengeluaran produk herba.

Memorandum of Understanding with Ministry of Health Malaysia

Forest Research Institute Malaysia (FRIM) and the Ministry of Health Malaysia (MOH) have signed a Memorandum of Understanding (MOU) 30 March 2018 to work together in ensuring the safety and quality of traditional herbal products or raw herbal materials marketed in the country.

Director General (DG) Dato' Dr Abd Latif Mohmod represented FRIM in signing the MoU while KKM was represented by Health DG Datuk Dr Noor Hisham Abdullah.

In the collaboration, FRIM would be responsible for providing exposure to the local industry on the importance of quality control testing on herbal raw materials before use as an active ingredient of traditional products; providing testing and advisory services on quality control of herbal raw materials and products; as well as conducting validation and verification of quality control tests which have been developed.

FRIM will continue to provide guidance to herbal entrepreneurs in producing safe and effective products through technology transfer in the form of courses, technical training and services; particularly in processing based on good manufacturing practices (GMPs) and smart partnerships through collaborations with industry, academia or stakeholders from the aspect of standard technologies from upstream to downstream herbal production processes.

Abd Latif (kiri) dan Noor Hisham semasa sesi pertukaran dokumen
Abd Latif (left) and Noor Hisham exchanging documents.

Inovasi & Komersialisasi
Innovation & Commercialisation

Inovasi dan Komersialisasi
Innovation and Commercialisation

Bilangan teknologi yang berpotensi untuk ditingkatkan skala, dikomersial atau diterima pakai oleh pemegang taruh:
Number of potential technology for upscaling, commercialise or applicable to stakeholders:

Bil. No.	Keberhasilan/Output Outcome/Output	Pegawai bertanggungjawab Person in-charge
1	Manufacturing formulation for producing *Eurycoma longifolia* extract in capsule dosage form	Khairul Iruwan
2	Active ingredients from *Aquilaria malaccensis* fruit as anti-proliferative agent against cancer cells	Dr Nurhanan Murni Yunos
3	Accelerated drying method for drying-cum-treatment of solid lumber	Dr Sik Huei Shing
4	Method production of Mycoinsecticide to control insect pest	Wan Muhammad Azrul Wan Azhar
5	Standard operating procedure (SOP) of standardized SEEL30 and SEEL50 extracts from *Eurycoma longifolia* (tongkat ali) roots with anti-ovarian properties	Dr Nurhanan Murni Yunos
6	Standard operating procedure (SOP) of isolation of 9-methoxycanthin-6-one (EL50) and eurycomalactone (EL30) from *Eurycoma longifolia* (tongkat ali)	Muhammad Haffiz Jauri
7	Antihypertrophic effect of 17βH-neriifolin on cardiomyocite cells	Dr Nurhanan Murni Yunos
8	Energy booster effect of saponin powder from *Mitragyna speciosa* (green vein)	Abd Rashid Li
9	Energy booster effect of protein from *Mitragyna speciosa* (green vein)	Dr Mohd Kamal Nik Hasan
10	Bioactive ingredient from *Aquilaria malaccensis* extract for cosmetic/skin care products	Dr Nor Azah Mohamad Ali

Perjanjian pelesenan pemindahan teknologi dengan pihak industri
Licencing agreement of technology transfer with the industry

Bil. No.	Pegawai Bertanggungjawab Person in charge	Pelanggan Client	Produk Product	Tarikh Tandatangan Signing Date
1	Dr Mohd Kamal Nik Hassan	FRIM Incorporated Sdn Bhd	Extract and product formulation of tongkat ali (*Eurycoma longifolia* and roselle (*Hibiscus sabdariffa*)	5/1/2018
2	En Zamree Mohd Shah	FRIM Incorporated Sdn Bhd	Contract manufacturing of tongkat ali (*Eurycoma longifolia* and roselle *(Hibiscus sabdariffa*)	7/5/2018
3	Dr Gan Kee Seng Dr Dahlia Abdullah Siam	Universiti Tunku Abdul Rahman (UTAR	Mobile wood identification system using deep learning technique (MyWood-ID)	23/10/2018

Reka cipta yang didaftarkan di MyIPO/Invention registered with MyIPO

Bil. No.	Pegawai bertanggungjawab Officer in-charge	Produk Product
1	Dr Nurhanan Murni Yunos	An anti-ovarian cancer composition
2	Zairul Amin Rabidin	A method of drying hardwoods
3	Dr Nurhanan Murni Yunos	An anti-hypertrophic compound for cardiomyocite cells

Pendedahan reka cipta/Invention disclosure

Bil. No.	Pegawai yang bertanggungjawab Officer in-charge	Produk Product
1	Khairul Iruwan	Manufacturing formulation for producing *Eurycoma longifolia* extract in capsule dosage form
2	Zairul Amin Rabidin	Protocol for drying heavy hardwoods incorporating conventional steam heated kiln drying and radio frequency-vacuum drying systems
3	Dr Nor Azah Mohamad Ali	*Sonneratia caseolaris* (pokok berembang) as natural ingredients in skin care, personal care and health care products
4	Dr Nurhanan Murni Yunos	Active ingredients from *Aquilaria malaccensis* fruit as anti-proliferative agent against cancer cells
5	Abd Rashid Li	Preparation of aqueous-ethanol fraction from *Mitragyna speciosa* (green vein) for antidiabetic activity
6	Abd Rashid Li	Extraction of polysaccharide rich fraction from *Mitragyna speciosa* (green vein)
7	Abd Rashid Li	Extraction of polysaccharide rich fraction from *Mitragyna speciosa* (red vein)
8	Dr Nurhanan Murni Yunos	Antihypertrophic effect of 17βH-neriifolin on cardiomyocite cells
9	Dr Mohd Noor Mahat	GahDM001: Commercial distillation machine for gaharu oil extraction
10	Dr Sik Huei Shing	Accelerated drying method for drying-cum-treatment of solid lumber
11	Dr Farah Fazwa Md. Ariff	Compost for acclimatization (CompAcc
12	Yanti Abdul Kadir	Coffa (Coffee table)
13	Yanti Abdul Kadir	Separa (Office table)
14	Yanti Abdul Kadir	Galon (Bamboo lamp)
15	Yanti Abdul Kadir	Guadro (Table lamp)
16	Wan Muhammad Azrul Wan Azhar	Method production of Mycoinsecticide to control insect pest
17	Dr Mohd Farid Ahmad	Endophytic bacterial strain (FRIM B0010) – *Brevibacillus agri*, a potential beneficial microbe to encounter plant pathogens
18	Mohd Rizuwan Mamat	Modular flotilla lotus
19	Norsheilla Mohd Johan Chuah	Manual sistem face FRIM

Bil. No.	Pegawai yang bertanggungjawab Officer in-charge	Produk Product
20	Dr Wan Tarmeze Wan Ariffin	Eco-friendly engineered lumbers using thermal-treated raw materials (veneers, strands and / or scrims)
21	Dr Nurhanan Murni Yunos	Standard operating procedure (SOP) of standardized SEEL30 and SEEL50 extracts from *Eurycoma longifolia* (Tongkat Ali) roots with anti-ovarian properties
22	Muhammad Haffiz Jauri	Standard operating procedure (SOP) of isolation of 9-methoxycanthin-6-one (EL50) and eurycomalactone (EL30) from *Eurycoma longifolia* (Tongkat Ali)
23	Dr Mohd Kamal Nik Hasan	Preparation of Aqueous extract from *Alpinia galangal* (Lengkuas) for antioxidant and antiobesity activity
24	Rozidah Khalid	Development of tissue culture protocol for *Citrus limon* (Lemon)
25	Shalini Markandan	Antioxidant efficacy of *Ocimum tenuiflorum* as active ingredient in oil-based prototype formulation
26	Abd Rashid Li	Wound healing effect of *Mitragyna speciosa* (red vein) powder for diabetic wound
27	Abd Rashid Li	Energy booster effect of saponin powder from *Mitragyna speciosa* (green vein)
28	Dr Mohd Kamal Nik Hasan	Energy booster effect of protein from *Mitragyna speciosa* (green vein)
29	Dr Nor Hasnida Hassan	Tissue culture protocol development for *Eucalyptus hybrid* (*E. urophyla x E. grandis*)
30	Dr Getha Krishnasamy	*Neonothopanus nambi* (Speg.), a new source of antioxidant and anti-elastase agent
31	Mohd Faizal Kamarudin	Broom stick holder
32	Dr Tumirah Khadiran	Polymer nanocapsules containing fungicide and preparation thereof by one-step miniemulsion in-situ polymerization technique
33	Noor Ratul Maleka Sirajuddin	Stacked acclimatization chamber (SAC) for tissue culture plantlets
34	Dr Siti Suhaila A. Rahman	Plastri - plant stand for rooting induction (in temporary immersion system)
35	Dr Nor Azah Mohamad Ali	Bioactive ingredient from *Aquilaria malaccensis* extract for cosmetic/skin care products
36	Dr Wan Tarmeze Wan Ariffin	''Beauty wood'' engineered lumber with designed visual properties
37	Azian Mohti	Main forest types in peninsular Malaysia
38	Dr Tumirah Khadiran	Nanocapsules as a smart controlled release insecticide and method for preparation thereof
39	Dr V. Jeyanny Vijayanathan	Improved peat sampling method for bulk density determination
40	Dr Wan Tarmeze Wan Ariffin	BAMBEUTY' a system to manufacture bamboo veneer based enginered lumber and the product thereof

Khidmat perundingan melebihi RM50,000/Consultancy services more than RM50,000

Bil. No.	Pegawai yang bertanggungjawab Officer in-charge	Tajuk perundingan Consultancy
1	Tan Sek Aun	Penilaian perkhidmatan ekosistem hutan dan kebergantungan komuniti setempat terhadap Hutan Simpan Ampang dan Hutan Sirnpan Hulu Langat, Selangor
2	Mohd Afendi Husin	Pengindahan landskap untuk 52 unit rumah berkembar 2 tingkat, Fasa 7A8B (Anggun) Bandar Kinrara, Selangor
3	Muhammad Ammar Hamzah	Reforestation works at Financial Education Campus, Bank Negara Malaysia
4	Mohd Afendi Husin	Penyelenggaraan pokok dan tanaman landskap termasuk kawasan "wall plants", "linear parks", taman permainan dan "water fountain" Bandar Kinrara, Puchong, Selangor Darul Ehsan
5	Dr Samsudin Musa	EIA for Genting Permai mixed development in Bentong, Pahang
6	Mohd. Afendi Hussin	Cadangan pengindahan landskap untuk 52 unit rumah berkembar 2 tingkat, Fasa 7A8B (Anggun) Bandar Kinrara, Selangor Darul Ehsan
7	Nur Hajar Zamah Shari	Penyediaan *mini working master plan* kawasan koridor Ekologi Central Forest Spine (CFS) di Negeri Perak
8	Wan Mohd Nafizul Hal-Alim Wan Ahmad	Cadangan perkhidmatan penanaman pokok-pokok landskap hutan dan berkaitan yang sesuai di kawasan Muzium Sultan Abu Bakar, Pekan Pahang
9	Adnan Mohammad	Reforestration works for Bank Negara Malaysia Financial Education Campus
10	Dr Richard Chung	Gamuda parks - FRIM in biodiversity advisory role

Pemindahan Teknologi
Technology Transfer

Pemindahan Teknologi
Technology Transfer

Seminar/persidangan/bengkel/dialog/pemindahan teknologi/program latihan yang dianjurkan oleh FRIM atau dengan kerjasama pihak lain:
Seminar/conference/workshop/dialogue/technology transfer/training organised by FRIM or jointly organised with other party:

Bil. No.	Penganjur/ Penganjur Bersama Organiser/ Joint Organiser	Tajuk Title	Lokasi Venue	Tarikh Date
1	NRE	Sesi Perundingan Kebangsaan Inventori Gas Rumah Kaca bagi Sektor LULUCF	Langkawi	18–19/1/2018
2	AJK Sahabat Komuniti Tapak Warisan Kebangsaan FRIM	Mesyuarat Jawatankuasa Sahabat Komuniti Tapak Warisan Kebangsaan FRIM Bil 1, 2, 3 & 4	FRIM	21/1, 7/4, 29/9 & 11/11/2018
3	Dewan Bandaraya Kuala Lumpur	Kursus Pengurusan Tapak Semaian Siri 1 & 2	Institut Latihan Dewan Bandaraya Kuala Lumpur (IDB) & FRIM	23–24/1 & 17–18/4/2018
4	FRIM	Teknik Asas Kultur Tisu Tumbuhan	CBB FRIM	23–25/1, 21/1, 5/7, 10–12/7 & 24/10/2018
5	Dewan Bandaraya Kuala Lumpur	Kursus Penggunaan & Penyelenggaraan Mesin Ringan, Jentera & Peralatan Landskap Siri 1 & 2	IDB & FRIM	29–30/1/ & 20–21/3/2018
6	FRIM	Bengkel Kesedaran Pengetahuan Tradisi Orang Asli Subetnik Bateq	Kampung Sungai Berjuang, Jerantut, Pahang	6/2/2018
7	Dewan Bandaraya Kuala Lumpur	Kursus Dendrologi Siri 1,2, 3	IDB & FRIM	6–7/2,10–11/4, 24–25/7/2018
8	FRIM	Bengkel Kesedaran Pengetahuan Tradisi Orang Asli Subetnik Temuan	Balai Raya Kampung Dusun Kubor, Jelebu, Negeri Sembilan	8/2/2018
9	Dewan Bandaraya Kuala Lumpur	Kursus Asas Interpretasi Persekitaran Siri 1, 2 & 3	IDB & FRIM	14–15/2, 3–5/4 & 17–19/7/2018
10	Dewan Bandaraya Kuala Lumpur	Kursus Kaedah Penanaman Pokok Siri 1 & 2	IDB & FRIM	20–21/2 & 12–13/9/2018
11	Dewan Bandaraya Kuala Lumpur	Kursus Pemangkasan, Penebangan dan Cantasan Pokok Landskap Siri 1 & 2	Kuala Lumpur & FRIM	26–28/2, 27–29/11/2018
12	Perbadanan Taman Negara Johor	Program Kesedaran Herba 2.0	Taman Negara Tanjung Piai	26–27/2/2018

Bil. No.	Penganjur/ Penganjur Bersama Organiser/ Joint Organiser	Tajuk Title	Lokasi Venue	Tarikh Date
13	Pelbagai stakeholders (komuniti, agensi kerajaan, swasta & NGO termasuk Sabah dan Sarawak)	Bengkel Konsultansi Stakeholdersi Kajian Penglibatan Komuniti Setempat Termasuk Orang Asli/Orang Asal dalam Ekopelancongan & Kawasan Perlindungan (Protected Areas) di Malaysia	Putrajaya	6/3/2018
14	FRIM	Program *Go Green* FRIM Siri 1/2018	FRIM	9/3/2018
15	Komuniti Orang Asli Bukit Lagong, AJK Sahabat Komuniti TWK FRIM	Bengkel Konsultasi Pemegang Taruh Penyertaan Komuniti & Pelbagai Pemegang Taruh dalam Program Pemuliharaan Tapak Warisan Kebangsaan FRIM	Kg. Orang Asli Bukit Lagong	11/3/2018
16	FRIM	Bengkel Penyediaan Tapak Tanaman ABP 16 di RPS Banun	RPS Banun, Gerik	13–16/3/2018
17	Dewan Bandaraya Kuala Lumpur	Kursus Penanaman & Penjagaan Pokok Hiasan Siri 1 & 2	IDB & FRIM	14–15/3, 29–30/8/2018
18	Dewan Bandaraya Kuala Lumpur	Kursus Asas Kemahiran & Kecekapan Memanjat Pokok Siri 1, 2 & 3	IDB & FRIM	20–21/3, 14–15/8 & 4–5/9/2018
19	NRE	Sesi Perundingan & Pelaporan Data kepada FAO, FRA, SDG & GHG Inventory bagi Sektor LULUCF	Putrajaya	22/3/2018
20	FRIM	Bengkel Kutipan & Penanaman ABP16 di RPS Banun	RPS Banun, Gerik	26–30/3/2018
21	Terbuka	Kursus Andaman Topiari & Taman Vertikal	Kuala Lumpur & FRIM	27–29/3/2018
22	FRIM	Bengkel Pengisian Borang Permohonan FRIM PCS	FRIM	27/3/2018
23	FRIM	Bengkel Penyediaan Tapak Tanaman ABP 16 di Ulu Geroh, Gopeng	Ulu Geroh, Gopeng	2–4/4/2018
24	FRIM	Kursus Pengecaman Kayu	FRIM	3–5/4/2018
25	NRE	Sesi Perundingan Kebangsaan Inventori Gas Rumah Kaca bagi Sektor LULUCF	Kota Kinabalu	5&6/4/2018
26	FRIM	*Biodiversity Talk: Conservation of Mammals in Malaysia*	FRIM	16/4/2018

Bil. No.	Penganjur/ Penganjur Bersama Organiser/ Joint Organiser	Tajuk Title	Lokasi Venue	Tarikh Date
27	KATS	Bengkel *Core Group* Semakan Semula Dasar Tanah Lembap Negara Bil. 3	Terengganu	16–19/4/2018
28	FRIM	Bengkel Konsultansi Pemegang Taruh: Sistem Perabot Makmal,Produk Tilam, Bantal dan Plastik untuk Perolehan Kerajaan	FRIM	18/4/2018
29	FRIM	Latihan Pengendalian Sampel Tumbuhan Ubatan & Beraroma	FRIM	19/4/2018
30	FRIM	Bengkel Penyediaan Nanoselulosa	Makmal Pulpa & Kertas	23–27/4/2018
31	FRIM	Bengkel MyBIS	Taman Botani Putrajaya	24/4/2018
32	FRIM	Bengkel Penganalisisan Data Bancian Menggunakan Perisian STSS (Silviculture Tree Selection System)	Mersing, Johor	2–3/5/2018
33	FRIM	Latihan Penggunaan MobileGT bagi Aplikasi Perhutanan	Stesen Penyelidikan Pasoh, Negeri Sembilan	7–8/5/2018
34	STEKKEN Sdn. Bhd.	Exterminex Asia-Pacific 2018 Workshop	FRIM	10–12/5/2018
35	Dewan Bandaraya Kuala Lumpur	Kursus Teknik Pembiakan Pokok Siri 1 & 2	IDB & FRIM	15–16/5 & 9–10/10/2018
36	Terbuka	Kursus Tapak Semaian	Kuala Lumpur & FRIM	25–28/6/2018
37	FRIM	Bengkel Teknik Pengutipan Sampel Tumbuhan Ubatan & Beraroma (Berasaskan Pengetahuan Tradisi Subetnik Temuan)	Kampung Dusun Kubor, Jelebu, Negeri Sembilan.	26–28/6/2018
38	FRIM	*Workshop/Village Level Consultations — Conservation of Forest Through Sustainable Ecotourism Resources & Conservation*	Kg Janda Baik, Bentong, Pahang	30/6/–1/7/2018
39	FRIM & FRIM Inc Sdn Bhd	Mesyuarat dengan Kerajaan Negeri Kedah	Pejabat Menteri Besar Kedah	2/7/2018
40	FRIM	Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018	FRIM	3/7/2018
41	Dewan Bandaraya Kuala Lumpur	Kursus Penyelenggaraan Pokok Rendang Siri 1 & 2	IDB & FRIM	3–4/7 & 18–19/9/2018

Bil. No.	Penganjur/ Penganjur Bersama Organiser/ Joint Organiser	Tajuk Title	Lokasi Venue	Tarikh Date
42	FRIM	Kursus Pemangkasan & Cantasan Pokok Landskap	Universiti Perguruan Sultan Idris	3–4/7/2018
43	Terbuka	Kursus Pemeriksaan Pokok Berisiko	Kuala Lumpur & FRIM	3–5/7/2018
44	FRIM	*Stakeholders Consultation Workshop- Establishing Joint Community Conservation Management & Mechanism Development*	Kg Janda Baik, Bentong, Pahang	8/7/2018
45	FRIM	Kursus Pengurusan Hutan	FRIM	9–11/7/2018
46	FRIM	Bengkel Forensik DNA untuk Pengesanan Balak untuk JPSM	Makmal Genetik, FRIM	9–11/7/2018
47	FRIM	Kursus Asas Survei Hutan & AutoCAD	FRIM	9–11/7/2018
48	FRIM	Kursus Interpretasi Persekitaran	IDBKL & FRIM	17–19/7/2018
49	FRIM	Big Data	FRIM	24–25/7/2018
50	FRIM	Bengkel Teknik Pengutipan Sampel Tumbuhan Ubatan & Beraroma (Berasaskan Pengetahuan Tradisi Subetnik Bateq) Fasa 1 & 2	Kg Sungai Berjuang, Jerantut, Pahang	24–26/7 & 25–27/9/2018
51	Global Environment Centre (GEC)	Talk on Fauna and Conservation at Peat Swamp Forest for the Junior Peatland Forest Rangers	Sekolah Kebangsaan Raja Musa	1/8/2018
52	FRIM	Bioinformatics: De Novo Genome and Transcriptome Assemblies	Makmal Genetik, FRIM	7–9/8/2018
53	KATS	Bengkel Konsultasi Semakan Semula Dasar Tanah Lembap Negara (bersama dengan AG Sabah)	Kota Kinabalu, Sabah	9/8/2018
54	FRIM	*Market Study*	FRIM	9–10/8/2018
55	Jabatan Hutan Sarawak	Pengharmonian Data Lapangan untuk Sistem Inventori Hutan (HoB), Sibu, Sarawak	Jabatan Hutan Wilayah Sibu	13–17/8/2018
56	FRIM	Perbincangan Kumpulan Fokus bagi projek *Market Validation for 3WOOD Manufacturing Industry from Plantation Species*	Kuala Lumpur	14/8/2018
57	FRIM	Kursus Pengecaman Fauna	FRIM	15–16/8/2018
58	Terbuka	Kursus Landskap Kejur, Kolam Pancuran dan Pencahayaan	Kuala Lumpur & FRIM	27–29/8/2018

Bil. No.	Penganjur/ Penganjur Bersama Organiser/ Joint Organiser	Tajuk Title	Lokasi Venue	Tarikh Date
59	FRIM	Bengkel Pengemaskinian Pengurusan Pangkalan Data STI MASTIC – Pangkalan Data Modal Insan *System Walkthrough: National Minimum Data Set* (NDMS)	Makmal ICT, FRIM	28–30/8/2018
60	FRIM	*User Acceptance Test* (HerbaXpress)	FRIM	29/8/2018
61	FRIM	Bengkel Pengemaskinian Pengurusan Pangkalan Data STI MASTIC – Pangkalan Data Fasiliti dan Peralatan *System Walkthrough: E-survey*	Makmal ICT, FRIM	30/8/2018
62	FRIM	Bengkel Teknik Pengutipan Sampel Tumbuhan Ubatan & Beraroma (Berasaskan Pengetahuan Tradisi Subetnik Temuan)- Fasa 2	Kg Dusun Kubur, Jelebu	4–6/9/2018
63	Jabatan Hutan Sarawak	Bengkel HoB Inventori Sumber Hutan Sarawak	Genting Highland	18–20/9/2018
64	JKL	*Course on Formaldehyde Emission Analysis Using Small Chamber Method* (ASTM D6007)	CARB	19–20/9/2018
65	Terbuka	Kursus Penubuhan Tapak Semaian	FRIM	1–5/9/2018
66	FRIM	Program "Jom Kenali FRIM"	FRIM	7/10/2018
67	FRIM	*Study Tour to Other Protected Areas - Community Based Ecotourism Project* (KOPEL Sabah)	KOPEL Kinabatangan, Sabah	16–19/10/2018
68	FRIM	15th Medicinal and Aromatic Plants Seminar 2018	FRIM	16–17/10/ 2018
69	FRIM	*Oh My English*	FRIM	19/10/2018
70	FRIM	*Road Tour* HerbaXpress siri I - IV I. Seberang Jaya, Pulau Pinang II. Mardi Manir, Kuala Terengganu III. Kluang, Johor IV. Kinta Riverfront Ipoh, Perak	I. Seberang Jaya, Pulau Pinang II. Mardi Manir, Kuala Terengganu III. Kluang, Johor IV. Ipoh, Perak	I. 20/10, II. 25–27/10, III. 26-28/10/2018, IV. 2 /11/2018
71	Terbuka	Kursus Asas Arborikultur	Kuala Lumpur & FRIM	22–25/10/2018
72	FRIM Inc	*Course on Formaldehyde Emission Analysis from Wood Composite Products*	Makmal Formaldehid, FRIM	23–25/10/2018

Bil. No.	Penganjur/ Penganjur Bersama Organiser/ Joint Organiser	Tajuk Title	Lokasi Venue	Tarikh Date
73	Global Environment Centre (GEC)	*Talk on Fauna & Conservation at Peat Swamp Forest for the Junior Peatland Forest Rangers*	Selangor Fruit Valley	26/10/2018
74	FRIM	*ASEAN Cooperation Project, Equivalent Timber Names in ASEAN Workshop*	Royale Chulan The Curve Hotel	7–9/11/2018
75	FRIM	Seminar *Rafflesia* di Malaysia 2018. Status Penyelidikan Rafflesia: Satu Perspektif	FRIM	13/11/2018
76	Jabatan Pertanian Negeri Sembilan	Pengurusan Data Geo-lokasi, Pengurusan Kutipan Tanaman & Teknik Tapak Semaian	Pusat Pelancongan Sungai Menyala, Negeri Sembilan	13/11/2018
77	KATS	Bengkel Dasar Tanah Lembap Kebangsaan	Putrajaya	14–15/11/2018
78	FRIM	Bengkel Asas Teknik Translokasi Akar Tetrastigma bagi Konservasi Populasi *Rafflesia*	Gerik, Perak	16–18/11/2018
79	FRIM	Bengkel "Impak Sosio-Ekonomi Pemuliharaan Persekitaran Hutan Bakau" & Sesi Dialog Bersama Komuniti Daerah Bagan Datuk, Perak	Dewan Dato Lope Hashim, Bagan Datuk	17/11/2018
80	Majlis Daerah Batu Gajah, Perak	Kursus Penyelenggaraan Pokok Teduhan	Majlis Daerah Batu Gajah, Perak	21–22/11/2018
81	FRIM	Bengkel Konsultasi Pemegang Taruh "Pembangunan Pakej" Projek Ekopelancongan Berasaskan Komuniti	Bentong, Pahang	21–22/11/2018
82	Nottingham University, Kuala Lumpur	Pembentangan CFS Selangor semasa Mesyuarat MYCFS ke-2	Nottingham University, Kuala Lumpur	22/11/2018
83	UiTM Puncak Alam	Program Latihan: Aktiviti Trekking Malam di Denai Alam Cadamba, Kampus UiTM Puncak Alam	UiTM Puncak Alam	24/11/2018
84	FRIM	Bengkel Projek Kajian Biodiversiti Fasa 3 RMKe-11 Tahun 2018: Kajian Penyediaan Dokumen Pelan Strategik Perhutanan Sosial Malaysia, 2018 - 2025	Genting Highlands	29–30/11/2018
85	FRIM	Bengkel Perbincangan Kumpulan Focus (FGD): Projek Penilaian Impak Aktiviti Guna Tanah Tapak Warisan FRIM	Kuala Lumpur	20/12/2018

SEMINAR TUMBUHAN UBATAN DAN BERAROMA KE-15

Seminar Tumbuhan Ubatan dan Beraroma kali ke-15 (MAPS-15) bertemakan "Merungkai Khazanah dan Rahsia Alam Semula Jadi: Spesies Pilihan Semasa" telah diadakan pada 16–17 Oktober 2018 di Auditorium FRIM. Seminar ini telah dirasmikan oleh Timbalan Menteri Air, Tanah dan Sumber Asli (KATS), YM Tengku Zulpuri Shah Raja Puji mewakili YB Menteri KATS, YB Dr Xavier Jayakumar. Buku bertajuk "*Medicinal Plant Species in FRIM Vol. 2*" dan rangkaian produk kosmetik Tranquil telah dilancarkan dengan jayanya semasa majlis perasmian tersebut.

Seminar yang berlangsung selama dua hari ini telah dihadiri seramai 208 peserta yang terdiri daripada penyelidik (56.2 %), ahli akademik (8.2 %), pengusaha industri herba (7.2 %), pelajar (21.2 %) dan lain-lain (7.2 %). MAPS-15 telah berjaya mengumpulkan sebanyak 74 kertas kerja (23 pembentang lisan dan 51 pembentang poster). Seminar ini telah dibahagikan kepada lima sesi utama iaitu: (1) Pengetahuan tradisi, agronomi dan pemuliharaan; (2) Penemuan hasilan semula jadi, komersialisai dan undang-undang; (3) Pemiawaian, kawalan kualiti dan teknologi pemprosesan; (4) Praklinikal, klinikal dan pembangunan produk dan (5) Pembangunan produk dan komersialisasi.

Di samping itu, seminar ini juga telah menarik sebanyak 10 pempamer yang terdiri daripada industri herba, agensi kerajaan dan syarikat instrumentasi saintifik. Bengkel pasca seminar iaitu Bengkel Kawalan Kualiti Herba juga telah dijalankan pada 18 Oktober 2018 dan telah dihadiri oleh enam orang peserta. Antara topik yang diketengahkan ialah bebanan mikrob, logam berat dan ujian fizikal.

Seminar ini telah memperoleh pendapatan (keuntungan) sebanyak RM14,944. Sebanyak lima artikel telah dikeluarkan oleh media cetak susulan daripada seminar tersebut dengan nilai PR sebanyak RM254,109. Seminar Tumbuhan Ubatan dan Beraroma kali ke-16 dijangka akan diadakan pada 2020 dan mungkin boleh dikembangkan kepada peserta antarabangsa dengan perancangan dan promosi yang lebih awal (sekurang-kurangnya setahun) dan rapi.

15TH MEDICINAL AND AROMATIC PLANTS SEMINAR 2018

The 15th Medicinal and Aromatic Plants Seminar (MAPS-15) 2018 themed "Unrevealing Nature's Treasures and Secrets: Current Species of Interest" was held from 16–17 October 2018 at FRIM Auditorium. The seminar was officiated by Deputy Minister of Water, Land and Natural Resources (KATS), YM Tengku Zulpuri Shah Raja Puji representing YB Minister of KATS, YB Dr. Xavier Jayakumar. The book titled "*Medicinal Plant Species in FRIM Vol 2*" and a range of Tranquil cosmetic products were successfully launched during the opening ceremony.

The two-day seminar was attended by 208 participants comprising researchers (56.2%), academics (8.2%), herbal industry (7.2%), students (21.2%) and others (7.2%). MAPS-15 has successfully collected as many as 74 papers (23 oral speakers and 51 posters). The seminar was divided into five main sessions: (1) Traditional knowledge, agronomy and conservation; (2) Natural products discovery, commercialisation and legislation; (3) Standardisation, quality control and processing technology; (4) Pre-clinical, clinical and product development and (5) Product development and commercialisation.

In addition, the seminar has also attracted 10 exhibitors including herbal industries, government agencies and scientific instrument companies. Post seminar workshop Herbal Quality Control Workshop was also held on 18 October 2018 and attended by six participants. Among the topics highlighted were the microbial load, heavy metals and physical test.

This seminar has earned a profit of RM 14,944. A total of five articles were published by the print media following the seminar with a PR value of RM 254,109. The 16th MAPS is expected to be held in 2020 and may be expanded to international participants subjected to earlier planning and promotion (at least a year) so that it be more organised and neat.

Pameran/Exhibition

Antara pameran yang dianjurkan/disertai oleh FRIM/Among the exhibitions organised /participated by FRIM:

Bil. No.	Pameran Exhibition	Tempat Venue	Tarikh Date
1	Pameran Sempena Program *Nature Fun Ride* 2018	Putrajaya	14/1/2018
2	Pameran MBR Sempena Perasmian FRIM Inc.	FRIM	2/2/2018
3	Malaysia Technology Expo 2018	Pusat Dagangan Dunia Putra, Kuala Lumpur	22–24/2/2018
4	Malaysian International Furniture Fair 2018	MITEC, Kuala Lumpur	8–11/3/2018
5	Export Furniture Exhibition	Kuala Lumpur Convention Centre	9–12/3/2018
6	Ekspo Inovasi Islam Kali Ke-8 (8th i-INOVA'18)	Dewan Tuanku Canselor, USIM, Nilai, Negeri Sembilan	10–11/3/2018
7	Sambutan Hari Air Sedunia Peringkat Kebangsaan	Laman Budaya Kuala Kangsar, Perak	24/3/2018
8	Ecobuild Southeast Asia 2018 (International Construction Week	Kuala Lumpur Convention Centre	27–29/3/2018
9	Pameran Sempena Pertandingan Mengenal Burung Antarabangsa Bukit Fraser 2018	Bukit Fraser, Raub, Pahang	31/3/2018–1/4/2018
10	Sambutan Hari Hutan Antarabangsa Negeri Perlis, 2018	Taman Negeri Perlis, Wang Kelian	12/4/2018
11	*Earth Day Celebration With Awareness Programme*	Menara Multi-purpose, Jalan Munshi Abdullah, Kuala Lumpur	19/4/2018
12	Program Restorasi Hutan Bersama Rakyat Daerah Tangkak Sempena Hari Bumi	Pulau Penarik, Tangkak, Johor	22/4/2018
13	Pameran Sempena Sambutan Hari Buku Sedunia	Perpustakaan Negara Malaysia	24/4/2018
14	Pelancaran Program 'Back To School'; Pelestarian Kebun	Sk Sungai Nipah, Bagan Datoh, Perak	7/5/2018
15	*29th International Invention, Innovation & Technology Exhibition 2018*	Kuala Lumpur Convention Centre	10–12/5/2018
16	Pameran Sempena Majlis Gotong Royong FRIM Bersama Sahabat Komuniti	Taman Warisan FRIM, Kepong Indah	5/7/2018
17	Pameran Sempena International Tropical Arboriculture Conference Kuala Lumpur 2018	Kuala Lumpur	25–26/9/2018

Majlis Perasmian Seminar Tumbuhan Ubatan dan Beraroma ke – 15 (MAPS -15)
Opening ceremony 15th MAPS 2018

Majlis Pelancaran buku Medicinal Plant Species in FRIM dan rangkaian produk kosmetik Tranquil
Launching Ceremony of the Medicinal Plant Species in FRIM Book and the Tranquil cosmetic product range

Sesi lawatan ke tapak pameran dan poster
Exhibition and poster session visit

Sebahagian daripada penceramah jemputan
Some of the invited speakers

Peserta Bengkel Kawalan Kualiti Herba
Herbal Quality Control Workshop participants

Sesi Pembelajaran semasa bengkel
Learning Sessions during workshop

Anugerah & Pengiktirafan
Awards & Recognitions

Anugerah dan Pengiktirafan
Awards and Recognitions

1. Reka Cipta Terbaik dalam Anugerah Reka Bentuk

Projek inovasi "Modular Seating System" yang diketuai oleh Nik Adlin Nik Mohamed Sukri dan Dr Wan Tarmeze Wan Ariffin telah memenangi anugerah *Best Invention in Design Award* daripada *Japan Intellectual Property Association* (JIPA) di MTE pada 24 Februari 2018. Kumpulan projek ini juga terdiri daripada Tariq Mubarak Husin, Zairul Amin Rabidin dan Khairul Masseat. Sistem yang serba guna, mudah alih dan menjimatkan ruang ini membolehkan kerusi dan meja digabungkan dan disusun mengikut kehendak pengguna.

1. Best Invention in Design Award

"Modular Seating System" innovative project led by Nik Adlin Nik Mohamed Sukri and Dr Wan Tarmeze Wan Ariffin received the Japan Intellectual Property Association (JIPA) Award for the "Best Invention in Design Award" at the MTE on 24 February 2018. The project was assisted by Tariq Mubarak Husin, Zairul Amin Rabidin and Khairul Masseat. The versatile, portable and space-saving system allows chair and table units to be combined and arranged according to the users' needs.

Nik Adlin dengan sijil anugerah JIPA
Nik Adlin with the JIPA award certificate

Reka bentuk 'Modular Seating System' yang serba guna
The versatile 'Modular Seating System'

2. Anugerah Kecemerlangan Penarafan Lima Bintang Pengurusan Kewangan Berdasarkan Indeks Akauntabiliti

FRIM telah menerima "Anugerah Kecemerlangan Penarafan Lima Bintang Pengurusan Kewangan Berdasarkan Indeks Akauntabiliti" bagi tahun 2016 daripada Jabatan Audit Negara. Pengiktirafan lima bintang yang julung-julung kali diterima ini menunjukkan FRIM telah berjaya menguruskan kewangannya dengan penuh bertanggungjawab dan berintegriti.

Pengauditan yang dilaksanakan pada 28 November hingga 22 Disember 2016 memberi tumpuan terhadap sembilan (9) aspek iaitu Kawalan Pengurusan; Kawalan Bajet; Kawalan Terimaan; Kawalan Perbelanjaan; Pengurusan Kumpulan Wang Amanah/Akaun Amanah dan Deposit; Pengurusan Aset dan Inventori; Pengurusan Pelaburan dan Pengurusan Pinjaman serta Penyata Kewangan.

2. Financial Management Five Star Rating Excellence Award Based on Accountability Index

Forest Research Institute Malaysia (FRIM) received the Financial Management Five Star Rating Excellence Award Based on Accountability Index (Anugerah Kecemerlangan Penarafan Lima Bintang Pengurusan Kewangan Berdasarkan Indeks Akauntabiliti) for 2016 from the National Audit Department.

This first five star rating award shows that FRIM have successfully ensured that the management of its finances has been conducted with full responsibility and accountability. The audit conducted from 28 November to 22 December in 2016 focused on nine aspects, namely Management Control; Budget Control; Receipting Control; Expenditures Control; Management of Trust Funds/Trust Accounts and Deposits; Management of Assets and Inventory; Investment Management and Loan Management as well as Financial Statements.

Sijil yang disampaikan oleh Jabatan Audit Negara
The certificate presented by the National Audit Department

3. Islamic Global Innovation Festival and Talent

Para penyelidik FRIM telah memenangi satu pingat perak dan satu gangsa pada i-Inova yang diadakan sempena "Islamic Global Innovation Festival and Talent" (i-GIFT) pada 10–11 Mac 2018. Projek inovasi "PDM3: Nature Inspired Active Ingredient for an Ecofriendly Multipurpose Disinfectant" oleh Dr Mastura Mohtar, Dr Saiful Azmi Johari dan Mohd Ramdan Parman telah memenangi pingat perak manakala projek "CompAcc: Compost for Acclimatisation" oleh Dr Farah Fazwa Md Ariff, Dato' Dr Marzalina Mansor, Syafiqah Nabilah dan Norhayati Saffie telah memenangi pingat gangsa.

PDM3 merupakan formulasi mikrobiosid unik berinspirasi hasilan semula jadi untuk penghasilan rangkaian produk disinfektan mesra alam berjenama Ciera. Dengan kerjasama rakan komersial iaitu Syarikat Nature Profusion, rangkaian produk Ciera telah berada di pasaran.

CompAcc ialah inovasi kompos pengikliman yang dihasilkan sepenuhnya daripada bahan organik mesra alam. CompAcc membantu meningkatkan kualiti pokok kacip fatimah dengan pertambahan pengeluaran pucuk dan menambah baik pengeluaran jumlah kandungan fenolik.

3. Islamic Global Innovation Festival and Talent

FRIM researchers won a silver and a bronze medal at the i-Inova, held in conjunction with the "Islamic Global Innovation Festival and Talent" (i-GIFT) on 10–11 March 2018. The innovation project entitled, "PDM3: Nature Inspired Active Ingredient for an Ecofriendly Multipurpose Disinfectant" by Dr Mastura Mohtar, Dr Saiful Azmi Johari and Mohd Ramdan Parman won the silver medal. The "CompAcc: Compost for Acclimatisation" project by Dr Farah Fazwa Md Ariff, Dato' Dr Marzalina Mansor, Syafiqah Nabilah and Norhayati Saffie won the bronze medal.

PDM3 is an unique nature inspired microbiocide formulation for an ecofriendly disinfectant product range, named Ciera. Working together with its commercial partner Nature Profusion, Ciera products are now sold in the markets.

CompAcc is innovative acclimatisation compost produced totally from environmental-friendly organic materials. It enhances the kacip fatimah plants quality by increasing the shoot production and improving the production of total phenolic contents.

Dari kiri: Mohd Ramdan, Saiful Azmi, Mastura, Farah Fazwa dan Syafiqah bergambar bersama sijil i-Inova dan pingat mereka
From left: Mohd Ramdan, Saiful Azmi, Mastura, Farah Fazwa and Syafiqah posing with their i-Inova certificates and medals

Farah Fazwa menerangkan kelebihan CompAcc kepada seorang juri
Farah Fazwa explaining the advantages of CompAcc to a jury

4. Sijil Pengiktirafan Skim Galakan Penerbitan 2018

Journal of Tropical Forest Science (JTFS) yang diterbitkan oleh FRIM menerima Sijil Pengiktirafan Skim Galakan Penerbitan (CREAM) 2018 bagi kategori Jurnal Berprestasi Tinggi Diindeks dalam Web of Science pada 25 Oktober 2018. Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod telah menerima sijil yang disampaikan oleh Datin Paduka Ir Dr Siti Hamisah Tapsir, Ketua Pengarah Pendidikan Tinggi, Kementerian Pendidikan Malaysia (KPM) pada Majlis *Malaysia's Research Star Award* (MRSA) dan Pengiktirafan Jurnal CREAM 2018 anjuran Jabatan Pendidikan Tinggi, KPM melalui Pusat Sitasi Malaysia. Majlis ini telah disempurnakan oleh Ketua Setiausaha KPM, Dato' Dr Mohd Gazali Abas.

JTFS merupakan satu-satunya jurnal terbitan institusi penyelidikan daripada 22 jurnal universiti awam dan swasta yang terpilih untuk pengiktirafan CREAM tahun ini. Pengiktirafan ini bertujuan untuk meraikan jurnal-jurnal tempatan yang berprestasi cemerlang sebagai galakan bagi peningkatan serta visibiliti jurnal ilmiah negara di peringkat antarabangsa.

Jurnal ini turut menerima pengiktirafan daripada Malaysia Book of Record (MBR) pada 2012 sebagai jurnal saintifik pertama di Malaysia yang mempunyai impak faktor. JTFS yang mula diterbitkan pada September 1988 merupakan jurnal antarabangsa yang menitikberatkan isu-isu perkembangan hutan tropika terutamanya dari aspek pengurusan serta penggunaan hutan tropika.

4. 2018 Publishing Encouragement Scheme (CREAM) Award

Journal of Tropical Forest Science (JTFS), published by FRIM, received the 2018 Publishing Encouragement Scheme (CREAM) Award for the category of High Impact Indexed Journal in Web of Science on 25 October 2018. FRIM Director General Dato' Dr Abd Latif Mohmod received the certificate from the Ministry of Education Malaysia (MOE) Higher Education Director General, Datin Paduka Ir Dr Siti Hamisah Tapsir, at the Malaysia's Research Star Award (MRSA) and 2018 CREAM Journal Recognition ceremony organised by the MOE Higher Education Department through the Malaysian Citation Centre. The event was officiated by MOE Secretary General Dato' Dr Mohd Gazali Abas.

JTFS is the only journal published by a research institute out of 22 journals by public and private universities that were selected for the CREAM award this year. The award is given in recognition of the accomplishment of local scholarly journals as an incentive for the improvement and enhancement of the journal's international visibility.

The journal also received recognition from the Malaysia Book of Records (MBR) in 2012 as the first scientific journal in Malaysia with impact factor. The JTFS, first published in September 1988, is an international journal focusing on issues of tropical forest development, particularly in the management and utilisation of tropical forests.

KP FRIM (kiri) dan Sarifah bergambar dengan sijil-sijil pengiktirafan bagi JTFS
FRIM DG (left) and Sarifah posing for a photograph with certificates of recognition for JTFS

5. Anugerah Antarabangsa Jepun untuk Penyelidik Muda Pertanian

Penyelidik FRIM, Dr Farah Fazwa Md Ariff telah menerima pengiktirafan "Japanese International Award for Young Agricultural Researchers" 2018 di United Nations University Tokyo, Jepun pada 6 November 2018.

Farah Fazwa yang mengetuai Cawangan Pembaik Biak Herba dan Pokok FRIM, dipilih atas penyelidikan inovatif dan berfaedah dalam penghasilan bahan tanaman berkualiti tinggi bagi spesies herba penting di Malaysia, iaitu *Labisia pumila* (kacip fatimah).

Anugerah tahunan tersebut diberikan oleh Kementerian Pertanian, Perhutanan dan Perikanan (MAFF) Jepun sejak tahun 2007 sebagai pengiktirafan kepada sumbangan dan pencapaian cemerlang penyelidik asing muda terhadap pembangunan teknologi demi peningkatan dalam bidang pertanian, perhutanan dan perikanan di negara-negara membangun.

Farah Fazwa menerima sijil anugerah daripada Yoshio Kobayashi, Pengerusi Majlis Penyelidikan Pertanian, Perhutanan dan Perikanan (Agriculture, Forestry and Fisheries Research Council), MAFF; dan pingat daripada Dr Masa Iwanaga, Presiden Pusat Penyelidikan Pertanian Antarabangsa Jepun (JIRCAS).

5. Japanese International Award for Young Agricultural Researchers

FRIM researcher Dr Farah Fazwa Md Ariff received the prestigious 2018 Japan International Award for Young Agricultural Researchers at the United Nations University Tokyo, Japan on 6 November 2018.

Farah Fazwa, who heads the FRIM Herbs and Trees Improvement Branch, was chosen for her innovative and beneficial research in the production of high quality planting materials of important herbal species in Malaysia, *Labisia pumila* (kacip fatimah).

The award, held since 2007, is presented annually by the Japanese Ministry of Agriculture, Forestry and Fishery (MAFF) as a recognition of the contributions and excellent achievements of young foreign researchers to technological development for the improvement in the fields of agriculture, forestry and fishery in developing nations.

Farah Fazwa received the award certificate from the Agriculture, Forestry and Fisheries Research Council, MAFF Chairman Yoshio Kobayashi; and medal from Japan International Research Center for Agricultural Sciences (JIRCAS) President Dr Masa Iwanaga.

Farah Fazwa menerima sijil daripada Yoshio (gambar kiri) dan pingat daripada Masa
Farah Fazwa receiving the certificate from Yoshio (left pix) and the medal from Masa

6. Pengerusi Jawatankuasa Eksekutif Persatuan Institusi-Institusi Perhutanan Asia Pasifik (APAFRI) 2018–2021

Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod telah dilantik semula sebulat suara sebagai Pengerusi Jawatankuasa Eksekutif Persatuan Institusi-Institusi Perhutanan Asia Pasifik (APAFRI) untuk 2018–2021.

Keputusan ini telah diumumkan ketika Mesyuarat Agung APAFRI yang kelapan yang diadakan di Putrajaya, Malaysia pada 9 November 2018. Abd Latif telah dilantik pada kali pertamanya sebagai Pengerusi APAFRI semasa Mesyuarat Agung yang kelima di Kuala Lumpur pada 2009 dan sekali lagi di Guangzhou, China pada 2012 pada mesyuarat keenam. Abd Latif merupakan Pengerusi APAFRI pertama dipilih untuk kali ketiga.

APAFRI merupakan sebuah pertubuhan bukan berasaskan keuntungan yang mempunyai 69 ahli institusi daripada 25 buah negara termasuk negara-negara Asia Tenggara, China, Jepun, Korea dan Australia. Pertubuhan ini mempunyai kepentingan yang aktif dalam penyelidikan perhutanan, pemuliharaan, pengurusan dan perkara-perkara lain berkaitan perhutanan di rantau Asia Pasifik.

6. Chairman of the Asia Pacific Association of Forestry Research Institutions (APAFRI) Executive Committee 2018–2021

FRIM Director General Dato'Dr Abd Latif Mohmod, has been unanimously re-elected to the Chair of the Asia Pacific Association of Forestry Research Institutions (APAFRI) Executive Committee for another term from 2018 to 2021.

APAFRI announced the decision at its Eighth General Assembly held in Putrajaya, Malaysia on 9 November 2018. The FRIM Director General was first elected as the Chair during the APAFRI's Fifth General Assembly in Kuala Lumpur in 2009 and again in Guangzhou, China (2012) during the sixth assembly. Abd Latif is the first Chairman to be elected for the third time.

APAFRI is an independent non-profit association of 69 institutional members from 25 countries including the South East Asia countries, China, Japan, Korea and Australia, with an active interest in forestry research, conservation, management and other forestry-related issues in Asia Pacific.

Abd Latif (kiri) menyampaikan sijil penghargaan kepada Park
Abd Latif (left) presenting a certificate of appreciation to Park

7. *Malaysia Book of Records (MBR)*

Lima pengiktirafan *Malaysia Book of Records* (MBR) yang diterima oleh Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod telah menyempurnakan sasaran FRIM untuk mendapat 33 rekod MBR sempena Ulang Tahun ke-33 FRIM pada 2018.

Dua sijil pengiktirafan MBR telah disampaikan oleh Ketua Pegawai Operasi MBR, Christopher Wong semasa majlis perasmian FRIM Inc. pada 2 Februari 2018. Turut hadir ialah Dato' Seri Dr Ahmad Zahid Hamidi, Timbalan Perdana Menteri, Datuk Seri Dr Wan Junaidi Tuanku Jaafar, Menteri Sumber Asli dan Alam Sekitar (NRE) dan Dato' Sri Azizan Ahmad, Ketua Setiausaha NRE.

Pada Januari 2018, Timbalan Pengurus Besar MBR, Mohamad Alex Edward telah menyampaikan tiga sijil MBR kepada Abd. Latif. Abd Latif telah menerima lima pengiktirafan atas pencapaian berikut: Saintis Perhutanan Pertama menerima Anugerah Saintis Muda Negara, Saintis Perhutanan Pertama menerima dua Anugerah Sains Kebangsaan, Saintis Perhutanan Termuda menerima Anugerah Pencapaian Saintifik IUFRO, Saintis Perhutanan Pertama menerima Anugerah Tokoh Buku Penyelidikan, dan Saintis Perhutanan Pertama menerima Anugerah Tokoh Penyelidikan dan Pembangunan (R&D).

Ketua Pengarah FRIM memenangi Anugerah Tokoh Buku Penyelidikan (2015) dan Anugerah Tokoh R&D (2016) daripada Yayasan Pembangunan Buku Negara bagi mengiktiraf sumbangan beliau yang mempelopori usaha menterjemah penerbitan saintifik FRIM kepada bentuk buku-buku mesra ilmu yang lebih mudah difahami.

Dua lagi MBR yang diterima FRIM termasuklah "Garis Panduan Pemindahan Bahan Tanaman yang Pertama untuk Spesies Hutan Tropika", hasil usaha pasukan penyelidik bioteknologi dan biodiversiti FRIM yang diketuai oleh Dr Lee Chai Ting, dan "Bangunan Pertama dibina Menggunakan Kayu *Acacia mangium*", hasil kajian pasukan penyelidik yang diketuai oleh Dr Hamdan Husain.

7. *Malaysia Book of Records (MBR)*

Five Malaysia Book of Records (MBR) recognitions received by FRIM Director General, Dato' Dr Abd Latif Mohmod, has accomplished the institute's target to attain 33 MBR in conjunction with its 33rd anniversary in 2018.

On 2 February 2018, Abd Latif received two MBR certificates from MBR Chief Operating Officer Christopher Wong at the FRIM Inc. launching ceremony. The ceremony was witnessed by Deputy Prime Minister Dato' Seri Dr Ahmad Zahid Hamidi, the Natural Resources and Environment (NRE) Minister Datuk Seri Dr Wan Junaidi Tuanku Jaafar and NRE Secretary General Dato' Sri Azizan Ahmad.

Earlier in January, MBR Deputy General Manager Mohamad Alex Edward presented three MBR certificates to Abd Latif at the DG's office. The five MBRs that Abd Latif received were for the following achievements: First Forestry Scientist to Receive National Young Scientist Award; First Forestry Scientist to Receive Two National Science Awards; Youngest Forestry Scientist to Receive IUFRO Scientific Achievement Award; First Forestry Scientist to Receive *Anugerah Tokoh Buku Penyelidikan*, and First Forestry Scientist to Receive *Anugerah Tokoh Penyelidikan dan Pembangunan* (R&D).

The FRIM DG won the *Anugerah Tokoh Buku Penyelidikan* (2015) and *Anugerah Tokoh R&D* (2016) presented by National Book Development Foundation (Yayasan Pembangunan Buku Negara) in recognition of his contribution in efforts to share scientific information through the production of more simple, easy-to-read coffee-table books.

Two other MBRs that FRIM received recently are for the "First Plant Material Transfer Guidelines for Tropical Forest Species" produced by FRIM biotechnology and biodiversity scientists led by Dr Lee Chai Ting; and for the "First Full-scale House Made of *Acacia mangium* Wood" built by a group of researchers headed by Dr Hamdan Husain.

Pengurusan Kualiti
Quality Management

Pengurusan Kualiti
Quality Management

FRIM berjaya mengekalkan pensijilan MS ISO 9001:2015 selepas pelaksanaan audit luar pada 26–27 September 2018. ISO 9001:2015 menumpukan pada elemen-elemen asas bagi mewujudkan dan melaksanakan Sistem Pengurusan Kualiti (SPK) yang berkesan. Standard ini juga menekankan keperluan organisasi menepati kriteria penghasilan output atau perkhidmatan yang memenuhi kehendak dan keperluan pelanggan serta pihak-pihak yang berkepentingan tanpa menjejaskan ketetapan peraturan dan perundangan yang berkaitan. Standard ISO/IEC 17025:2017 pula memastikan setiap perkhidmatan ujian yang ditawarkan kepada pelanggan mengikut prosedur dan kaedah yang betul dan menjamin kesahihan keputusan ujian yang dikeluarkan.

Pada tahun 2018, terdapat sedikit perubahan proses pengauditan ISO 9001 kerana kesemua warga PJK telah terlibat secara langsung dengan dibantu oleh juruaudit dalaman FRIM yang terdiri daripada pegawai, penolong pegawai dan pembantu penyelidik kanan FRIM. Tahun ini juga merupakan tahun kedua audit ISO/IEC 17025 dilaksanakan di bawah konsep payung dalam bidang mikrobiologi dan biologi (SAMM 558), kimia (SAMM 154) dan mekanikal dan fizikal (SAMM 205).

Selain kedua-dua standard ini, FRIM juga patuh pada ISO/IEC 27001:2013 yang menekankan isu risiko keselamatan maklumat diuruskan secara berkesan, memantau, mengkaji semula, memelihara dan menambah baik sistem pengurusan keselamatan maklumat yang tentunya akan memberi keyakinan kepada pelanggan dan pihak-pihak berkepentingan. Proses pengauditan dibuat berpandukan skop dan fungsi setiap bahagian dan CUMBS. Pasukan audit mendapati secara keseluruhannya semua CUMBS menunjukkan tahap pematuhan dan pencapaian prestasi yang baik serta menepati keperluan-keperluan yang ditetapkan dalam standard SPK masing-masing.

FRIM has successfully retained its MS ISO 9001:2015 certification after undergoing the external audit on 26–27 September 2018. ISO 9001: 2015 is a standard that focuses on the basic elements of creating and implementing an effective Quality Management System (QMS). This standard also emphasizes organizational requirements in meeting output or service producing criteria that meet the needs and requirements of customers and stakeholders without compromising the provision of relevant regulations and legislation. Standard ISO/IEC 17025: 2017 ensures that each test service offered to the customer is in accordance with the proper procedures and methods and guarantees the validity of the test results.

In 2018, there has been a slight change in the ISO 9001 auditing process as all PJK members have been directly involved and assisted by FRIM's internal auditors; consisting of FRIM senior officers, assistants and assistant researchers. The year 2018 is also the second year of the ISO / IEC 17025 audit carried out under the concept of umbrella under the field of microbiology & biology (SAMM 558), chemical (SAMM 154) and mechanical & physical (SAMM 205).

In addition to these two standards, FRIM also complies with ISO/IEC 27001: 2013 which emphasizes the security issues of information security effectively managed, monitored, reviewed, maintained and improved information security management systems which would certainly provide customers and stakeholders with confidence. The auditing process is based on the scope and function of each section and CUMBS. The audit team finds that all CUMBS have demonstrated a good level of compliance and achievement and meet the requirements set in their respective SPK standards.

Perkhidmatan Pensijilan Produk FRIM
FRIM Product Certification Services (FRIM PCS) 2018

Perkhidmatan Pensijilan Produk FRIM (FRIM PCS) 2018
FRIM Product Certification Services (FRIM PCS) 2018

Sejajar dengan penguatkuasaan Pekeliling Perbendaharaan Malaysia PK 2 Lampiran 2.1 bertarikh 1 Julai 2018, Perolehan Perabot Pelbagai Jenis Melalui Kontrak Panel Berpusat oleh Semua Agensi Kerajaan di Semenanjung Malaysia, Kementerian Kewangan telah melantik FRIM sebagai agensi pengawal selia bagi menjamin kualiti perabot yang dibekalkan. FRIM berperanan sebagai Badan Pensijilan dan Pengujian bagi perabot mudah alih yang dibekalkan kepada semua agensi kerajaan. Kementerian Kewangan telah memberi tempoh kepada semua syarikat untuk mendapatkan pensijilan produk FRIM PCS ini dalam tempoh setahun iaitu dari Julai 2018 hingga Jun 2019.

FRIM PCS telah mengambil tanggungjawab ini untuk mempersijilkan produk perabot yang dihasilkan oleh 87 buah syarikat di bawah Kontrak Panel Berpusat (KPB). Hasil daripada sesi dialog, mesyuarat dan perbincangan yang diadakan sepanjang tahun 2018, lebih daripada 136 jenis perabot telah dikenal pasti meliputi segmen kayu, fabrik, polypropelene, logam dan katil besi. FRIM PCS juga membuka permohonan kepada semua syarikat perabot untuk pasaran terbuka.

Sebanyak 34 permohonan baharu telah diterima sepanjang 2018 dan aktiviti audit semakan dokumen, audit penilaian di kilang, pengujian produk dan kelulusan panel pensijilan telah dilaksanakan. Kebanyakan syarikat menghadapi masalah untuk melengkapkan dokumen yang diperlukan dan ini menyebabkan kelewatan kepada syarikat untuk dilaksanakan audit penilaian. Sebanyak lima syarikat baharu telah berjaya dipersijilkan pada 2018 dan menjadikan jumlah terkumpul dan syarikat masih aktif ialah sebanyak 19 syarikat. Manakala satu syarikat telah digugurkan kerana tidak memperbaharui sijil setelah tamat tempoh tiga tahun yang ditetapkan menjadikan jumlah terkumpul sebanyak empat syarikat yang telah digugurkan.

In line with the enforcement of the Malaysian Treasury Circular PK 2 Appendix 2.1 dated July 1, 2018, Procurement of Various Types of Furniture through Central Panel Contracts by All Government Agencies in Peninsular Malaysia, the Ministry of Finance has appointed FRIM as the regulatory agency for the quality of furniture. FRIM has to play her role as the Certification and Testing Bodies for all type of loose furniture supplied to the government agencies. The Ministry of Finance has given all the companies to obtain certification for FRIM PCS products within a year from July 2018 to June 2019.

FRIM PCS has taken the responsibility to certify all loose furniture products produced by 87 companies under the Central Panel Contract. As a result of dialogue, meetings and discussions held throughout the year, more than 136 types of wood, fabrics, polypropylene, metal and metal beds segments furniture have been identified. FRIM PCS also opens up applications to all furniture companies who are interested to certify their products.

A total of 34 new applications were received during 2018 and all the documentation review audit, factory audits, product testing and certification panel approvals were implemented. Most of companies having problems in completing the required documentation and this causes delays to carry out the assessment audit. A total of five new companies have been successfully certified in 2018 and made the cumulative amount of 19 companies remains active. One company has been withdrawn from product certification due to not renewing the certificate after the expiration date; and the cumulative amount of four companies has been withdrawn.

Skop pensijilan produk FRIM PCS yang telah diakreditasikan oleh Jabatan Standard Malaysia berdasarkan kepada kepatuhan standard MS ISO/IEC 17065:2012 (*Conformity Assessment – Requirements for Bodies Certifying Products, Processes and Services)* adalah seperti berikut:

The scope of certification of FRIM PCS products that has been accredited by the Department of Standards Malaysia based on MS ISO / IEC 17065: 2012 (Conformity Assessment - Requirements for Bodies Certifying Products, Processes and Services) are as follows:

SKOP AKREDITASI **SCOPE OF ACCREDITATION**	
NO. SKOP DAN KOD NACE : **SCOPE NO. AND NACE CODE:** **23 (31.01 & 31.09)**	
Standard Pensijilan **Certification Standard**	**Tajuk** **Title**
BS EN 1729-2:2012+A1:2015	Furniture- Chairs and tables for educational institutions Part 2: Safety requirements and test methods
BS EN 14073-2:2004	Office Furniture – Storage furniture- Part 2: Safety requirements
BS EN 15372:2016	Furniture- Strength, durability and safety – Requirements for nondomestic tables
BS EN 16121:2013	Non-domestic storage furniture- Requirements for safety, strength, durability and stability
BS EN 527-2:2016	Office furniture – Work tables and desks – Part 2: Mechanical safety requirements
BS EN 16139:2013	Furniture – Strength, durability & safety – Requirements for nondomestic seating

1. Senarai syarikat yang aktif dalam Pensijilan Produk FRIM PCS
List of companies active in FRIM PCS Product Certification

Bil. No.	Nama Syarikat Company Name	Alamat Adress	Bil. Produk Num. of Product	Tarikh Mula dipersijilkan Start Date of Certificate	Jenis Produk Category of Product	Standard	Nace Code	No. Sijil Certificate Number	Tarikh Sah Sijil Validity of Certificate	
									Mula Start	Tamat End
1	Adunan Komersil (M) Sdn Bhd	Plot 8, Fasa 4C, Jalan PBR 33, Kawasan Perindustrian Bukit Rambai, 75250, Melaka	4	02/06/14	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012 + A1:2015	31.09	414-1/1	05/04/18	04/04/21
				02/04/14	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012 + A1:2015	31.09	414-1/2	05/04/18	04/04/21
				02/04/14	3) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012 + A1:2015	31.09	414-1/4	05/04/18	04/04/21
				13/03/15	4) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	415-1/3	13/03/15	12/03/18
2	MS Zabki (M) Sdn Bhd	No.58, Jalan Besar, 33600, Enggor, Karai, Perak	4	17/10/14	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012 + A1:2015	31.09	514-1/1	7/12/2018	6/12/2021
				17/10/14	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012 + A1:2015	31.09	514-1/2	05/04/18	04/04/21
				17/10/14	3) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012 + A1:2015	31.09	514-1/3	7/12/2018	6/12/2021
				17/10/14	4) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012 + A1:2015	31.09	514-1/4	05/04/18	04/04/21

Bil. No.	Nama Syarikat Company Name	Alamat Adress	Bil. Produk Num. of Product	Tarikh Mula dipersijilkan Start Date of Certificate	Jenis Produk Category of Product	Standard	Nace Code	No. Sijil Certificate Number	Tarikh Sah Sijil Validity of Certificate	
									Mula Start	Tamat End
3	Puncak Bumi Utama (M) Sdn Bhd	S-10, Lorong Kendi 1, Jalan Kendi, Kawasan Industri MARA, 14100, Simpang Ampat, Seberang Perai Selatan, Penang.	4	26/01/16	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012	31.09	1816-1/1	26/01/16	25/01/19
				26/01/16	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	1816-1/2	26/01/16	25/01/19
				26/01/16	3) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	1816-1/4	26/01/16	25/01/19
				22/08/16	4) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012	31.09	1816-1/3	22/08/16	21/08/19
4	Subki Kassim Sdn Bhd	2792, Kubang Menerong, 18300 Tasek Gelugor, Pulau Pinang	2	18/04/16	1) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	1516 -1/2	18/04/16	17/04/19
				18/04/16	2) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012	31.09	1516 - 1/4	18/04/16	17/04/19
5	Alwy Development Sdn Bhd	Lot 4491, Kg Bukit Berangan, Tepoh, 21060, Kuala Terengganu	6	18/04/16	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012	31.09	1216 - 1/1	18/04/16	17/04/19
				18/04/16	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	1216 - 1/2	18/04/16	17/04/19
				18/04/16	3) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	1216 - 1/4	18/04/16	17/04/19
				18/04/16	4) Meja Kantin (PK1)	BS EN 15372:2008	31.09	1216 - 1/8	18/04/16	17/04/19
				03/06/16	5) Meja Guru Karel Berpedestal (BG 4)	BS EN 527-2:2002	31.01	1216 - 2/7	03/06/16	02/06/19
				03/06/16	6) Gerobok (BD 7)	BS EN 16121:2013	31.01	1218 - 2/2	03/06/16	02/06/19

Bil. No.	Nama Syarikat Company Name	Alamat Adress	Bil. Produk Num. of Product	Tarikh Mula dipersijilkan Start Date of Certificate	Jenis Produk Category of Product	Standard	Nace Code	No. Sijil Certificate Number	Tarikh Sah Sijil Validity of Certificate	
									Mula Start	Tamat End
6	Subky Sdn Bhd	3876 A Kampung Gemuroh Lama, 21060, Tepoh, Kuala Terengganu, Terengganu Darul	6	09/05/16	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012	31.09	1116 - 1/1	09/05/16	08/05/19
				09/05/16	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	1116 - 1/2	09/05/16	08/05/19
				09/05/16	3) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	1116 - 1/3	09/05/16	08/05/19
				09/05/16	4) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012	31.09	1116 - 1/4	09/05/16	08/05/19
				09/05/16	5) Meja Kantin (PK1)	BS EN 15372:2008	31.09	1116 - 1/8	09/05/16	08/05/19
				28/06/16	6) Meja Guru Karel Berpedestal (BG4)	BS EN 527-2:2002	31.01	1116 - 2/7	28/06/16	27/06/19
7	Teras Puncak Sdn Bhd	Lot 10, Jalan PBR 33, Fasa 4C, Kawasan Perindustrian Bukit Rambai, 75250 Bukit Rambai, Melaka	5	18/04/16	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012	31.09	716 - 1/1	18/04/16	17/04/19
				18/04/16	2) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	716 - 1/3	18/04/16	17/04/19
				03/06/16	3) Rak Rendah Terbuka (BG 1)	BS EN 16121:2013	31.01	716 - 2/4	03/06/16	02/06/19
				03/06/16	4) Rak Fail Terbuka Serbaguna (Rak Fail) (PP 9)	BS EN 16121:2013	31.01	716 - 2/17	03/06/16	02/06/19
				28/06/16	5) Meja Guru Berpedestal (BD5)	BS EN 14073-2:2004	31.01	716-2/1	28/06/16	27/06/19

Bil. No.	Nama Syarikat Company Name	Alamat Adress	Bil. Produk Num. of Product	Tarikh Mula dipersijilkan Start Date of Certificate	Jenis Produk Category of Product	Standard	Nace Code	No. Sijil Certificate Number	Tarikh Sah Sijil Validity of Certificate	
									Mula Start	Tamat End
8	Hasro Furniture Gallery (M) Sdn Bhd	Lot 12, Jalan PBR 33, Fasa 4C, Kawasan Perindustrian Bukit Rambai, 75250, Bukit Rambai, Melaka	5	18/04/16	1) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	816 - 1/2	18/04/16	17/04/19
				18/04/16	2) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	816 - 1/3	18/04/16	17/04/19
				03/06/16	3) Rak Rendah Terbuka (BG 1)	BS EN 16121:2013	31.01	816 - 2/4	03/06/16	02/06/19
				03/06/16	4) Rak Fail Terbuka Serbaguna (Rak Fail) (PP 9)	BS EN 16121:2013	31.01	816 - 2/17	03/06/16	02/06/19
				28/06/16	5) Meja Guru Berpedestal (BD5)	BS EN 14073-2:2004	31.01	716 -2/1	28/06/16	27/06/19
9	Regal Bonus (M) Sdn Bhd	No. 2 Jalan Anggerik Vanilla W 31/W Kota Kemuning, Seksyen 31, 40460 Shah Alam Selangor	5	18/04/16	1) Meja Guru Berpedestal (BD5)	BS EN 14073-2:2004	31.01	2516 - 2/1	18/04/16	17/04/19
				18/04/16	2) Meja Guru Karel Berpedestal (BG4)	BS EN 14073-2:2004	31.01	2516 - 2/7	18/04/16	17/04/19
				18/04/16	3) Meja Kerani (PP4)	BS EN 14073-2:2004	31.01	2516-2/12	18/04/16	17/04/19
				18/04/16	4) Rak Pigeon Hole 12s (PP13)	BS EN 16121:2013	31.01	2516-2/21	18/04/16	17/04/19
				5/4/2018	5) Kitchen Cabinet	BS EN 14749:2016	31.02	2518-4/1	05/04/18	04/04/21

Bil. No.	Nama Syarikat Company Name	Alamat Adress	Bil. Produk Num. of Product	Tarikh Mula dipersijilkan Start Date of Certificate	Jenis Produk Category of Product	Standard	Nace Code	No. Sijil Certificate Number	Tarikh Sah Sijil Validity of Certificate	
									Mula Start	Tamat End
10	A.M.A.B Bina Enterprise Sdn Bhd	No. 4, Kawasan Perindustrian Gong Badak, 21300 Kuala Terengganu	4	09/05/16	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012	31.09	2216-1/1	09/05/16	08/05/19
				09/05/16	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	2216-1/2	09/05/16	08/05/19
				09/05/16	3) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	2216-1/3	09/05/16	08/05/19
				09/05/16	4) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012	31.09	2216-1/4	09/05/16	08/05/19
11	Bidin bin Jasin Sdn. Bhd.	Bidin bin Jasin Sdn. Bhd. Batu 2, Jalan Raja Syed Alwi 01000 Kangar, Perlis	5	09/05/16	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012	31.09	1016-1/1	09/05/16	08/05/19
				09/05/16	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	1016-1/2	09/05/16	08/05/19
				09/05/16	3) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	1016-1/3	09/05/16	08/05/19
				09/05/16	4) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012	31.09	1016-1/4	09/05/16	08/05/19
				28/06/16	5) Meja Guru Berpedestal (BD5)	BS EN 527-2:2002	31.01	1016-2/1	28/06/16	27/06/19

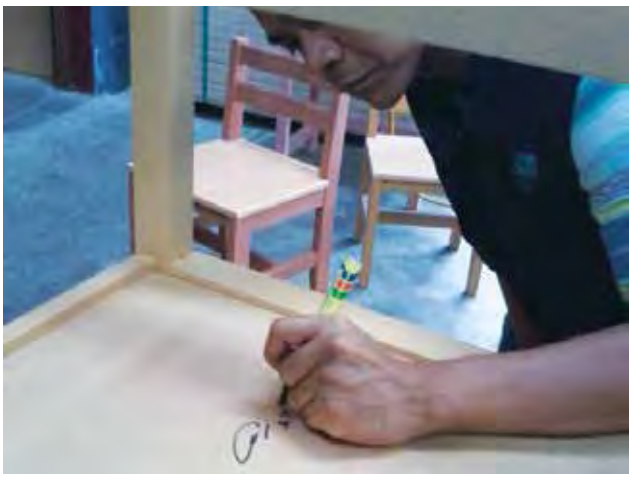
Bil. No.	Nama Syarikat Company Name	Alamat Adress	Bil. Produk Num. of Product	Tarikh Mula dipersijilkan Start Date of Certificate	Jenis Produk Category of Product	Standard	Nace Code	No. Sijil Certificate Number	Tarikh Sah Sijil Validity of Certificate	
									Mula Start	Tamat End
12	Teras Kreatif Sdn Bhd	Kg. Baru Batu 3 ½ Jalan Changloon, 06100, Kodiang Kedah	4	09/05/16	1) Kerusi Murid Rendah (BDR1)	BS EN 1729-2:2012	31.09	916-1/1	09/05/16	08/05/19
				09/05/16	2) Meja Murid Rendah (BDR2)	BS EN 1729-2:2012	31.09	916-1/2	09/05/16	08/05/19
				09/05/16	3) Kerusi Murid Menengah (BDM3)	BS EN 1729-2:2012	31.09	916-1/3	09/05/16	08/05/19
				09/05/16	4) Meja Murid Menengah (BDM4)	BS EN 1729-2:2012	31.09	916-1/4	09/05/16	08/05/19
13	Hashim Bakar Sdn Bhd	1503, Jalan Datuk Hj. Ahmad Badawi, 13200 Kepala Batas, Seberang Perai Utara, 13200 Pulau Pinang	1	28/06/16	1) Meja Guru Karel Berpedestal (BG4)	BS EN 527-2:2002	31.01	1316-2/7	28/06/16	27/06/19
14	Homestead Sdn Bhd	Homestead Wood Industries Sdn Bhd, Lot 906, Jalan Gemas, 73000 Tampin Negeri Sembilan	3	30/11/16	1) Rak Fail Berpintu Serbaguna (PP10)	BS EN 16121:2013	31.01	1416-2/8	30/11/16	29/11/19
				30/11/16	2) Meja Kerani (PP4)	BS EN 14073-2:2004	31.01	1416-2/12	30/11/16	29/11/19
				30/11/16	3) Rak Pigeon Hole 12s (PP13)	BS EN 16121:2013	31.01	1416-2/21	30/11/16	29/11/19
15	Prisma Tegas Sdn. Bhd	Kilang Perabot Lot 509, KM 8, Jalan Bukit Kayan, Bukit Katil, 75450 Melaka.	4	07/12/18	1) Meja Kerani (PP4)	BS EN 527-2:2016 BS EN 14073-2:2004	31.01	2618-2/12	07/12/18	06/12/21
				07/12/18	2) Meja Guru Berpedastal (BD5)	BS EN 527-2:2016 BS EN 14073-2:2004	31.01	2618-2/1	07/12/18	06/12/21
				07/12/18	3) Pedestal Mudah Alih (PP3)	BS EN 14073-2:2004	31.01	2618-2/11	07/12/18	06/12/21
				07/12/18	4) Rak rendah Terbuka (BG1)	BS EN 16121:2013	31.01	2618-2/4	07/12/18	06/12/21

Bil. No.	Nama Syarikat Company Name	Alamat Adress	Bil. Produk Num. of Product	Tarikh Mula dipersijilkan Start Date of Certificate	Jenis Produk Category of Product	Standard	Nace Code	No. Sijil Certificate Number	Tarikh Sah Sijil Validity of Certificate	
									Mula Start	Tamat End
16	Kabimas Manufacturing Sdn Bhd	No. 10, Jalan 1, Kawasan Perindustrian Hi-Tech 2, Jalan Sg. Lalang, 43500 Semenyih, Selangor	3	07/09/18	1) Gerobok Besi Bertingkat 3-G3 KM	BS EN 16121:2013	31.01	2718-5/5	07/09/18	06/09/21
				07/09/18	2) Kabinet ' Pigeon Hole' 15 Lubang–PG15-KM	BS EN 16121:2013	31.01	2718-5/7	07/09/18	06/09/21
				07/09/18	3) Rak Stor Tertutup–RS(CT)-KM	BS EN 16121:2013	31.01	2718-5/16	07/09/18	06/09/21
17	K.U.S Industries Sdn Bhd	Lot 3.22 & 3.23, Tingkat 2, Pertama Kompleks, Jalan Tuanku Abdul Rahman, 50100 Kuala Lumpur	1	07/12/18	Library Double C/W Side Panel (KUS 023)	BS EN 16121:2013	31.01	2818-5/14	07/12/18	06/12/21
18	Metro Manufacturing Sdn Bhd	No. 49, Jalan Bulan US/167, Seksyen US, Subang 2, 40150, Shah Alam, Selangor	1	07/12/18	Kerusi Bankuet Besi (MBP 6b)	BS EN 16121:2013	31.01	2918-8/1	07/12/18	06/12/21
19	Azas Rekalogam Sdn Bhd	Lot 1019B, Jalan 4/32A, Mukim Batu 6 1/2, Off Jalan Kepong, Kuala Lumpur	4	07/12/18	Almari (AZ-W)	BS EN 16121:2013	31.01	3018-5/19	07/12/18	06/12/21
				07/12/18	Gerobok Besi Bertingkat 3 (AZ-G1)	BS EN 16121:2013	31.01	3018-5/5	07/12/18	06/12/21
				07/12/18	Katil Besi Satu Tingkat (AZ-SBB)	BS EN 1725:1998	31.09	3018-6/1	07/12/18	06/12/21
				07/12/18	Kabinet Pigeon Holes 15 (AZ-P15)	BS EN 16121:2013	31.01	3018-5/7	07/12/18	06/12/21

Berikut merupakan gambar sepanjang proses audit dilaksanakan di kilang:
Pictures of the audit process at the factory:

Pemeriksaan kualiti produk
Quality of product inspection

Ujian in-situ dilaksanakan di kilang
in-situ test at the factory



Juruaudit menanda sampel untuk ujian
Sample marking for full type test

Juruaudit mengukur ketepatan ukuran produk mengikut lukisan teknikal
Auditor measure the product

Juruaudit melaksanakan semakan dokumen
Auditor checking the documents at the factory

Sorotan Media
Highlights of Media

Sorotan Media
Highlights of Media

KP FRIM: Kakitangan Kami Tidak Terlibat Dengan Pembunuhan Gajah di Gerik, Perak

Rabu, 14 Mac 2018, Ipoh: Institut Penyelidikan Perhutanan Malaysia (FRIM) telah menafikan salah seorang yang disyaki terlibat dengan pembunuhan seekor gajah jantan di Hutan Piah, Gerik, merupakan kakitangannya.

Ketua Pengarah FRIM, Dato' Dr Abd. Latif Mohmod mengambil tindakan segera dan mengesahkan bahawa individu tersebut bukan kakitangan kontrak mahupun kontraktor yang berkhidmat dengan FRIM.

"Kami bersedih dengan pembunuhan yang tidak berperi kemanusiaan itu dan terkejut dengan berita yang mengaitkan dengan kemungkinan salah seorang kakitangan kami terlibat dengan kes ini." Abd. Latif berkata, beliau perlu menjernihkan keadaan kerana laporan tersebut mungkin akan menjejaskan imej dan reputasi FRIM.

FRIM memandang serius akan apa jua salah laku pekerjanya dan memberi jaminan kepada orang awam bahawa sesiapa yang didapati terlibat dalam semua aktiviti haram akan diambil tindakan segera.

Bantahan ke atas Cadangan Penyahwartaan Sebahagian daripada Hutan Simpan (HS) Bukit Lagong, Gombak

Institut Penyelidikan Perhutanan Malaysia (FRIM) telah mengemukakan pandangan dan bantahannya terhadap cadangan penyahwartaan sebahagian daripada Hutan Simpan (HS) Bukit Lagong, Gombak yang terletak berhampiran kampus FRIM, Kepong. Surat bantahan rasmi FRIM dihantar ke Jabatan Perhutanan Negeri Selangor pada 6 Disember 2018.

"Kami telah dihubungi pihak media dan badan-badan bukan kerajaan sejak 23 November untuk menyatakan pendirian FRIM. Ada dalam kalangan pengunjung yang menuduh FRIM terlibat dalam cadangan penyahwartaan ini. Ada juga yang berpendapat bahawa FRIM mengambil keputusan menutup Denai Rover pada tahun 2016 untuk memberi laluan kepada penyahwartaan kawasan berkenaan," kata Ketua Pengarah FRIM, Dato' Dr Abd Latif Mohmod.

FRIM DG: Our People Not Involved with Killing Elephant in Gerik, Perak

Wednesday, 14 Mar 2018 IPOH: The Forest Research Institute Malaysia (FRIM) has denied that one of the suspects involved with the killing of a male elephant in Hutan Piah, Gerik, works for them.

Its director-general Datuk Dr Abd Latif Mohmod took immediate action to verify the matter and confirmed that the person implicated was neither a contract staff nor a contractor engaged to provide services to them.

"We are outraged by the senseless killing and appalled at the thought that one of our staff may be involved in this case," he said, adding that it was important for him to clarify the situation because the report may affect image and reputation of FRIM.

FRIM takes a serious view on any misconduct of its employees and gave its assurance to the public that anyone found to be involved in any illegal activities will face severe and immediate action.

Objections to the Proposed Degazettement and Development of Parts of the Bukit Lagong Forest Reserve (FR) in Gombak

Forest Research Institute Malaysia (FRIM) has submitted its views and objections to the proposed degazettement and development of parts of the Bukit Lagong Forest Reserve (FR) in Gombak. The official response was sent to the Selangor State Forestry Department (FD) on 6 December.

"We have been contacted by the media and civil society since 23 November to make our stand on this issue. Some of our visitors are accusing FRIM of being involved in the proposed degazettement. Some even thought that our decision to close off our Rover Track in 2016 was to make way for this," said FRIM Director General Dato' Dr Abd Latif Mohmod.

Beliau menjelaskan bahawa kawasan HS Bukit Lagong yang dicadangkan untuk penyahwartaan berada di luar bidang kuasa FRIM walaupun ia terletak kira-kira 3.5 km sahaja dari kampus FRIM.

"Mereka yang tinggal berhampiran kawasan terbabit yang tidak senang dengan cadangan tersebut haruslah mengemukakan bantahan secara rasmi kepada jabatan perhutanan negeri secepat mungkin dan bukan menunjukkan kemarahan kepada FRIM," katanya.

Walau bagaimanapun, FRIM mengambil positif reaksi pihak umum yang mencerminkan peningkatan tahap kesedaran dalam kalangan rakyat Malaysia tentang kepentingan usaha pemuliharaan hutan dan alam sekitar.

He explained that the proposed area for degazettement is located outside of FRIM's jurisdiction, some 3.5 km from the research institute's campus perimeters.

"Those living around the proposed area who feel unhappy with the degazettement should promptly send their objections officially to the state forestry department and not direct their frustration and anger towards FRIM," he advised.

Nevertheless, he added, FRIM appreciates the public outcry over this issue as it reflects the increasing awareness among Malaysians on the importance of forest and environment conservation.

Abd Latif menyeru semua pihak berkepentingan untuk menyuarakan bantahan kepada jabatan perhutanan negeri.
Abd Latif urges all stakeholders to voice their concerns to the state forestry department

Peta menunjukkan zon teras (berwarna hijau) dan penampan (biru) bagi pencalonan FRIM untuk pengiktirafan Tapak Warisan Dunia UNESCO.
The map showing the core (green) and buffer (blue) zones for the nomination of the FRIM Selangor Forest Park as a UNESCO WHS by 2020.
Marked in red is the proposed degazettement area.

Abd Latif khuatir penyahwartaan kawasan berkenaan akan menjejaskan peluang FRIM mendapat pengiktirafan status Tapak Warisan Dunia UNESCO (WHS), selain membuka ruang kepada lebih banyak permohonan penyahwartaan HS tersebut bagi tujuan pembangunan.

FRIM mula berusaha ke arah mencapai pengiktirafan WHS UNESCO pada 2014 dan pencalonan FRIM untuk Senarai Tentatif UNESCO WHS telah berjaya diterima pada Mesyuarat Jawatankuasa Warisan Dunia (WHC) ke-41 yang diadakan di Krakow, Poland pada 7 Julai 2017.

HS Bukit Lagong merupakan zon penampan bagi pemuliharaan kawasan FRIM seluas 544-hektar yang telah diwartakan di bawah Akta Warisan Kebangsaan 2005 sebagai Warisan Semula Jadi pada tahun 2009 serta diisytiharkan sebagai Warisan Kebangsaan pada 2012.

Antara lain, FRIM berpendapat bahawa keseluruhan HS Bukit Lagong perlu dikekalkan kerana:

- Ia merupakan tempat tadahan air penting yang membekalkan air kepada kawasan sekitarnya;
- Pembangunan kawasan yang terletak di cerun yang curam ini akan meningkatkan lagi risiko kejadian tanah runtuh dan banjir; serta
- Pembangunan yang dicadangkan juga akan menjejaskan kehidupan masyarakat Orang Asli yang tinggal berhampiran.

Penyiasatan awam sedang dilaksanakan oleh Jabatan Perhutanan Negeri Selangor untuk mendapatkan maklum balas serta bantahan terhadap cadangan pengeluaran tanah seluas 28.3 hektar dari HS Bukit Lagong. Notis penyiasatan awam telah disiarkan pada 23 November bagi menjemput semua pihak yang berkepentingan di Daerah Gombak untuk menyuarakan bantahan mereka dalam tempoh 30 hari dari tarikh penyiaran notis tersebut.

Pelbagai aktiviti berkaitan R&D dan CSR FRIM mendapat liputan meluas daripada media elektronik dan media cetak. Sehingga September 2018, sebanyak 122 rencana dan makalah berkenaan R&D FRIM telah disiarkan oleh media termasuk di Sabah dan Sarawak dengan nilai perhubungan awam (PR value) berjumlah RM21.4 juta berbanding dengan RM7.6 juta pada 2017.

Abd Latif said he is particularly concerned that the proposed development may affect FRIM's chances of achieving the UNESCO World Heritage Site (WHS) status, apart from opening the floodgate of demands for further degazettement of the forest reserve for development purposes.

Working towards attaining the UNESCO WHS recognition since 2014, FRIM's nomination for the Tentative List of the UNESCO WHS was accepted at the 41st World Heritage Committee (WHC) Meeting held in Krakow, Poland on 7 July 2017.

The Bukit Lagong FR serves as a buffer for the conservation of the 544-hectare FRIM campus, which has been gazetted under the National Heritage Act 2005 as a Natural Heritage in 2009 and declared as a National Heritage in 2012.

Among others, FRIM is of the view that the Bukit Lagong FR should remain intact because:

- It is an important water catchment which supplies water to the surrounding area;
- The development of this area, which is on a steep slope, will increase the risk of landslide and flood occurrences; and
- The proposed development will also adversely affect the lives of the nearby Orang Asli community.

A public hearing by the Selangor FD is being held to seek feedback on the degazettement proposal covering an area of 28.3ha in the forest reserve. The Selangor FD published a public notice on 23 November inviting all stakeholders in the Gombak district to voice their objections within 30 days.

Various activities on R&D and FRIM CSR were widely covered widely by both the electronic and printed media. Until September 2018, a total of 122 features and articles on FRIM R&D were published by the media including in Sabah and Sarawak with total PR Value of RM21.4 million compared to RM7.6 million in 2017.

Bil. No.	Tarikh Date	Tajuk Title	Akhbar Newspaper
1	9/1/2018	*Forest de-gazetting hurts state*	New Straits Times
2	5/2/2018	Usahawan herba di Sagil	Utusan Malaysia
3	6/2/2018	*Constructed wetlands proposed to manage industrial waste water*	China Press
4	2/3/2018	Malaysia komited pelihara hutan	Utusan Malaysia
5	2/3/2018	TPM ingatkan FRIM Inc tidak tersasar daripada perniagaan teras	Utusan Borneo Sarawak
6	2/3/2018	*Rare plants named after Zahid and Wan Junaidi*	The Star
7	2/3/2018	*DPM Zahid cautions Malaysia`s FRIM Inc. against over diversification*	Guang Ming Daily
8	14/2/2018	"Saya cinta bidang penyelidikan"	Sinar Harian
9	7/3/2018	FRIM tawar khidmat nasihat	Utusan Malaysia
10	16/3/2018	*Ministry studying remuneration for researchers — Wan Junaidi*	Borneo Post (KK)
11	16/3/2018	*FRIM scientists to reap profits from discoveries*	The Star
12	5/4/2018	*Promote forest protection in Taman Sinonim*	Oriental Daily News
13	6/4/2018	*Establishing first ever Taman Sinonim in Melaka*	Nanyang Siang Pau (Johor)
14	13/4/2018	Bantu lonjakkan industri perabot bumiputera	Utusan Malaysia
15	3/5/2018	FRIM Inc. pacu pengkomersialan R&D	Utusan Malaysia
16	7/5/2018	Kerjasama KEJORA, FRIM, SIRIM	Kosmo
17	16/5/2018	FRIM perhebat penyelidikan mamalia	Utusan Malaysia
18	31/5/2018	Kehebatan ilmu perubatan Melayu diakui	Berita Harian
19	22/6/2018	Pasoh pun ada lokasi menarik	Sinar Harian (Selatan)
20	18/7/2018	Pusat sehenti penyelidik hutan hujan	Kosmo
21	1/8/2018	Hargai pengetahuan tradisi	Utusan Malaysia
22	16/8/2018	Sayang kelip-kelip	Harian Metro (Timur)
23	9/9/2018	*Plant named in honour of the king*	Sunday Star
24	22/9/2018	Pelihara, pulihara sumber batu kapur di Sarawak	Utusan Borneo Sarawak
25	6/10/2018	Inovasi FRIM dikomersialkan	Utusan Malaysia
26	17/10/2018	Pokok ketum mungkin dikomersial	Kosmo
27	19/10/2018	Ketum berkesan rawat pelbagai penyakit—Penyelidik	Kosmo
28	24/10/2018	*FRIM creates anti-gout product from "cucur atap" herbal plant*	Traxx FM
29	31/10/2018	*"Cucur atap" for anti-ageing beauty care*	Daily Express (KK)
30	16/11/2018	Kok gesa banyakkan R&D mengenai batang kelapa sawit	Utusan Borneo Sarawak
31	16/11/2018	Antara spesies tumbuhan penyembuh kanser	Utusan Malaysia
32	28/11/2018	*Gua Tempurung to establish limestone research center in 2021*	Nanyang Siang Pau

Sumber Manusia
Human Resource

Sumber Manusia
Human Resource

Perjawatan/Establishment

Komposisi Penjawat Awam/Staff Composition	Bil./No.
Bilangan penjawat awam/Total number of staff	661/248(K)
Kategori/Categories	
Pegawai/Officer (JUSA)	9 / -(K)
Pegawai penyelidik/Research officer	189 / 70(K)
Pegawai (selain pegawai penyelidik)/Officer (Other than research officer)	20 / 24(K)
Penolong pegawai penyelidik/Assistant research officer	49 / 12(K)
Penolong pegawai (selain penolong pegawai penyelidik) Assistant officer (other than assistant research officer)	50 / 10(K)
Penjawat awam (Kumpulan Pelaksana)/Public servant (Support Group)	353 / 132(K)

Nota/Note: K=Kontrak/Contract

Pelantikan (Tetap)/Appointment (Permanent)

Bahagian/Program/ Cawangan Division/Programme/ Branch	Nama Name	Jawatan/Gred Post/Grade	Tarikh Lantikan Date of Appointment
Bioteknologi Perhutanan	Dr Siti Suhaila A. Rahman	Pegawai Penyelidik Q41	15/1/2018
Bioteknologi Perhutanan	Syafiqah Nabilah Samsul Bahari	Pegawai Penyelidik Q41	15/1/2018
Perhutanan & Alam Sekitar	Dr Farah Shahanim Mohamed Mohidin	Pegawai Penyelidik Q41	15/1/2018
Perhutanan & Alam Sekitar	Mohamad Danial Md Sabri	Pegawai Penyelidik Q41	15/1/2018
Hasilan Semula Jadi	Abd Majid Jalil	Pegawai Penyelidik Q41	16/1/2018
Inovasi & Komersialisasi	Khairul Kamilah Abd Kadir	Pegawai Penyelidik Q41	16/1/2018
Perhutanan & Alam Sekitar	Abdul Hayat Mat Saad	Pegawai Penyelidik Q41	16/1/2018
Unit Undang-Undang	Nur Shafiqa Abdul Jamil	Pegawai Undang-Undang L41	17/1/2018

Bahagian/Program/ Cawangan Division/Programme/ Branch	Nama Name	Jawatan/Gred Post/Grade	Tarikh Lantikan Date of Appointment
Biodiversiti Hutan	Kaviarasu Munian	Pegawai Penyelidik Q41	18/1/2018
Perhutanan & Alam Sekitar	Hazira Md Hazif	Pengawas Hutan G19	2/4/2018
Perkhidmatan Teknikal	Norazian Syahid Tay	Setiausaha Pejabat N29	2/5/2018
Keluaran Hutan	Tuan Nur Atiqah Tuan Hussin	Setiausaha Pejabat N29	2/5/2018
Bioteknologi Perhutanan	Mohd Zaini Zainol	Pembantu Awam H11	2/5/2018
Bioteknologi Perhutanan	Shaharudin Md. Taib	Pembantu Awam H11	2/5/2018
Perhutanan & Alam Sekitar	Muhamad Saiful Azhar Nordin	Pembantu Awam H11	2/5/2018
Perkhidmatan Teknikal	Muhamad Yusuf Mukhamad Yamin	Jurufotografi B21	27/7/2018
Pentadbiran	Redzuan Mahat	Pemandu Kenderaan H11	30/7/2018
Pentadbiran	Mohd Hasriq Roslan	Pemandu Kenderaan H11	30/7/2018
Pentadbiran	Norazmi Ab.Rahim@Nawi	Pemandu Kenderaan H11	31/7/2018
Pentadbiran	Izzuddin Shah Kamal	Pembantu Kemahiran H19	1/8/2018
Kewangan	Shamira Aida Sahimi	Pembantu Tadbir(Kewangan) W19	1/8/2018
Keluaran Hutan	Mohamad Zaki Kamim	Pembantu Kemahiran H19	2/8/2018
Keluaran Hutan	Mohamad Idris Mohamad Ullul Azemi	Pembantu Kemahiran H19	2/8/2018

Pelantikan/Appointment (Kontrak/Contract)

Bahagian Division	Nama Name	Jawatan/Gred Post/Grade	Tarikh Lantikan Date of Appointment
Bioteknologi Perhutanan	Syafiqah Nabilah Samsul Bahari	Pembantu Penyelidik Q19	3/1/2018–31/12/2018
Bioteknologi Perhutanan	Norhayati Saffie	Pembantu Penyelidik/Q19	3/1/2018–31/12/2018
Bioteknologi Perhutanan	Fara Shazwanie Omar Tarmizi	Pembantu Penyelidik/Q19	8/1/2018–31/12/2018

Bahagian **Division**	**Nama** **Name**	**Jawatan/Gred** **Post/Grade**	**Tarikh Lantikan** **Date of Appointment**
Sumber Manusia	Muhammad Helmi Abdullah	Pembantu Awam Gred H11	8/1/2018–31/12/2018
Biodiversiti Hutan	Mohd Firdaus Nor Rasid	Pembantu Awam Gred H11	9/1/2018–31/12/2018
Biodiversiti Hutan	Muhammad Huzaifah Hussain	Pembantu Awam Gred H11	9/1/2018–31/12/2018
Bioteknologi Perhutanan	Amelia Azman	Pegawai Penyelidik Q41 (Naik taraf jawatan)	15/1/2018–31/12/2018
Perhutanan dan Alam Sekitar	Nurcahaya Khairany Mohamad Azmi	Pegawai Penyelidik Q41 (Naik taraf jawatan)	1/2/2018–31/12/2018
Inovasi dan Komersialisasi	Mahmud Husni Abd Hadi	Pegawai Penyelidik Q41	1/2/2018–31/12/2018
Inovasi dan Komersialisasi	Noor Syakilah Shafiee	Pegawai Ehwal Ekonomi E41	1/2/2018–31/12/2018
Perhutanan dan Alam Sekitar	Muhammad Syafiq Razali	Pembantu Awam H11	1/2/2018–31/12/2018
Perhutanan dan Alam Sekitar	Abdul Aizudden Abdul Aziz	Penolong Pegawai Penyelidik Q29 (Naik taraf jawatan)	5/2/2018–31/12/2018
Perhutanan dan Alam Sekitar	Kamariah Mihad	Pegawai Penyelidik Sosial N41	15/2/2018–31/12/2018
Perhutanan dan Alam Sekitar	Muhammad Ilham Ab Rahman	Pembantu Penyelidik Q19	19/2/2018–31/12/2018
Bioteknologi Perhutanan	Norhayati Saffie	Pegawai Penyelidik Q41 (Naik taraf jawatan)	15/3/2018– 31/12/2018
Perancangan Penyelidikan	Iskandar Muhammad Masrukin	Pegawai Penyelidik Q41 (Naik taraf jawatan)	15/3/2018– 31/12/2018
Biodiversiti Hutan	Aliaa Athirah Adam Malek	Pegawai Penyelidik Q41	15/3/2018– 31/12/2018
Perancangan Penyelidikan	Siti Aisyah Jabaruddin	Pegawai Penyelidik Q41	15/3/2018– 31/12/2018
Perkhidmatan Teknikal	Ahmad Ruzaini Md Rahin	Pegawai Teknologi Maklumat F41	15/3/2018– 31/12/2018
Bioteknologi Perhutanan	Aminuddin Muhamad Salleh	Pengawas Hutan G19	2/4/2018– 31/12/2018
Bioteknologi Perhutanan	Mior Muhammad Fizree Najmudin Abd Razak	Pengawas Hutan G19	2/4/2018– 31/12/2018

Bahagian **Division**	**Nama** **Name**	**Jawatan/Gred** **Post/Grade**	**Tarikh Lantikan** **Date of Appointment**
Unit Komuikasi Korporat	Mohd Haznizam Abd Kadir	Pereka B19	2/4/2018– 31/12/2018
Biodiversiti Hutan	Muhammad Ashraf Mohd Kamar	Pembantu Penyelidik Q19	2/4/2018– 31/12/2018
Bioteknologi Perhutanan	Siti Noratikah Mustafa	Penolong Pemelihara Hutan G29	9/4/2018– 31/12/2018
Perkhidmatan Teknikal	Nur Asnida Md Thaha	Penolong Pegawai Teknologi Maklumat FA29	9/4/2018– 31/12/2018
Keluaran Hutan	Sharaffie Mohamad Zain	Pembantu Penyelidik Q19	12/4/2018– 31/12/2018
Sumber Manusia/ Caw. Perjawatan	Noorazlan Amiruddin Mohd Noor	Pembantu Tadbir (P/O) N19	2/5/2018–31/12/2018
Keluaran Hutan	Abdul Hakim Abdul Aziz	Pembantu Kemahiran H19	2/5/2018–31/12/2018
Keluaran Hutan	Zakinatus Saadah Suruji	Pembantu Kemahiran H19	3/5/2018–31/12/2018
Pentadbiran	Nur Amalina Abdullah Lim	Pembantu Awam H11	3/5/2018–31/12/2018
FRIM PCS	Muhammad Azidan Zakaria	Pereka B41	23/5/2018–31/12/2018
FRIM PCS	Muhammad Ikhwan Mohd Nor	Pereka B41	23/5/2018–31/12/2018
FRIM PCS	Ahmad Salihin Sulaiman	Pereka B41	23/5/2018–31/12/2018
Hasilan Semula Jadi (SPF Maran)	Syazwan Ahmad	Pegawai Penyelidik Q41	24/5/2018–31/12/2018
Bioteknologi Perhutanan	Mohd Syahiran Sulaiman	Penolong Pegawai Penyelidik Q29 (Naik taraf jawatan)	24/5/2018–31/12/2018
Bioteknologi Perhutanan	Nurnadiah Roslan	Penolong Pegawai Penyelidik Q29	24/5/2018–31/12/2018
FRIM PCS	Noor Khairani Abd Latif	Penolong Pegawai Teknologi Maklumat FA29	1/6/2018–31/12/2018
Bioteknologi Perhutanan	Muhammad Fauzi Hassan	Pembantu Awam H11	1/6/2018–31/12/2018
FRIM PCS	Fakhrul Islam Abd Wahab	Pereka B41	4/6/2018–31/12/2018
FRIM PCS	Aizat Marzuki Ahmad Mokhtar	Pembantu Penyelidik Q19	4/6/2018–31/12/2018
FRIM PCS	Mohamad Nazrin Nordin	Penolong Pegawai Tadbir N29	5/6/2018–31/12/2018

Bahagian **Division**	**Nama** **Name**	**Jawatan/Gred** **Post/Grade**	**Tarikh Lantikan** **Date of Appointment**
FRIM PCS	Mohd Faisal Iskandar Sukhairi	Pembantu Penyelidik Q19	5/6/2018–31/12/2018
FRIM PCS	Syed Afif Syed Osthman	Pembantu Penyelidik Q19	8/6/2018–31/12/2018
FRIM PCS	Nurfaizatul Ashikin Mokhtar	Pegawai Tadbir N41	25/6/2018–31/12/2018
FRIM PCS	Nurfarahin Mohd Sani	Pegawai Ehwal Ekonomi E41	25/6/2018–31/12/2018
FRIM PCS	Norlela Tajuddin	Pembantu Penyelidik Q19	26/6/2018–31/12/2018
Keluaran Hutan	Dr Mohd Fahmi Awalludin	Pegawai Penyelidik Q41	2/7/2018–31/12/2018
FRIM PCS	Elia Suhaily Md Yacob	Pegawai Tadbir N41	2/7/2018–31/12/2018
FRIM PCS	Nur Liyana Izzati Rohaffin	Pegawai Penyelidik Q41	2/7/2018–31/12/2018
Taman Botani Kepong	Syazwani Azeman	Pegawai Penyelidik Q41 (Lantikan semula)	2/7/2018–31/12/2018
Taman Botani Kepong	Norzielawati Salleh	Pegawai Penyelidik Q41 (Lantikan semula)	2/7/2018–31/12/2018
Hasilan Semula Jadi	Muhammad Haffiz Jauri	Pegawai Penyelidik Q41 (Lantikan semula)	2/7/2018–31/12/2018
FRIM PCS	Muhammad Wafiq Mohd Noor	Pembantu Penyelidik Q19	2/7/2018–31/12/2018
FRIM PCS	Muhammad Syafiq Abd. Muhaimin	Pembantu Penyelidik Q19	2/7/2018–31/12/2018
Perhutanan dan Alam Sekitar	Fatin Amalina Halim	Penolong Pegawai Penyelidik Q29	17/7/2018–31/12/2018
Biodiversiti Hutan	Muhammad Khairul Anwar Ismail	Pegawai Penyelidik Q41	18/7/2018–31/12/2018
Bioteknologi Perhutanan	Sakinah Riduan	Pembantu Penyelidik Q19	1/8/2018–31/12/2018
Pentadbiran	Ardey Othman	Pemandu Kenderaan H11	27/8/2018–31/12/2018
FRIM PCS	Mohamad Nazri Ngadinin	Penolong Akauntan W29	18/9/2018–31/12/2018
Perhutanan dan Alam Sekitar	Mohd Syamin Aizat Mohamed Yusof	Pembantu Penyelidik Q19	15/10/2018–31/12/2018
Bioteknologi Perhutanan	Hazwani Humaira Zakaria	Pembantu Penyelidik Q19	15/10/2018–31/12/2018

Bahagian Division	Nama Name	Jawatan/Gred Post/Grade	Tarikh Lantikan Date of Appointment
Biodiversiti Hutan	Norleyana Azman	Pembantu Penyelidik Q19	15/10/2018–31/12/2018
Biodiversiti Hutan	Mohamad Hazmi Abdullah Zabir	Pembantu Awam H11	15/10/2018–31/12/2018
Biodiversiti Hutan	Muhammad Na'im Mohd Kharudin	Pembantu Awam H11	15/10/2018–31/12/2018
Perkhidmatan Teknikal	Noor Izzuana Solihin	Pembantu Tadbir (P/O) N19	1/11/2018–31/12/2018

Kenaikan Pangkat/Promotions

Nama Name	Jawatan dan Gred Post and Grade	Tarikh Date
Liza Ismail	Pegawai Penyelidik Q52	1/1/2018
Rozaida Latip	Penolong Pegawai Penyelidik Q36	1/1/2018
Norli Raja Mohamad	Penolong Akauntan W36	1/1/2018
Abdul Wahid Abd. Aziz	Pembantu Hal-Ehwal Agama Islam S26	1/1/2018
Zaliha Che Muda	Pembantu Akauntan W26	1/1/2018
Wan Zahari Wan Yaacob	Pembantu Kemahiran H26	1/1/2018
Salen Ismail	Pembantu Kemahiran H26	1/1/2018
Suffian Hamsan	Pembantu Kemahiran H26	1/1/2018
Omarali Abdul Rahim	Pen. Peg. Teknologi Maklumat FA32	5/3/2018
Mohd Faizal Kamaruddin	Pembantu Penyelidik Q22	5/3/2018
Fakhrul Effendi Othman	Pembantu Penyelidik Q22	5/3/2018
Nurhajarul Hasni Md. Ismail	Pembantu Tadbir (P/O) N22	5/3/2018
Madzlan Zainuddin	Pembantu Penyelidik Q22	5/3/2018
Adi Purba Fadzilah	Pekerja Awam R4	5/3/2018
Hamidi Abu Bakar	Pekerja Awam R4	5/3/2018
Mohd Shahrul Amin Mat Shaharuddin	Pekerja Awam R4	5/3/2018
Nazima Ayub	Pegawai Khidmat Pelanggan N22	1/7/2018
Ervina Abdullah	Pegawai Khidmat Pelanggan N22	1/7/2018

Nama **Name**	**Jawatan dan Gred** **Post and Grade**	**Tarikh** **Date**
Norhusaini Abdullah	Penolong Jurutera Elektrik J36	2/7/2018
Mohd Hasan Buang	Penolong Pegawai Penyelidik Q32	1/8/2018
Muhammad Asri Lias	Penolong Pegawai Penyelidik Q32	1/8/2018
Abdul Halim Talha	Pembantu Penyelidik Q26	1/8/2018
Azman Mohamed	Pembantu Penyelidik Q22	1/8/2018
Nafaruding Che Man	Pembantu Penyelidik Q22	1/8/2018
Roshafiza Mohamad	Pembantu Penyelidik Q22	1/8/2018

Nama **Name**	**Jawatan Pemangkuan/Gred** **Acting Post/Grade**	**Tarikh** **Date**
Dr Khali Aziz Hamzah	Pegawai Penyelidik Gred Utama B (VU6)	1/1/2018
Dr Samsudin Musa	Pegawai Penyelidik Gred Utama B (VU6)	10/11/2018
Dr Nor Azah Mohamad Ali	Pegawai Penyelidik Gred Utama C (VU7)	1/1/2018
Dr Ismail Parlan	Pegawai Penyelidik Gred Utama C (VU7)	10/11/2018
Dr Marryanna Lion	Pegawai Penyelidik Q52	26/3/2018
Dr Ong Chee Beng	Pegawai Penyelidik Q52	30/5/2018
Dr Shahlinney Lipeh	Pegawai Penyelidik Q48	1/10/2018
Ilyani Mazlan	Juruaudit W48	1/4/2018
Dr Chan Yoke Mui	Pegawai Penyelidik Q44	27/9/2018
Toh An Nee	Pegawai Tadbir N44	1/1/2018
Sharifudden Samin	Jurutera J44	1/4/2018

Peletakan Jawatan/Resignation

Nama/Name	Jawatan/Gred/Post/Grade	Tarikh/Date
Muhamad Izham Muhamad Jamil	Pegawai Penyelidik Q41 (K)	5/1/2018
Shamira Aida Sahimi	Pembantu Tadbir (Kew) W19 (K)	25/3/2018
Azizi Abd Jalil	Pen. Peg. Penyelidik Q32	13/4/2018
Noor Neknazrul Husain	Pembantu Penyelidik Q19 (K)	14/4/2018
Nurfasehah Zulkufli	Pembantu Tadbir (P/O) N19 (K)	26/4/2018
Mohamad Izham Mohd Ariffin	Pembantu Penyelidik Q19(K)	28/4/2018
Nor Izyantie Shahrul Anuar	Pembantu Awam H11(K)	30/4/2018
Muhammad Haffiz Jauri	Pegawai Penyelidik Q41(K)	1/5/2018
Mohd Izwan Ismail	Pegawai Tadbir N48(K)	1/5/2018
Norleyana Azman	Pembantu Penyelidik Q19(K)	11/5/2018
Muhammad Safuan Sulaiman	Penolong Pegawai Penyelidik Q29(K)	1/6/2018
Kamariah Mihad	Pegawai Penyelidik Sosial N41(K)	30/6/2018
Mohamad Iyad Amir Hamirudin	Pembantu Penyelidik Q19(K)	30/6/2018
Nur Adilla Rosidi	Pegawai Penyelidik Q41(K)	1/8/2018
Kavhn Surendran	Jurutera J41	1/8/2018
Dr Serafina Dawn Flecther	Pegawai Penyelidik Gred 52	27/8/2018
Norhidayah Rasid	Penolong Pegawai Penyelidik Q29	1/9/2018
Fazlina Mohd Nor	Pembantu Penyelidik Q19	1/10/2018
Saiful Azhari Zainal Abidin	Pembantu Penyelidik Q19	8/10/2018
Nur Eliana Mohd Asfi	Pembantu Tadbir (P/O) N19	1/11/2018
Muhammad Ilham Ab Rahman	Pembantu Penyelidik Q19	8/11/2018
Mohamad Hanif Che Othman	Pembantu Penyelidik Q19	1/11/2018
Suhazreen Mohd Hassan	Pembantu Penyelidik Q19	1/11/2018
Muhammad Mustaza Hakimi Norzilan	Pembantu Penyelidik Q19	1/11/2018
Nurhayati Mohd Esa	Pembantu Awam H11	1/11/2018
Mohammad Saiful Nizam Mohamed Roslan	Pembantu Awam H11	1/11/2018

Nota/Note: K—Kontrak/Contract

Pelantikan Secara Pinjaman/Appointment by Secondment

Nama Name	Jawatan dipinjamkan dan Gred Secondment Post and Grade	Tarikh Date
1 Dr Gary William Theseira	Pegawai Tugas-Tugas Khas (PTTK) Gred 54 (Terbuka)	16/8/2018–15/8/2021
2 Mohd Shahidan Mohamad Arshad	Ketua Pegawai Eksekutif (CEO)	1/9/2017–31/8/2020
3 Dr Mohd Noor Mahat	Pengurus Projek	1/9/2017 – 31/8/2020
4 Abdul Jabbar Sabli	Pengurus Pentadbiran dan Operasi	1/9/2017 – 31/8/2020
5 Norhayati Nordin	Pengarah Bahagian Komersialisasi dan Inovasi Gred Utama 'C' (Terbuka)	4/10/2017 – 30/9/2019

Persaraan/Retirement

Persaraan/Retirement	Tarikh/Date
Wajib/Mandatory:	
Markandan a/l Moorthy	2/1/2018
Abd. Rahim Ahmad	29/1/2018
Abd. Razak Othman	1/2/2018
Datin Salamah Selamat	7/4/2018
Abdul Rahim Razali	11/4/2018
Rosman Ibrahim	13/6/2018
Narayanan a/l Alimuthu	8/7/2018
Dr Ismail Harun	5/9/2018
Dr Woon Weng Chuen	1/11/2018
Rozita Ibrahim	3/12/2018
Dr Nur Supardi Md. Noor	5/12/2018
Dr Mohd Tarmizi Mustafa	20/12/2018
Pilihan/Optional:	
Yang Nazli Yahya	1/2/2018
Zakiah Mohamed	4/7/2018
Mastura Buang	31/12/2018

Meninggal Dunia/Deceased

Nama/Name (Allahyarham/The late)	Tarikh Date
Ramlee Kamarudin	15/6/2018
Noorsuhanis Abdul Latif	21/10/2018

Latihan Akademik/Academic Training

Bil. No.	Nama Name	Bahagian Division	Universiti University
1	Dr Marryana Lion	Perhutanan dan Alam Sekitar	PhD/Kyoto University, Japan
2	Dr Ong Chee Beng	Keluaran Hutan	PhD/University of Bath, UK
3	Dr Farah Shahanim Mohamed Mohidin	Perhutanan dan Alam Sekitar	PhD/Universiti Malaya
4	Dr Shahlinney Lipeh	Keluaran Hutan	PhD/ Oregon State University, USA
5	Dr Phon Chooi Khim	Biodiversiti Hutan	PhD/Universiti Malaya
6	Dr Rafidah Abd Jalil	Keluaran Hutan	PhD /UKM
7	Dr Chan Yoke Mui	Biodiversiti Hutan	PhD/ Universiti Malaya
8	Suhaida Binti Mustafa	Biodiversiti Hutan	MSc/ Universiti Malaya
9	Mohd Rizuwan Mamat	Perhutanan dan Alam Sekitar	MSc/Universiti Teknologi MARA
10	Nazirah Abdullah	Bioteknologi Perhutanan	MSc/Universiti Kebangsaan Malaysia
11	Syafiqah Nabilah Samsul Bahari	Bioteknologi Perhutanan	MSc/Universiti Teknologi MARA
12	Norhayati Saffie	Bioteknologi Perhutanan	MSc/Universiti Teknologi MARA
13	Norfadilah Wook	Bioteknologi Perhutanan	MSc/Universiti Teknologi MARA

Hari Anugerah
Award Day

Institut Penyelidikan Perhutanan Malaysia (FRIM) meraikan ulang tahun ke-10 pelantikan Dato' Dr Abd Latif Mohmod sebagai Ketua Pengarah dan melafazkan Ikrar Bebas Rasuah (IBR) di Majlis Hari Anugerah di Dewan Alwy, pada 27 April 2018.

Forest Research Insitute Malaysia (FRIM) celebrated the 10th year anniversary of Dato' Dr Abd Latif Mohmod's appointment as the Director General (DG) and took the Corruption-Free Pledge (IBR) at the FRIM Awards Day ceremony on 27 April 2018.

Abd Latif (kedua dari kanan) menunjukkan Anugerah Khas Ikon FRIM sambil diperhatikan oleh (dari kiri) Basir Malan Ab Rahman, Pengarah Sumber Manusia; Ismail; Azizan dan Khali Aziz
Abd Latif (second from right) showing his Special FRIM Icon Award while (from left) Human Resource Director Basir Malan Ab. Rahman, Ismail, Azizan and Khali Aziz look on

Majlis perasmian disempurnakan oleh Dato' Sri Azizan Ahmad, Ketua Setiausaha Kementerian Sumber Asli dan Alam Sekitar (NRE) yang juga merupakan Pengerusi FRIM dan FRIM Inc. Dato' Sri Azizan turut melancarkan buku terbitan FRIM yang berjudul, *Pelestarian Rizab Biosfera Tasik Chini* yang disunting oleh beliau bersama-sama Dato' Dr Abd Latif Mohmod, Dr Siti Aisah Shamsuddin dan Dr Wan Mohd Shukri Wan Ahmad.

The event, held at Dewan Alwy in FRIM, Kepong, was officiated by the Ministry of Natural Resources and Environment (NRE) Secretary General, Dato' Sri Azizan Ahmad, who is also the Chairman of both the Institute and FRIM Inc. Dato' Sri Azizan also launched the book entitled, "*Pelestarian Rizab Biosfera Tasik Chini*" which was co-edited by him, Dato' Dr Abd Latif Mohmod, Dr Siti Aisah Shamsuddin and Dr Wan Mohd Shukri Wan Ahmad.

Ketua Pengarah memimpin penjawat awam FRIM melafazkan Ikrar Bebas Rasuah serta menandatangani Ikrar Bebas Rasuah bersama-sama Timbalan Ketua Pengarah (Penyelidikan), Dr Ismail Harun; Timbalan Ketua Pengarah (Operasi), Dr Khali Aziz Hamzah; dan Pengurus Pentadbiran dan Operasi FRIM Inc., Abdul Jabbar Sabli. Acara ini disaksikan oleh Dato' Shamshun Baharin Mohd Jamil, Timbalan Ketua Pesuruhjaya (Pencegahan), Suruhanjaya Pencegahan Rasuah Malaysia (SPRM)

Dato'Dr Abd. Latif led FRIM staff in taking the IBR pledge and in signing the pledge along with Dr Ismail Harun, Deputy DG (Research); Dr Khali Aziz Hamzah, Deputy DG (Operations) and Abdul Jabbar Sabli, FRIM Inc. Administration and Operation Manager. The signing ceremony was witnessed by Dato' Shamshun Baharin Mohd Jamil, Deputy Chief Commissioner (Prevention) of the Malaysian Anti-Corruption Commission (MACC).

Seramai 109 orang kakitangan telah menerima pengiktirafan FRIM atas pencapaian cemerlang bagi tahun 2017. Acara kemuncak ialah penyampaian Anugerah Khas Ikon FRIM kepada Abd Latif.

A total of 109 staff were rewarded for their excellent performance and achievements in 2017. The highlight of the event was the presentation of the Special FRIM Icon Award to Abd Latif.

Azizan menandatangani buku baharu yang dilancarkan
Azizan signing on the newly launched book

Sempena majlis ini, turut diadakan Perhimpunan Bulanan dan Majlis Jasamu Dikenang yang meraikan pesara dan bakal pesara FRIM sebagai penghargaan atas segala jasa dan khidmat bakti mereka. Mereka yang diraikan ialah Datin Salamah Selamat, Abd Razak Othman, Yang Nazli Yahya, Abdul Rahim Razali, Rosman Ibrahim dan Narayanan Alimuthu.

The Monthly Asssembly and 'Jasamu Dikenang' Ceremony were also held in conjunction with this event to honour retirees as well as those about to retire for their service and contributions. They included Datin Salamah Selamat, Abd Razak Othman, Yang Nazli Yahya, Abdul Rahim Razali, Rosman Ibrahim and Narayanan Alimuthu.

Staf FRIM dan wakil-wakil SPRM menunjukkan isyarat Gerakan Revolusi Anti Rasuah
FRIM staff and MACC representatives posing for a picture showing the anti-corruption revolution movement sign

Para pesara dan bakal pesara FRIM bersama-sama dengan dif-dif kehormat
Retirees and those about to retire with the VIPs

Senarai Penerima Anugerah:
List of Award Recipients:

A. **Anugerah Khas Institut/Special Institute Award:** Tiada penerima/No recipient

B. **Anugerah Ketua Pengarah/Director General's Award:** Dr Ismail Harun

C. **Anugerah Saintis Terbaik/Best Scientist Award:** Dr Lee Soon Leong

D. **Anugerah Penyelidikan Terbaik/Best Research Award:** *Anti-obesity investigation on the standardised extract from the calyx of Hibiscus sabdariffa (Roselle): in vitro and in vivo Study*

Ahli Kumpulan: Dr Mohd Kamal Nik Hasan (Ketua), Dr Rasadah Mat Ali, Abd. Rashid Li, Nurnadiah Rahim, Norsuhaina Zakaria, Dr Ling Sui Kiong, Dr Zunoliza Abdullah, Ihsan Safwan Kamarazaman, Mohammad Khair Mohd Ayob, Mohd Radzi Ahmad, Nurul Hafizatul Syafiqah Mamat Azlan & Siti Kamariah Mohamed Hussan

Dari kiri/From left: Dr Ismail, Dr Lee Soon Leong & Dr Mohd Kamal

E. Anugerah Pekerja Terbaik Tahunan

Kumpulan Pengurusan dan Profesional: Maizura Ishak & Dr Farah Fazwa Mohd. Ariff

Kumpulan Pelaksana I: Nordaiman Shairi

Kumpulan Pelaksana II: Mohamad Aidil Noordin

Dari kiri, atas/From left, top: Dr Farah Fazwa, Maizura
Bawah/bottom: Nordaiman & Mohamad Aidil

F. Anugerah Perkhidmatan Cemerlang (APC) – Individu

Dr Ismail Harun, Basir Malan Ab. Rahman, Dr Ismail Parlan, Hashim Wan Samsi, Wan Zahiri Hj.Wan Yaacob, Abd. Razak Othman, Dr Mastura Mohtar, Liza Ismail, Zamree Md Shah, Nik Zanariah Nik Mahmood, Sarifah Kunju Ahmad, Dr Nurhanan Murni Yunos, Dr Ho Wai Mun, Dr Zunoliza Abdullah, Nurul Hilal Ahmad Tarmidzi, Zamri Mohd. Zangi, Suhana Rafidah Md.Yusof, Syahida Emiza Suhaimi, Ong Su Ping, Intan Dalina Rafidah Othman, Sahrim Lias, Muhammad Izham Muhammad Jamil, Norazian Mohd Kasby, Ruziah Ripin, Norbaiti Saharuddin, Sadali Sahat, Sarina Hussin, Mashilah Mior Ismail, Zawiah Ngah, Nor Fazhani Hashim, Jesmini Mat Ali, Othman Mohd. Desa, Jalali Hj. Salleh, Salen Ismail, A. Roslee Radzali, Ismail Mansor, Nor Ashikin Mohd Zabri, Rohayu Yunus, Azlina Azit, Markandan Moorthy, Suzanaakma Mansor, Norashikin Md Yusof, Rosnaidah Ibrahim, Naemah Hashim, Ellamah Perumal, Shahar Wagio, Mohd Khairul Abd Rahim, Mohd. Kamarudin Jalil, Latifamir Ibrahim & Mohd. Ali Awang

Nota: APC Individu telah menerima anugerah masing-masing pada 8 Mac 2018 sempena Majlis APC NRE di MAEPS, Serdang.
Note: Individual APC were awarded to the respective recipients on 8 March 2018 during the NRE APC Day at the MAEPS, Serdang.

Dari kiri/From left: Nik Zanariah, Sarifah, Dr Mastura, Abd. Razak, Dr Ismail P, Wan Zahiri, Dr Ismail H, Basir Malan, Hashim, Dr Nurhanan Murni, Liza & Dr Ho Wai Mun

Dari kiri/From left: Ruziah, Dr Zunoliza, Ong Su Ping, Intan Dalina, Sadali, Zamri, Nurul Hilal, Sahrim, Muhammad Izham, Syahida Emiza, Suhana, Norbaiti & Norazian

Dari kiri/From left: Rosnaidah, Ellamah, Suzanaakma, Naemah, Norashikin, Mohd Khairul, A. Roslee, Mohd. Ali, Latifamir, Mohd. Kamarudin & Shahar

Dari kiri/From left: Nor Ashikin, Zawiah, Sarina, Nor Fazhani, Rohayu, Azlina, Salen, Markandan, Ismail, Othman, Jalali, Jesmini & Mashilah

G. Anugerah Perkhidmatan Cemerlang (APC) - Kumpulan

Makmal Kawalan Kualiti Hasilan Semula Jadi
Ahli Kumpulan: Ong Boo Kean (Ketua), Dr Nor Hayati Abdullah, Norulaiman Yusoff, Nurhazwani Mohd Hirmizi & Amira Rina Nurdiana Mohd Sabarudin

Cawangan Latihan
Ahli Kumpulan: Zamri Mohd Zangi (Ketua), Ruziah Ripin, Muhammad Fadzlan Husain, Che Rohani Che Wil, Norashikin Kamarudin, Siti Salihah Abd.Karim & Mohd. Helmi Haidhir

CSR Kampung Sagil
Ahli Kumpulan: Dr Farah Fazwa Md Ariff (Ketua), Syafiqah Nabilah Samsul Bahari, Norhayati Saffie, Dato' Dr Marzalina Mansor, Samsuri Toh Harun, Mohd Zaini Zainol, Maria Arlene Jackan Siba, Norhayati Nordin, Rozita Ibrahim, Mohd Afendi Hussin & Edi Hermi Ramli



Dari kiri/From left: Ong dan kumpulan, staf Cawangan Latihan & Kumpulan CSR Kampung Sagil

H. Anugerah Khidmat Masyarakat/Community Service Award:

Rozita Ibrahim & Mohd.Yatim Abdul Aziz

Dari kiri/From left: Rozita & Mohd. Yatim

I. **Anugerah Khidmat Setia:** Dr Norwati Muhammad, Nor Asmah Safian, Dr Raja Barizan Raja Sulaiman, Paiman Nasron, Dr Elizabeth Philip, Narayanan Alimuthu, Norsiha Ayop, Hashim Wan Samsi, Samsul Musa, Suhaimi Mohd Eskak @ Khairi, Nik Zanariah Nik Mahmood, Zawawi Kassim, Ahmad Sariani Salimat, Mohd. Ariffin Harun, Hamzah Mamat, Norihan Mohd Salih, Hamidi Abas, Mohd Zaini Adam, Vasuthevan Narayana, Yahaya Hamid, Mahat Mohd Judin & Wan Adenan Wan Ishak

Dari kiri/From left: Dr Norwati, Dr Raja Barizan, Hashim & Nik Zanariah

Dari kiri/From left: Zawawi, Norihan, Hamidi & Mohd Zaini

Dari kiri/From left: Mahat, Wan Adenan, Nor Asmah & Paiman

Dari kiri/From left: Suhaimi, Ahmad Sariani, Mohd. Ariffin, Vasuthevan & Yahaya

J. Anugerah Penerbitan/Publication Award

Kategori/Category A: Penerbitan Teknikal/Technical Publications

***Pertama/First*:** Hamdan Omar, Muhamad Afizzul Misman & Abd Rahman Kassim
Synergetic of PALSAR-2 and Sentinel-1A SAR Polarimetry for Retrieving Aboveground Biomass in Dipterocarp Forest of Malaysia. Applied Sciences 7(7): 675. doi: 10.3390/app7070675

***Kedua/Second*:** Ng Chin Hong, Lee Soon Leong, Tnah Lee Hong, Kevin Ng Kit Siong, Lee Chai Ting, Diway Bibian & Khoo Eyen
Geographic Origin and Individual Assignment of Shorea platyclados (Dipterocarpaceae) for Forensic Identification. PLoS ONE 12(4): e0176158.

***Ketiga/Third*:** Richard Chung Cheng Kong & Soepadmo E
Brownlowia latifiana (Malvaceae-Brownlowioideae), a New Species from Terengganu, Peninsular Malaysia. Phytotaxa 298(2): 134–146

Dari kiri/From left: Dr Hamdan, Dr Ng Chin Hong & Dr Richard

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

***Pertama/First*:** Siti Aisah Shamsuddin, Wan Mohd Shukri Wan Ahmad, Zulkifli Yusop & Noguchi Shoji
Forest Management and Water in Malaysia. Pp. 105–127 in Pablo A (ed.) Forest management and the impact on water resources: a review of 13 Countries. UNESCO, Montevideo

***Kedua/Second*:** Lim Seng Choon, Gan Kee Seng & Nordahlia Abdullah Siam
Pocket Information on Malaysian Timbers. Timber Technology Bulletin No 75, FRIM, Kepong

***Ketiga/Third*:** Roszaini Kadir
Termites in Timber Buildings. FRIM Technical Information No 77. FRIM, Kepong

Dari kiri/From left: Dr Siti Aisah, Lim Seng Choon & Dr Roszaini

Kategori/Category C: Buku/Book

Khazanah Perubatan Melayu Tumbuhan Ubatan Jilid 1 & 2
Nik Musa'adah Mustapha *et al*.
Editor**:** Nik Musa'adah Mustapha, Nik Zanariah Nik Mahmood, Nor Azah Mohamad Ali & Norini Haron

Dari kiri/From left: Md Azharulzaman, Madihah, Dr Nor Azah, Dr Nik Musa'adah, Dr Fadzureena, Tan Ai Lee & Abdul Hayat

Kategori/Category D: Buku Panduan/Handbook

Identification of Malaysian Timber Using Dichotomous Key
Lim Seng Choon, Gan Kee Seng & Nordahlia Abdullah Siam
Editor**:** Mohamad Zaki Mohd Isa

Kategori E/Category E: Buku Mesra Ilmu/Knowledge-Friendly Book

Ikonik NRE
Abd. Latif Mohmod, Mohd Tamizi Mustafa, Hamdan Husain, Mohd Afendi Hussin, Mohd Izani Ishak, Othman Mohd Desa, Abdul Rahim Ahmad & Mohd Yatim Abd Aziz
Editor: Nik Zanariah Nik Mahmood

Dari kiri/From left: Lim Seng Choon, Dr Mohd Tamizi, Mohamad Zaki & Nik Zanariah

Kategori/Category: Tesis/Thesis

Tesis Sarjana Sains/MSc thesis
Noraliza Alias: *Kaedah Penyimpanan dan Pemprofilan Protein Embrio Biji Benih Swietenia macrophylla* (Universiti Kebangsaan Malaysia, Bangi)

Tesis Doktor Falsafah/PhD thesis
Dr Siti Suhaila A. Rahman: *Enhancement of Key Chemical Constituents in Aquilaria malaccensis Lamarck (Karas) through In Vitro Polyploidisation* (Universiti Putra Malaysia, Serdang)


Dari kiri/From left: Dr Siti Suhaila & Noraliza

L. Insentif Artikel yang diterbitkan dalam Jurnal Berfaktor Impak/Incentive for article published in Journal with Impact Factor

Kategori/Category: Individu/Individual

Bil. No.	Pemenang Winner	Faktor Impak Impact Factor
1	Dr Sharmiza Adnan	4.811
2	Dr Latifah Jasmani	4.811
3	Dr Maryyanna Lion	3.950
4	Dr Roszaini Kadir	2.968
5	Dr Ng Chin Hong	2.806
6	Dr Lee Soon Leong	2.806
7	Phon Chooi Khim	2.806
8	Dr Saiful Azmi Johari	2.476
9	Dr Mastura Mohtar	2.476
10	Khairul Masseat	2.334
11	Dr Hamdan Omar	1.679
12	Muhamad Afizzul Misman	1.679
13	Nurnadiah Rahim	1.430
14	Abd Rashid Li	1.430
15	Dr Richard Chung Cheng Kong	1.240
16	Avelinah Julius	1.240
17	Siti Munirah Mat Yunoh	1.116
18	Imin Kamin	1.116

Dari kiri/From left: Dr Sharmiza, Dr Latifah, Dr Maryyanna & Dr Roszaini

Dari kiri/From left: Dr Ng, Dr Lee, Phon & Dr Saiful Azmi

Dari kiri/From left: Dr Mastura, Dr Hamdan & Abd Rashid

Dari kiri/From left: Dr Richard, Siti Munirah & Imin

KATEGORI: BAHAGIAN

Penerima/Faktor Impak Kumulatif/Recipients/Acummulative Impact

Pertama/First: Perhutanan dan Alam Sekitar/52.580

Kedua/Second: Bioteknologi Perhutanan/12.649

Ketiga/Third: Hasilan Semula Jadi/10.622

Dari kiri/From left: Dr Samsudin, Dato' Dr Marzalina & Dr Nor Azah

Penghargaan Khas Penerbitan/Special Appreciation for Publication Award:

Jacob Usinowicz *et al*.
Temporal Coexistence Mechanisms Contribute to the Latitudinal Gradient in Forest Diversity
Nature 550. doi:10.1038/nature24038

M. Sagu Hati Artikel yang Diterbitkan dalam *Journal of Tropical Forest Science*/Consolation Award for Article Published in the *Journal of Tropical Forest Science*

Mohd Jamil AW & Khairul M.
Variations of Mechanical Properties in Plantation Timbers of Jelutong (Dyera costulata) and Khaya (Khaya ivorensis) along the Radial and Vertical Positions. Journal of Tropical Forest Science 29(1): 114–120.

Nurhanan MY, Nor Azah MA, Zunoliza A, Siti Humeriah AG, Siti Syarifah MM & Nor Hayati A
In Vitro Anticancer Activity and High-Performance Liquid Chromatography Profiles of Aquilaria subintegra Fruit and Seed Extracts. Journal of Tropical Forest Science 29(2): 208–214.

Marryanna L, Kosugi Y, Itoh M, Noguchi S, Takanashi S, Katsuyama M, Tani M & Siti-Aisah S
Temporal Variation in the Stable Isotopes in Precipitation Related to the Rainfall Pattern in a Tropical Rainforest in Peninsular Malaysia. Journal of Tropical Forest Science 29(3): 349–363.

Wan Shafrina WMJ, Woodhouse IH, Silva CA, Hamdan O & Hudak AT
Modelling Individual Tree Aboveground Biomass Using Discrete Return LIDAR in Lowland Dipterocarp Forest of Malaysia. Journal of Tropical Forest Science 29(4): 465–484.

Dari kiri/From left: Mohd Jamil, Dr Nurhanan, Dr Marryanna & Dr Hamdan

N. Insentif Penulisan Buku/Incentive for Writing of Book

1. ***Ikonik NRE***
   Pengarang: Abd. Latif M, Mohd Tamizi M, Hamdan H, Khairul A, Mohd Afendi H, Mohd Izani I, Othman MD, Rahim A & Mohd Yatim Aziz
   Editor: Nik Zanariah Nik Mahmood

2. ***Koleksi Pokok Taman Botani Kepong***
   Pengarang: Adnan M, Ahmad Firdaus Z, Muhammad Ammar H & Markandan M
   Editor: Mohamad Zaki Mohd Isa

3. ***Legasi Waris Rimba***
   Pengarang: Mastura M, Norini H, Madihah MN, Intan Nurulhani B, Chee BJ, Tan AL, Badariah M, Amizan N & Abd. Latif
   Editor: Mastura M & Norini H

4. ***Pelestarian Rizab Biosfera Tasik Chini: Penyelidikan FRIM***
   Pengarang: Wan Mohd Shukri WA, Mohd Azahari F, Mohd Ghazali H, Ismail P, Rashidah H, Abdul Razak O, Amir Saaifuddin K, Adnan M, Ahmad Firdaus Z, Mohd Hasan B, Raja Barizan RS, Farah Shahanim MM, Mohd Parid M,Norliyana A, Mukrimah A, Faten Naseha TH, Siti Aisah S, Chew MY & Mohd Rizuwan M
   Editor: Azizan A, Abd. Latif M, Siti Aisah S & Wan Mohd Shukri WA
   Pereka bentuk: Rashidah Hasnim@Hashim

5. ***Pictorial Guide to the Flora of Tasik Chini***
   Pengarang: Chew MY, Abdul Rahman K, Ummul Nazrah AR, Ahmad Firdaus Z, Sarah Nabila R, Abu Husin H & Afiqah Nursafarini AS
   Editor: Wan Junaidi TJ, Abd. Latif M, Chew MY & Azimuddin B
   Pereka bentuk: Mohd Yusof Mohamed

6. ***FRIM News & Events: A Compilation of Website Reports 2009–2016***
   Pengarang: Toh AN, Norhayati N & Lim CL
   Editor: Abd. Latif M & Praveena B

Dari kiri/From left: Mohd Tamizi, Mohamad Zaki, Dr Mastura & Chew

Dari kiri/From left: Rashidah & Mohd Yusof (pereka bentuk/designers)

Dari kiri/From left: Toh, Norhayati, Abd. Latif, Lee & Praveena

O. Anugerah Kecemerlangan Sukan/Sports Excellent Award

Pasukan Terbaik/Best Team: Bola Tampar Wanita/Women Volleyball
Patahayah Mansor (Pengurus), Dato' Dr Marzalina Mansor, Dr Wan Rasidah A. Kadir, Dr Asiah Osman, Rosmaniza Umar, Dr Serafina Christine Fletcher, Lili Sahira Husin, Abriza Mad Zin, Zaiton Mohamad, Nurul Ain Abdul Manaf, Maimunah Tompang, Nur Zati Akma Mustafa & Norizan Mohd Ariffim

Pengurus Pasukan Terbaik/Best Team Manager: Patahayah Mansor
Olahragawan/Best Athlete (Man): Firmansyah Julius Sapri
Olahragawati/Best Athlete (Woman): Saizatul Maheran Ramle
Anugerah Kepimpinan Sukan/Sports Leadership Award: Dr Ismail Harun & En. Mohd Zamshari Hj. Abd Rahman

Dari kiri/From left: Pasukan bola tampar wanita: Dr Asiah, Nur Zati Akma, Zaiton, Lili Sahira, Dato' Dr Marzalina, Patahayah, Maheran, Abriza & Rosmaniza

Dari kiri/From left: Patahayah, Firmansyah & Saizatul Maheran

Aktiviti/Majlis/Lawatan
Activity/Event/Visit

Aktiviti/Majlis/Lawatan
Activity/Event/Visit

1. Inventori Tumbuhan di Hutan Simpan Bukit Nanas

Institut Penyelidikan Perhutanan Malaysia (FRIM) dan Dewan Bandaraya Kuala Lumpur (DBKL) telah membuat inventori tumbuhan bagi Hutan Simpan Bukit Nanas serta menerbitkan hasil penemuan berkenaan di jurnal saintifik.

1. Plant Inventory for Bukit Nanas Forest Reserve

Forest Research Institute Malaysia (FRIM) and Kuala Lumpur City Hall (DBKL) have done the plant inventory for Bukit Nanas Forest Reserve in Kuala Lumpur and the research findings were published in a scientific journal recently.

Ahli-ahli botani menjalankan kerja inventori flora
Botanists conducting flora inventory

Kawasan hijau yang signifikan ini merupakan satu-satunya hutan simpan di ibu negara. Pada 2015–2016, pasukan botani FRIM telah menjalankan lawatan bulanan ke hutan tersebut untuk mencatat kekayaan tumbuhan.

Kajian sepanjang tahun ini merekodkan 425 spesies dalam hutan yang bersaiz 9.37 ha; antara yang menarik ialah 16 spesies yang endemik di Semenanjung Malaysia termasuk *Tarenna rudis* daripada famili kopi (Rubiaceae) yang hanya terdapat di Selangor. Spesies ini telah dijumpai 88 tahun dahulu.

The forest reserve is the only remaining green lung in the country's capital city. From 2015 to 2016, FRIM botanical team conducted monthly visits to the area to record the flora biodiversity.

The year-long survey found a total of 425 species within the 9.37 ha forest, including 16 species endemic to Peninsular Malaysia. One of the species was the rare *Tarenna rudis* of the coffee family (Rubiaceae), only found in Selangor. This species was last recorded 88 years ago.

Memandangkan hutan tersebut tidak pernah ditebang, ia masih mengekalkan struktur lazim hutan dipterokarpa tanah pamah yang mempunyai banyak pokok besar dan tua, termasuk 16 spesies kaum damar (Dipterocarpaceae). Spesies lain yang direkodkan termasuklah meranti batu (*Shorea dasyphylla*) yang dikategorikan sebagai 'Vulnerable' dalam Senarai Merah IUCN bagi Spesies Terancam; serta cempaka hutan (*Magnolia montana*), nipis kulit (*Memecylon campanulatum*), mersawa kesat (*Anisoptera costata*) dan sengkawang (*Shorea sumatrana*) yang tergolong sebagai Spesies Hampir Terancam. Hasil penemuan ini menunjukkan kepentingan dan kekayaan biodiversiti Hutan Simpan Bukit Nanas yang harus dipulihara dengan baik.

Since this forest has never been harvested, it retains the typical structure of a lowland dipterocarp forest with numerous huge and old trees including 16 Dipterocarpaceae species. The botanists recorded, among others, *Shorea dasyphylla* (meranti batu), categorised as Vulnerable in the IUCN Red List; as well as *Magnolia montana* (cempaka hutan), *Memecylon campanulatum* (nipis kulit), *Anisoptera costata* (mersawa kesat) and *Shorea sumatrana* (sengkawang), categorised as Near Threatened. There was only one *Shorea sumatrana* tree found there. The findings reveal the significance of this green lung and the importance of ensuring its conservation.

Tarenna rudis yang hanya terdapat di Selangor
Tarenna rudis, a species endemic to Selangor

Satu-satunya pokok sengkawang yang dijumpai di hutan simpan tersebut
The only *Shorea sumatrana* tree found in the forest reserve

2. Perasmian FRIM Incorporated

Timbalan Perdana Menteri (TPM), YB Dato' Seri Dr Ahmad Zahid Hamidi telah melancarkan secara rasmi FRIM Incorporated (FRIM Inc.) di Villa Fragrans, FRIM, Kepong pada 2 Februari 2018. Turut hadir ialah Menteri Sumber Asli dan Alam Sekitar (NRE), Datuk Seri Dr Wan Junaidi Tuanku Jaafar; Ketua Setiausaha NRE merangkap Pengerusi FRIM, Dato' Sri Azizan Ahmad, Ketua Pengarah (KP) FRIM, Dato' Dr Abd Latif Mohmod; ketua-ketua dan wakil-wakil agensi/jabatan di bawah NRE; rakan-rakan kerjasama FRIM; para pemain industri; para pemegang taruh dan wakil-wakil dari *Malaysia Book of Records* (MBR).

FRIM Inc. ditubuhkan pada 4 Ogos 2017 sebagai subsidiari FRIM bagi menterjemahkan penemuan penyelidikan dan pembangunan (R&D) termasuk perkhidmatan teknikal FRIM kepada aktiviti komersialisasi ke arah penjanaan pendapatan.

Berdasarkan slogan "Discover Unlimited Potential" FRIM Inc. akan melaksanakan aktiviti-aktiviti pemasaran dan jualan bagi hasil-hasil R&D FRIM, perkhidmatan kepakaran dan kemahiran, perkhidmatan perlindungan harta intelek, perkhidmatan teknikal dari segi pemindahan teknologi dan latihan serta komersialisasi harta intelek dalam pasaran terbuka. Syarikat telah berjaya menjalankan perniagaan bernilai kira-kira RM1 juta dari Disember 2017 hingga Januari 2018.

Pada majlis tersebut, Azizan telah mengumumkan dua spesies baharu tumbuhan batu kapur yang dinamakan sempena nama TPM dan Menteri NRE iaitu *Gymnostachyum ahmadzahidianum* dan *Impatiens feonajunaidiana*. FRIM menamakan kedua-dua spesies ini, yang dikategorikan sebagai "Critically Endangered", sebagai menghargai sokongan mereka dalam usaha-usaha perlindungan dan pemuliharaan biodiversiti, terutamanya di kawasan batu kapur. Ahli-ahli botani FRIM sedang menyediakan manuskrip berserta deskripsi dan ilustrasi kedua-dua spesies ini untuk diterbitkan dalam jurnal saintifik.

Timbalan Perdana Menteri turut merasmikan Villa Junaidiana yang menjadi pusat pentadbiran FRIM Inc. yang dinamakan sempena nama Menteri NRE sebagai pengiktirafan atas sokongan dan sumbangan beliau terhadap FRIM.

2. Launching of FRIM Incorporated

Deputy Prime Minister (DPM) Dato' Seri Dr Ahmad Zahid Hamidi had officially launched the FRIM Incorporated (FRIM Inc.) at the Villa Fragrans, FRIM in Kepong on 2 February 2018. Also present were the Natural Resources and Environment (NRE) Minister, YB Datuk Seri Dr Wan Junaidi Tuanku Jaafar; NRE Secretary General Dato' Sri Azizan Ahmad, also the FRIM Chairman; FRIM Director General (DG) Dato' Dr Abd Latif Mohmod; heads and representatives of agencies/departments under NRE; FRIM's collaborative partners; industry players; stakeholders and Malaysia Book of Records (MBR) representatives.

FRIM Inc. was established on 4 August 2017 as a FRIM's subsidiary to transform research and development (R&D) findings including FRIM's technical services into commercialisation activities for revenue generation.

Based on the "Discover Unlimited Potential" tagline, FRIM Inc. will conduct marketing and sales activities for FRIM R&D products, expertise and skills services, intellectual property (IP) protection services, technical services in the form of technology transfer and training as well as commercialisation of IP in open markets. From December 2017 to January 2018, the company has secured business worth around RM1 million.

At the same event, Azizan announced the names of two new limestone plant species named after DPM and the NRE Minister i.e. *Gymnostachyum ahmadzahidianum* and *Impatiens feonajunaidinana*. FRIM named these two species, categorised as Critically Endangered, in appreciation of their support on the protection and conservation efforts of biodiversity, especially in limestone areas. FRIM botanists are preparing the manuscripts with descriptions and illustrations of these species to be published in scientific journals.

The DPM also officiated Villa Junaidiana, which is the FRIM Inc. operations centre named after the NRE Minister in recognition of his support and contributions to FRIM.

Zahid turut menyaksikan penyerahan sijil-sijil MBR kepada FRIM. Bersempena dengan sambutan hari ulang tahun FRIM yang ke-33, FRIM telah menerima 33 pengiktirafan MBR termasuklah lima pengiktirafan yang diterima oleh KP FRIM; satu oleh kumpulan penyelidik yang diketuai oleh Dr Lee Chai Ting dan satu lagi anugerah diterima oleh kumpulan penyelidik yang diketuai oleh Dr Hamdan Husain.

Ketua Pengarah FRIM menerima MBR, antara lain, sebagai Saintis Perhutanan Pertama yang Memperoleh Anugerah Saintis Muda Negara; Saintis Perhutanan Pertama yang Menerima Dua Anugerah Sains Negara dan Saintis Perhutanan Termuda yang Menerima *IUFRO Scientific Achievement Award* iaitu semasa beliau berumur 34 tahun.

Di samping itu, TPM telah melancarkan secara rasmi *Mobile Wood Identification System* (MyWood-ID), satu aplikasi telefon pintar untuk pengecaman kayu. MyWood-ID dibangunkan oleh Ketua Makmal Anatomi Kayu FRIM, Dr Nordahlia Abdullah Siam dengan kerjasama Universiti Tunku Abdul Rahman. MyWood-ID merupakan kaedah yang cepat, tepat, murah, mesra pengguna dan mampu mengenal pasti 100 jenis kayu tempatan.

Zahid also witnessed the presentation of MBR certificates to FRIM. In conjunction with the 33rd anniversary this year, FRIM has received 33 MBR recognitions. Some of the most recent recognitions include five awarded to the FRIM DG; one to research team led by Dr Lee Chai Ting and another by research group led by Dr Hamdan Husain.

FRIM DG received the MBR, among others, for being the First Forestry Scientist to be Accorded the National Young Scientist Award; the First Forestry Scientist to Receive Two National Science Awards and the Youngest Forestry Scientist to Receive the IUFRO Scientific Achievement Award at the Age of 34.

In addition, DPM officially launched the "Mobile Wood Identification System" (MyWood-ID), a smartphone application for wood identification. MyWood-ID was developed by FRIM Wood Anatomy Laboratory Head Dr Nordahlia Abdullah Siam in collaboration with Tunku Abdul Rahman University (UTAR). MyWood-ID is fast, accurate, cheap, user-friendly and it is expected to identify 100 types of local timbers.

3. Lawatan Peserta *World Urban Forum* ke-9

Seramai 65 orang peserta "World Urban Forum" ke-9 (WUF9) dari 16 buah negara telah melawat kampus FRIM di Kepong pada 10 dan 11 Februari 2018. Tujuan lawatan tersebut adalah untuk mengetengahkan FRIM sebagai antara kawasan hijau bandar yang terbaik di Malaysia.

Ketua Program Ekopelancongan dan Hutan Bandar FRIM, Dr Noor Azlin Yahya telah menyampaikan taklimat khas mengenai sejarah, latar belakang, ekopelancongan dan kemudahan rekreasi di FRIM, serta usaha-usaha FRIM dalam pengurusan yang seimbang untuk memenuhi keperluan rekreasi dan perlindungan sumber alam semula jadi.

Peserta juga melawat Galeri Penyelidikan FRIM dan dibawa ke denai alam bagi meninjau fenomena *crown shyness* oleh jurupandu alam FRIM. Turut hadir, Menteri Perhutanan Bandar dan Perumahan Bandar Ethiopia, TYT Dr Ambachew Mekannon; dan Naib Menteri Alam Sekitar Lithuania, TYT Reda Brandisauskiene.

3. Visit of the Ninth World Urban Forum Participants

A total of 65 participants of the 9th World Urban Forum (WUF9) from 16 countries visited the FRIM campus in Kepong on 10 and 11 February 2018. The aim of the visit was to highlight FRIM as one of the best urban greenery in Malaysia.

FRIM Ecotourism and Urban Forestry Programme Head Dr Noor Azlin Yahya provided a special briefing on the FRIM's history, background, ecotourism and recreational facilities, as well as its efforts towards a balanced management for recreational needs and protection of the natural resources.

The participants visited the FRIM Research Gallery and led by nature guides for trekking along one of the forest trails to see the 'Crown Shyness' phenomenon with FRIM nature guides. Among the participants were the Minister of Ethiopian Urban Forestry and Housing, HE Dr Ambachew Mekannon; and the Vice-minister of Lithuanian Environment, HE Reda Brandisauskiene.

4. Delegasi Jepun Lawat FRIM

FRIM telah menerima lawatan enam wakil delegasi Jepun pada 19 Februari 2018 yang bertujuan untuk berkongsi pengalaman serta mengadakan perbincangan dengan penyelidik FRIM tentang *Access and Benefits Sharing* (ABS).

Delegasi ini terdiri daripada Maho Matsumoto mewakili Kementerian Alam Sekitar Jepun; Dr Manabu Suto (Biological Resource Center), Rie Funabiki (National Institute of Technology and Evaluation); Mutsumi Suzuki (National Institute of Genetics/ABS Task Team for Academia); Dr Yamasaki Takeshi (Makino Herbarium, Tokyo Metropolitan University); dan Michiko Nishikawa (Kedutaan Jepun di Malaysia).

4. Japan Delegation Visits FRIM

Forest Research Institute Malaysia (FRIM) received a visit from six Japanese representatives who wanted to share their experience and have a discussion on 'Access and Benefits Sharing' (ABS) with FRIM researchers.

The delegation, who came to FRIM on 19 February 2018, consisted of Maho Matsumoto from Japan Ministry of Environment, Dr Manabu Suto (Biological Resource Center), Rie Funabiki (National Institute of Technology and Evaluation), Mutsumi Suzuki (National Institute of Genetics/ ABS Task Team for Academia), Dr Yamasaki Takeshi (Makino Herbarium, Tokyo Metropolitan University) and Michiko Nishikawa (Embassy of Japan in Malaysia).

Nor Azah (kiri) menyampaikan sebuah penerbitan FRIM kepada Matsumoto.
Nor Azah (left) presenting a FRIM publication to Matsumoto.

Dalam perjumpaan tersebut; Dr Norini Haron (Felo FRIM) telah membentangkan Projek "Pendokumentasian Pengetahuan Tradisi (TK) Orang Asli ke Arah Perkongsian Faedah". Beliau, antara lain menerangkan usaha FRIM dalam pemeteraian perjanjian ABS dengan sebuah kerajaan negeri serta subetnik Orang Asli, sejajar dengan Akta Akses kepada Sumber Biologi dan Perkongsian Faedah (Akta 795) 2017. Beberapa orang wakil delegasi turut berkongsi pengalaman dan kemajuan ABS di Jepun. Mereka turut dibawa melawat ke Taman Etnobotani FRIM untuk melihat koleksi tumbuhan ubatan dan beraroma.

In the meeting, FRIM Fellow Dr Norini Haron presented the "Documentation of Traditional Knowledge (TK) of Orang Asli towards Benefit Sharing" project. Among others, she also shared FRIM initiative in the signing an ABS agreement with a state government as well as Orang Asli sub-ethnic group in line with the Access to Biological Resources and Benefit Sharing Act (Act 795) 2017. Some of the delegates also shared their ABS experience and progress. The delegation was later taken to FRIM Ethnobotanical Garden to see the medicinal and aromatic plants collection.

5. Taman Sinonim di SPF Selandar

Institut Penyelidikan Perhutanan Malaysia (FRIM) telah menganjurkan sambutan Hari Hutan Antarabangsa (IDF) Peringkat FRIM dan Penubuhan Taman Sinonim di Stesen Penyelidikan FRIM (SPF) Selandar, Melaka pada 3 April 2018. Ketua Pengarah (KP) FRIM, Dato' Dr Abd Latif Mohmod telah menyempurnakan majlis dengan penanaman pokok melaka (*Phyllanthus emblica*). Sejumlah 66 daripada 33 spesies tumbuhan yang namanya sinonim dengan nama-nama tempat di Melaka ditanam oleh 80 peserta dari FRIM dan wakil komuniti setempat termasuk sekolah, institusi pengajian tinggi, kampung serta badan kerajaan terlibat dalam aktiviti menanam pokok.

Sebanyak 33 spesies pokok dipilih sempena sambutan Ulang Tahun FRIM ke-33 pada tahun ini termasuk bidara (*Ziziphus mauritiana*) dan merlimau (*Suregada multiflora*). Program ini merupakan sebahagian daripada aktiviti tanggungjawab sosial korporat FRIM bersama-sama komuniti setempat. Program ini mengetengahkan kepentingan pemuliharaan hutan serta memberi kesedaran kepada masyarakat umum tentang kewujudan nama-nama tempat yang sinonim dengan nama tumbuhan. Dato' Dr Abd. Latif yang merupakan pengarang utama buku FRIM bertajuk, *Sinonim Nama Tempat dengan Nama Tumbuhan* turut menyampaikan hadiah senaskah buku tersebut kepada setiap wakil sekolah yang hadir. Buku tersebut telah memenangi Anugerah Buku Negara (Buku Teknikal Terbaik) pada 2016 daripada Yayasan Pembangunan Buku Negara.

SPF Selandar seluas 30 ha ditubuhkan pada 2009 sebagai pusat kecemerlangan berkonsepkan perhutanan sebagai tarikan pelancongan, penyelidikan uji tanam klon terpilih, hutan tani dan pelabur ladang hutan.

5. Taman Sinonim at the SPF Selandar

Forest Research Institute Malaysia (FRIM) celebrated its International Day of Forests (IDF) and established 'Taman Sinonim' at the FRIM Research Station in Selandar (SPF Selandar), Melaka, 4 April 2018. FRIM Director General (DG) Dato' Dr Abd Latif Mohmod officiated the event by planting a melaka tree (*Phyllanthus emblica*). A total of 66 saplings from 33 species with local names that are synonymous with names of places in Melaka were planted at Taman Sinonim by 80 representatives from FRIM and local communities including schools, higher learning institutes, villages as well as government bodies.

The 33 species, selected in conjunction with FRIM's 33rd Anniversary this year, include bidara (*Ziziphus mauritiana*) and merlimau (*Suregada multiflora*). This programme was part of the FRIM's corporate social responsibility (CSR) activities with local communities. The aim of the programme was to highlight the importance of forest conservation as well as enhance public awareness on the existence of plant names that are synonymous with places. Dato' Dr Abd Latif, the main author of the FRIM publication entitled, "Sinonim Nama Tempat dengan Nama Tumbuhan", presented a copy of the book to representatives from schools around mukim Selandar. The book was picked as the winner of the National Book Award (Best Technical Book category) by National Book Development Foundation in 2016.

The 30-ha SPF Selandar was established in 2009 as a centre of excellence based on the concept of forestry as a tourism attraction, a testing site for planting of selected forest species clones, for forest farming and investment in forest plantations.

Majlis penanaman pokok/Tree planting ceremony

4. YB Elizabeth Wong Sertai Gotong-royong di Taman Warisan FRIM

Ahli Dewan Undangan Negeri (ADUN) Bukit Lanjan, YB Elizabeth Wong Keat Ping telah menyertai Gotong-royong FRIM bersama-sama Sahabat Komuniti yang diadakan di Taman Warisan FRIM pada 5 Julai 2018.

Program tersebut melibatkan lebih 100 orang penjawat awam FRIM dan wakil-wakil Sahabat Komuniti yang terdiri darpada penduduk di sekitar kampus FRIM. Program ini bertujuan untuk memupuk kesedaran masyarakat terhadap kepentingan pemuliharaan warisan semula jadi serta memperkasakan sokongan komuniti setempat dalam usaha pengiktirafan FRIM sebagai Tapak Warisan Dunia UNESCO. YB Wong menanam pokok kundang (*Bouea oppositifolia*) sebagai acara simbolik bagi memperingati program ini. Taman ini dibangunkan sebagai kawasan rekreasi alternatif yang dapat memberi faedah kepada masyarakat setempat serta pelawat FRIM.

Setakat ini, taman ini hanya dibuka secara khas untuk majlis-majlis korporat atau acara persendirian seperti sambutan hari keluarga, perkahwinan dan sebagainya. Berdasarkan perancangan FRIM, taman ini akan dibuka kepada orang ramai pada tahun 2019. Kemudahan yang terdapat dalam taman ini termasuk gazebo, pavilion, amfiteater dan laluan pejoging.

4. YB Elizabeth Wong participated in the *Gotong-royong* at Taman Warisan FRIM

Bukit Lanjan State Assemblyman YB Elizabeth Wong Keat Ping has participated in the Forest Research Institute Malaysia (FRIM) *Gotong-royong* with Community Friends held at Taman Warisan FRIM (FRIM Heritage Park) on 5 July 2018.

Over 100 FRIM staff and Community Friends including representatives from nearby communities joined the programme. The aim of the event was to increase public awareness on the importance of conserving natural heritage as well as promote support for FRIM's efforts to attain the UNESCO World Heritage Site status. Wong also planted a kundang tree (*Bouea oppositifolia*) to commemorate this special occasion. This species with edible fruits is usually planted in rural areas as ornamental plants. Kundang is also the name of a place in Selangor. The park was developed as an alternative recreational area for the benefits of the surrounding communities as well as for FRIM's regular visitors.

For the time being, the park is only open for corporate or private events such as family day, weddings and other celebrations. This park will be fully open to the public next year. Facilities available in the park include a gazebo, pavilions, an amphitheatre and parcourse.

Wong (tengah) menyiram pokok yang ditanam
Wong (middle) watering the plant

Staf FRIM dan wakil komuniti menanam pokok di Taman Warisan
FRIM staff and community representatives planting trees at Taman Warisan

5. Penubuhan Taman Dipterokarpa di SPF Setiu

Institut Penyelidikan Perhutanan Malaysia (FRIM) telah menubuhkan Taman Dipterokarpa di Stesen Penyelidikan FRIM (SPF) Setiu, Terengganu dengan aktiviti penanaman 330 pokok daripada 33 spesies dipterokarpa bersama-sama dengan wakil penduduk setempat pada 23 Oktober 2018. Ketua Pengarah (KP) FRIM, Dato' Dr Abd Latif Mohmod telah menyempurnakan majlis perasmian ini dengan menanam pokok keruing neram (*Dipterocarpus oblongifolius*) sebagai acara simbolik. Aktiviti ini melibatkan lebih 100 peserta yang terdiri daripada kakitangan FRIM dan wakil komuniti setempat termasuk sekolah, institusi pengajian tinggi, kampung serta badan kerajaan negeri.

Aktiviti ini merupakan sebahagian daripada Program Penubuhan Taman Dipterokarpa, Penghayatan Alam dan Tanggungjawab Sosial yang dianjurkan sempena Sambutan Ulang Tahun ke-33 FRIM. Beberapa spesies yang ditanam adalah sinonim dengan nama tempat di Malaysia antaranya, pokok cengal (Kampung Lot Gong Chengal, Terengganu), keruing neram (Felda Neram, Terengganu), keladan (Kampung Paya Keladan, Pahang) serta meranti batu/ meranti rambai daun (Meranti, Kelantan).

5. Establishment of a Dipterocarp Garden at the Setiu SPF

Forest Research Institute Malaysia (FRIM) has established a Dipterocarp Garden at the FRIM Research Station (SPF) in Setiu, Terengganu by planting 330 Dipterocarpaceae trees of 33 species together with local residents on 23 October 2018. FRIM Director General (DG) Dato' Dr Abd Latif Mohmod officiated the programme by planting a *Dipterocarpus oblongifolius* (keruing neram) tree to commemorate the special occasion. The activity involved more than 100 participants comprising FRIM staff and local community representatives such as schools, institutions of higher learning, villages and state government bodies.

This activity was part of the Dipterocarp Garden Establishment, Nature Awareness and Social Responsibility Programme jointly organised by FRIM forestry biotechnology, innovation and commercialisation divisions as well as Corporate Communication Unit in conjunction with FRIM's 33rd Anniversary Celebration. The names of some tree species planted today are synonymous with the names of places in Malaysia. Among them are the cengal (Kampung Lot Gong Cengal, Terengganu), keruing neram (Felda Neram, Terengganu), keladan (Kampung Paya Keladan, Pahang) and meranti batu / meranti rambai daun (Meranti, Kelantan).

Program seperti ini diadakan untuk mengetengahkan kepentingan pemuliharaan hutan serta memberi kesedaran kepada masyarakat umum tentang kewujudan nama-nama tempat yang sinonim dengan nama tumbuhan. Abd Latif turut menyempurnakan Majlis Prapelancaran Produk Prototaip Antigout, "GOUTREE" yang dihasilkan daripada pokok cucur atap (*Baeckea frutescens*). Hasil kajian FRIM mendapati ekstrak cucur atap boleh menghalang penghasilan asid urik yang menyebabkan penyakit gout. Cucur atap juga merupakan spesies herba yang biasa ditemui di kawasan pantai timur terutamanya di kawasan berpasir.

Such programme was held to highlight the importance of forest conservation as well as to install awareness on the existence of plant names that are synonymous with places among the public. Abd Latif also officiated the soft launch of 'GOUTREE' anti-gout products prototype made from cucur atap (*Baeckea frutescens*). The results from FRIM's study indicate the extract of this species is effective in inhibiting the production of uric acid that causes gout. Cucur atap is a plant species commonly found in the east coast area, especially in sandy areas.

Para peserta bersama dengan Abd. Latif (tengah) semasa penanaman pokok di Taman Dipterokarpa
Some of the participants with Abd Latif (middle) during the tree planting activity at the Dipterocarp Garden

6. Lawatan Kerja Ketua Setiausaha Kementerian Air, Tanah dan Sumber Asli ke FRIM

Ketua Setiausaha (KSU) Kementerian Air, Tanah dan Sumber Asli (KATS), Dato' Dr Tan Yew Chong telah mengadakan lawatan kerja ke Institut Penyelidikan Perhutanan Malaysia (FRIM) pada 14 Ogos 2018. Beliau disambut oleh Dr Khali Aziz Hamzah, Timbalan Ketua Pengarah (TKP) (Operasi) FRIM; Dr Ismail Harun, TKP (Penyelidikan) serta ahli-ahli Pengurusan Tertinggi FRIM. Khali Aziz memberikan taklimat latar belakang FRIM serta peranan dan pencapaian FRIM dalam penyelidikan, pembangunan dan komersialisasi (R, D & C).

6. Official Visits of the Secretary General of the Ministry of Water, Land and Natural Resources

Secretary General of the Ministry of Water, Land and Natural Resources (KATS), Dato' Dr Tan Yew Chong visited Forest Research Institute Malaysia (FRIM) on 14 August 2018. Tan was greeted by FRIM Deputy Director General (DDG) (Operations) Dr Khali Aziz Hamzah, DDG (Research) Dr Ismail Harun and FRIM directorates. Khali Aziz gave a presentation on FRIM background as well as its roles and achievements in research, development and commercialisation (R, D & C).

Cenderamata daripada FRIM
The memento from FRIM

Pegawai Officers

Pegawai
Officers

Senarai pegawai Gred 27 dan ke atas (kelulusan tertinggi)
List of officer Grades 27 and above (highest educational background):

PEJABAT KETUA PENGARAH
DIRECTOR GENERAL'S OFFICE

Ketua Pengarah/Director General
Pegawai Penyelidik/Research Officer
Dato' Dr Abd Latif Mohmod, (DIMP, JSM, KMN, AMN),
PhD Non-Wood Forest Products (UPM)

Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)
Deputy Director General (Research and Development)
Pegawai Penyelidik/Research Officer
Dr Ismail Harun

PhD Forest Management (UPM) (hingga/until 4/9/2018)
Dr Samsudin Musa, PhD Botany (UKM)
Mulai/From 10/11/2018

Timbalan Ketua Pengarah (Operasi)
Deputy Director General (Operations)
Pegawai Penyelidik/Research Officer
Dr Khali Aziz Hamzah, PhD (Reading)

Pegawai Penyelidik/Research Officer
Praveena a/p Balai Kerishnan, BSc Forestry Science (UMS)

Setiausaha Pejabat/Administrative Secretaries

Pejabat Ketua Pengarah/Director General's Office
Amrah Toha, Dip Sec. Sc. (UiTM)

Pejabat Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)
Deputy Director General (Research and Development)'s Office
Adilahani Ahmad, B.Office Systems Mgmt. (Hons) (UiTM)

Pejabat Timbalan Ketua Pengarah (Operasi)
Deputy Director General (Operations)'s Office
Zariza Mohamed Yusuf, Dip Sec. Sc. (UiTM)

Unit Undang-Undang/Legal Unit

Ketua/Head
Pegawai Undang-Undang/Legal Officer
Nor Azura Ahmad Murad, LLB (Hons) (UIA) – Cuti tanpa gaji/Unpaid leave

Pegawai Undang-Undang/Legal Officers
Nur Shafiqa Abdul Jamil, LLB (Hons) (UIA)
Ali Safuan Nor Azhar, LLB (Hons) (UIA)

Penolong Pegawai Tadbir/Assistant Administrative Officer
Nur Dalila Zukiflee, B Office System (Hons) (UiTM)

Audit Dalam/Internal Audit

Juruaudit/Auditor
Ilyani Mazlan, B Acc. (Hons) (UiTM)

Penolong Juruaudit/Assistant Auditors
Mohd. Rozmi Mohamed Arif, Dip Acc. (UiTM)
Yusmaliza Hanim Mohd Arifin, Dip Buss. Study (Poli. Ungku Omar)
Mohamad Rosdi Abdul Kadir, Dip Buss. Study (Poli. Ungku Omar)

Unit Pengurusan Kualiti/Quality Management Unit

Ketua/Head
Pegawai Penyelidik/Research Officer
Datin Salamah Selamat, BSc Analytical Chem. (Hons)(UKM) – Hingga/Until 8 April 2018
Dr Sharmiza Adnan, PhD Chem. Engineering (Monash) – Mulai/From 9 April 2018

Pegawai Penyelidik/Research Officer
Suharti Samod, MSc Qty & Product. Improv. (UKM)

Pegawai Tadbir/Administrative Officer
Roshamida Ruslan, MSc IT (UiTM)

Unit Komunikasi Korporat/Corporate Communication Unit

Ketua/Head
Pegawai Tadbir/Administrative Officer
Toh An Nee, B Mass Comm. (USM)

Pegawai Media/Media Officer
Toh An Nee, B Mass Comm. (USM)

Pegawai Penerangan/Information Officer
Norain Mohd Ariff, MSc IT (UiTM)

Pegawai Perhubungan Awam/Public Relations Officer
Maria Arlene Jackan Anak Siba, BSc Int. Trop. Forestry (UMS)

Pegawai Media/Media Officer
Lim Chung Lu, MSc Plant Systematics (UM)

Penolong Pegawai Penerangan/Assistant Information Officer
Nur Afniza Mohammad Ghazali, B Corp. Admin. (UiTM)

Pereka Grafik/Graphic Designer
Rosdi Mohamad, Dip Comp. Sc. Mutimedia (UTM)

Unit Integriti/Integrity Unit

Pegawai Tadbir/Administrative Officer
Mohd Asmawee Ismail, MBA (UPM)

Unit Perkhidmatan Pensijilan Produk/Product Certification Services Unit

Pengarah Urusan/Managing Director
Datin Salamah Selamat, BSc Analytical Chem. (Hons)(UKM)

Timbalan Pengarah Urusan/*Deputy* Managing Director
Elia Suhaily Md Yacob, MSc Bio-resources, Paper and Coatings Tech. (USM)

Pengurus Pensijilan/Certification Manager
Nor Haliyan Tan Shilan, MSc IT (UiTM)

Pengurus Latihan/Training Manager
Suhana Rafidah Md. Yusof, MSc Qty & Product. Improve. (UKM)

Pengurus Jualan dan Pemasaran/Sales and Marketing Manager
Nurfarahin Mohd Sani, B. Marketing Financial Services (USIM)

Pengurus Operasi/Operation Manager
Norfaizatul Ashikin Mokhtar, MSc Qty & Product. Improve. (UKM)

Timbalan Pengurus Pensijilan/Deputy Certification Manager
Nur Liyana Izzati Rohaffin, BSc Furniture Technology (UiTM)

Penolong Pegawai Tadbir/Administrative Assistant Officer
Nur Elysa Shakira Othman, B. Buss. Administration (UKM)

Penolong Pegawai Teknologi Maklumat/Information Technology Assistant Officer
Noor Khairani Abd Latif, Dip. Comp. Sc. (Col. Tech. Bestari)

Penolong Akauntan/Accountant Assistant
Mohammad Nazri Ngadinin, Dip. Islamic Banking (KUIS)

BAHAGIAN PERANCANGAN PENYELIDIKAN
RESEARCH PLANNING DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officer
Dr Hj Nur Supardi Md Noor, [(JSM, AMK), PhD Ecology (Reading)]
Hingga/Until 5/12/2018

Cawangan Dasar dan Perancangan Penyelidikan/ Research Policy and Planning Branch

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Mohd Rosli Haron, PhD Molecular Bio. & Genetic Eng. (UPM)

Pegawai Penyelidik/Research Officers
Nik Zanariah Nik Mahmood, MSc Corporate Comm. (UPM)
Haliza Ismail, MSc Micropropagation (UPM)

Pegawai Teknologi Maklumat (Kontrak)/Inform. Tech. Officer (Contract)
Rosniza Rawi, MSc IT (UiTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Luqman Hakim Adzis, BSc AgricBiotech (UNISZA)
Iskandar Muhammad Masrukin, BSc Wood Science Tech (UPM)

Penolong Pegawai Tadbir (Kontrak)/Assistant Admin. Officer (Contract)
Norsaidatul Akmal Mohamad @ Ghazali, Dip. Wood Tech (UiTM)

Program Ekonomi dan Analisis Strategik/Economic and Strategic Analysis Programme

Ketua/Head
Pegawai Tadbir/Administrative Officer
Rohana Abd. Rahman, MSc Marketing (UPM)

Pegawai Penyelidik/Research Officers
Ariff Fahmi Abu Bakar, BSc For. (Hons) (UMS)
Noor Hazmira Merous, MSc Natural Res. & Environ. Econs. (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Nur Fazreen Zainal, BSc Hort. (Hons) (UPM)
Mohamad Azwir Ali Usar, Bsc Biology (Hons) (UKM) (sehingga/until September 2018)
Siti Aisyah Jabaruddin, Bsc Forestry Science (Hons) (UMS)

Pegawai Tadbir/Administrative Officer (Contract)
Nor Atiqah Mohd Fauzi, B Business Admin. (Hons) (UUM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)
Noradirawafa Adnan, BSc Plantation Tech. & Mgmt (Hons) (UiTM)

Program Perhutanan Sosial/Social Forestry Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Mohd. Parid Mamat, MSc Forest Econs. (UPM)

Pegawai Penyelidik/Research Officers
Dr Huda Farhana Mohamad Muslim, PhD Tourism Sc.
(Tokyo Metropolitan University, Japan)
Norliyana Adnan, M. Eng. Env. (UTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Mukrimah Abdullah, MSc Environ. Econ. (UPM)
Azreena Amer Khan, MSc Plant. Mgmt (UPM)
Amyrul Firdaus Othman, B. Forestry Science (Hons) (UPM)

Pegawai Penyelidik Sosial (Kontrak)/Social Research Officer (Contract)
Intan Nurulhani Baharuddin, B. Soc. Science (Hons) (UKM))
Faten Naseha Tuan Hussain, B. Parks and Amenity Mgmt (Hons) (UiTM)

Pegawai Tadbir (Kontrak)/Administrative Officer (Contract)
Badariah Malek, B. Office Syst. Mgmt (Hons) (UiTM)

Penolong Pegawai Tadbir (Kontrak)/Assistant Admin. Officer (Contract)
Amizan A/L Nazri, B. Office Syst. Mgmt (Hons) (UiTM)

BAHAGIAN PERHUTANAN DAN ALAM SEKITAR
FORESTRY AND ENVIRONMENT DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officers
Dr Samsudin Musa, PhD Botany (UKM) (Hingga/Until 9/11/2018)
Dr Ismail Hj. Parlan, PhD Botany (UKM) (10/11–31/12/2018: Memangku/Acting)

Program Hutan Asli/ Natural Forest Programme

Ketua/Head
Pegawai Penyelidik/Research Officers
Dr Ismail Hj. Parlan, PhD Botany (UKM) (Hingga/Until 31/12/2018)

Pegawai Penyelidik/Research Officers
Dr Raja Barizan Raja Sulaiman, PhD Biological & Molecular Sci.—Plant Eco.(Stirling)
Nur Hajar Zamah Shari, MSc Trop. Forest Mgmt (UPM)
Salleh Mat, MSc Forest Economics (UPM)
Tariq Mubarak Husin, BSc Forestry (UPM)
Azharizan Mohd Norizan, MSc Forest Prod. & Marketing (UiTM)
Yao Tze Leong, MSc Plant Systematics (UM)
Mohd. Ghazali Hasan, M Agric. Sc. (UPM)
Farah Shahanim Mohamed Mohidin, PhD Plant Physiology (UM)
Mohamad Danial Md Sabri, Msc Forest Ecology (UiTM)
Hyrul Izwan Mohd Husin, BSc Forestry Science (UMS)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Musalmah Nasardin, BSc Biology (Plant) (UPM)
Mohd Izwan Ramlan, BSc Agricultural Sc. (UPM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Sadali Sahat
Harfendy Osman, Dip Comp. Sc. (UPM)

Program Ekopelancongan dan Hutan Bandar/Ecotourism and Urban Forestry Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Noor Azlin Yahya, PhD Forest Recreation Mgt. (UPM)

Pegawai Penyelidik/Research Officers
Ahmad Azaruddin Mohd. Noor, MSc Landscape Studies (UPM)
Dr Ahmad Nazarudin Mohd. Roseli, PhD Plant Eco-Physiology (UiTM)
Nik Azyyati Abdul Kadir, BSc Forestry (UPM)
Nik Adlin Nik Mohamed Sukri, MSc Integrated Const. Project Mgmt. (UiTM)
Norsham Suhaina Yaakob, MSc Conservation Biology (UKM)
Abdul Hayat Mat Saad, Msc Forestry (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Nazimatul Azma Nazeri, BSc Forestry (UPM)
Fatin Amalina Halim, BSc Tech. & Plant. Mgt. (UiTM)

Pegawai Penyelidik Sosial (Kontrak)/Social Research Officer (Contract)
Nur Suriani Salleh, BSc. Parks & Amenity Mgmt. (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Mohd. Afendi Hussin, Dip Agric. (UPM)
Azahari Hj. Mohd. Yusoff, Dip Landscape Des.(UiTM)
Naimah Che Long, BSc Forestry (UPM)
Wan Mohd Nafizul Hal Alim Wan Ahmad, B Eng. Electric. (UiTM)
Samsul Bohari, Sijil Pertanian, Institut Pertanian Serdang

Program Geoinformasi/Geoinformation Programme

Ketua/Head
Dr Wan Mohd Shukri Wan Ahmad, PhD Environ. Sci. (UKM)

Pegawai Penyelidik/Research Officers
Dr Hamdan Omar, PhD Forest Eng. & Operation (UPM)
Tan Sek Aun, MSc Remote Sensing & GIS (UPM)
Mohd Rizuwan Mamat, B Eng., Mech.(UiTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Muhamad Afizzul Misman, MSc GIS & Geomatic Engineering (UPM)
Siti Yasmin Yaakub, BSc Remote Sensing (UTM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Rodziah Hashim, Dip Science (UiTM)
Abdul Azhan Shah Idris, Dip Forestry (UPM)

Program Perubahan Iklim dan Perhutanan/Climate Change and Forestry Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Elizabeth Philip, PhD Plant Physiology (UM)

Pegawai Penyelidik/Research Officer
Azian Mohti, MSc App. Remote Sensing/GIS (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Mohd Afzanizam Muda, BSc Science & Environ. Mgmt (UM)
Shahrul Azman Bakar, Sarjana Falsafah Geografi (UKM)
Norsheilla Mohd Johan Chuah, MSc Remote Sensing (UTM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Nazaruddin Ramli, Dip Agric. (UPM)
Mohd Rizal Mohd Kassim, Dip Plantation Mgmt (UiTM)
Abdul Razal Ab Latif, Sijil Pertanian (Institut Pertanian)

Program Ekohidrologi/Ecohydrology Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Siti Aisah Shamsuddin, PhD Hydro. & Water Res. Mgmt (UTM)

Pegawai Penyelidik/Research Officers
Marryanna Lion, MSc Env. Pelan. & Mgmt.(UPM)
Mohd Azahari Faidi, MSc Remote Sensing (UTM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Shahzerul Hizam Kamarudzaman, Dip. Makanan (POLISAS)

Program FRIM-WHS/FRIM-WHS Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Noorsiha Ayop, BSc Botany (UM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Ainnur Amira Anuar Musadad, BSc Forestry (UPM)
Nurliyana Abdul Latif, BSc Applied Sc. (Conserv. & Mgmt of Biodiv.) (UMT)
Nuranis Suraya Baharuddin, BSc Applied Sc. (Conserv. & Mgmt of Biodiv.) (UMT)
Law Shu Hui, BSc (Environ. Science & Mgmt) (UM)

Jurutera (Kontrak)/Engineers (Contract)
Nooredlin Ismail, B. Landscape Architect. (IIUM)
Muhammad Khairul Ikhwan Shahrin, Bachelor of Civil Engin. (UTM)
Muhammad Fauzi Arifin, Bachelor of Surveying Sc. & Geomatics (Hons.) (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officers (Contract)
Ajeera Tamin, Sijil Teknologi Berasaskan Kayu (Politek. Sultan Salahuddin Abdul Aziz Shah)
Mohamad Effy Hafizi Mat Zen, Dip in Science (UPSI)
Muhammad Haziq Mohd Salleh, BSc Science (Arch. Studies) (IUKL)

Setiausaha Pejabat/Administrative Secretaries
Nor Shahidah Hussin, B. Business Admin. (Hons.), (UKM)
Syuriani Mohd Zaki, Dip Sec. Sc. (UiTM)
Azrinawati Samsuri, Dip. Exec. Sec. (UiTM)

BAHAGIAN KELUARAN HUTAN
FOREST PRODUCTS DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officer
Dr Gan Kee Seng (AMN), PhD Mech. Eng. (Strathclyde)

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

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Zaihan Jalaludin, PhD Wood Sci. (Edinburgh)

Pegawai Penyelidik/Research Officers
Datin Salamah Selamat, BSc Chemistry (Hons) (UKM) (hingga/until 7/4/2018)
Dr Roszaini Kadir, PhD Wood Sci. (Bangor)
Dr Rafeadah Rusli, PhD Material Sci. (Manchester)
Dr Mohamad Nasir Mat Arip, PhD Chemistry (UKM)
Dr Suffian Misran, PhD Wood Sci. (Bangor)
Dr Tumirah Khadiran, PhD NanoScience (UPM)
Dr Shahlinney Lipeh, PhD Wood Sci. (Oregon State)

Penolong Pegawai Penyelidik/Assistant Research Officers
Rozaida Latip, Dip Wood Tech. (UiTM)
Baharudin Kamaruddin, BSc Forest Indust. (UPM) (hingga/until 30/9/2018)
Nuziah Hashim, Dip Indust. Chem. (UiTM)
Nordin Puteh, Sijil Pertanian (Inst. Pertanian Sem. Malaysia)
Mohd Shapiei Jusoh, Sijil Pertanian (Inst. Pertanian Sem. Malaysia)

Program Kualiti dan Kejuruteraan Kayu/Wood Quality and Wood Engineering Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Mohamad Omar Mohamad Khaidzir, PhD Auto. Contr. & Syst. Eng. (Sheffield)

Pegawai Penyelidik/Research Officers
Dr Hamdan Husain, PhD Wood Sci. (Wales)
Dr Nordahlia Abdullah Siam, PhD Botany (UKM)
Dr How Seok Sean, PhD Chem. & Process Eng. (Canterbury)
Dr Ong Chee Beng, PhD Civil Eng. (Bath)
Zairul Amin Rabidin, MSc Wood Sci. & Tech. (UPM) (hingga/until 30/4/2018)

Penolong Pegawai Penyelidik/Assistant Research Officer
Mohd Faiz Kamarudin, BSc (Hons) Furniture Tech. (UiTM)

Program Teknologi Biomass/Bioenergy Technology Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Wan Asma Ibrahim, PhD Soil Chemistry (UPM)

Pegawai Penyelidik/Research Officers
Dr Rushdan Ibrahim, PhD Paper Sci. (Manchester)
Mahmudin Saleh, MSc Mech. Eng. (UiTM)
Dr Sharmiza Adnan, PhD Chem. Eng. (Monash)
Dr Latifah Jasmani, PhD Chemistry (Nottingham)
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)

Penolong Pegawai Penyelidik/Assistant Research Officers
Azizi Abd. Jalil, Dip Wood Tech. (UiTM) (hingga/until 13/4/2018)
Baharudin Kamaruddin, BSc Forest Indust. (UPM) (mulai/from 1/10/2018)

Penolong Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Muhammad Fazrul Samsuddin, Dip Wood Indust. (UiTM)
Siti Nur Ridhwah Mohamed Ramli, BSc Molec. Biol. (UiTM)

Program Pemprosesan/Processing Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Mohd. Tamizi Mustafa, PhD Bioresource (USM) (hingga/until 20/12/2018)

Pegawai Penyelidik/Research Officers
Dr Wan Tarmeze Wan Ariffin, PhD Civil Eng. (Birmingham)
Dr Mohd Khairun Anwar Uyup, PhD Wood Sci. & Tech. (UPM)
Dr Sik Huei Shing, PhD Material Sci. (UKM)
Zairul Amin Rabidin, MSc Wood Sci. & Tech. (UPM)
Mohd. Jamil Abdul Wahab, M Eng. Sci. (UM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Dr Mohd Fahmi Awalludin, Phd Wood Properties (USM)(mulai/from 2/7/2018)

Penolong Pegawai Penyelidik/Research Officers
Siti Rafidah Mahmud, Dip Wood Tech. (UiTM)
Mashilah Mior Ismail, Cert. in Eng. Instrument. & Control (Politek. Ungku Omar)
Nor Marzuina F K Naysir, Dip Tourism Mgmt (UiTM)
Mohd Izani Ishak, Dip Mech. Eng. (Politek. Sultan Salahuddin Abdul Aziz Shah)

Program Pemerkasaan Pensijilan Produk

Ketua/Head
Pegawai Penyelidik/Research Officer
Hashim W. Samsi, MSc Wood Tech. (UPM)

Pegawai Penyelidik/Research Officers
Dr Khairul Awang, PhD Wood Sci. & Tech. (USM)
Siti Zaliha Ali, B Eng. Manufact. (UIAM)
Khairul Azmi Jabar, MSc Building Tech. (USM)
Noor Azrieda Abd. Rashid, MSc Wood Sci. (UiTM)
Yanti Abdul Kadir, MSc Wood Sci. (UiTM)
Khairul Masseat, MSc Wood Sci. & Tech. (UPM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Nor Azian Mohd Kasby, Dip Civil Eng. (UTM)
Zawawi Kassim, Dip Applied Sc. (UiTM)
Muhammad Taufiq Tajudin, Dip Mechatronic Eng. (Politek. Johor Bharu)

Setiausaha Pejabat/Administrative Secretaries
Maimunah Tompang
Azlina Ahmad, Dip Sec. Sci. (UiTM)
Tuan Nur Atiqah Tuan Hussin Dip Sec. Sci. (UiTM)

BAHAGIAN HASILAN SEMULA JADI
NATURAL PRODUCTS DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officers
Dr Hjh Nor Azah Mohamad Ali (mulai/from 1/01/2018)

Program Sumber Biologi/Bioresources Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Fadzureena Jamaludin, PhD Nat. Prod. Chem. (UPM)

Pegawai Penyelidik/Research Officers
Hada Masayu Ismail @ Dahlan, B Process & Food Eng. (Hons.) (UPM)
Tan Ai Lee, MSc Plant Systematics (UKM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Ummu Hani Badron, MSc Botany (UKM)
Norbaiah Mat Yaacob, MSc Forest Mgmt. Ecosys. Sc. (UPM)
Madihah Muhammad Nawi, BSc (Hons.) Biology (Botany) (UKM)

Penolong Pegawai Penyelidik/Assistant Research Officer
Sharmizi Ismail, Dip Plant Indust. Mgmt. (UiTM)

Program Fitokimia/Phytochemistry Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
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)
Abd Rashid Li, MSc Natural Prod. Chem. (UiTM)
Adiana Mohamed Adib, MSc Synthetic Chem. (UTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
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)
Salbiah Man, Dip Industrial Chem. (UiTM)
Nor Azlianie Ab'llah@Awang, BSc Applied Chem. (UiTM)
Mohamad Nazrin Che Saad, Dip Microbiology (UiTM)
Mohd Hafidz Hadi Abdullah,
Sijil Kejuruteraan Elektrik (Poli. Sultan Abdul Halim Mu'adzam Shah)

Program Bioaktiviti/Bioactivity Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Mastura Mohtar, PhD Biomedic. Sci.(UKM)

Pegawai Penyelidik/Research Officers
Dr Nik Musa'adah Mustapha, PhD Biomedic. Sci. (Univ. of London)
Dr Getha Krishnasamy, PhD Microbial Biotech.(UM)
Dr Asiah Osman, PhD Biological Sci. (Griffith Univ.)
Dr Nurhanan Murni Yunos, PhD Medicine (Univ. of Sydney)
Dr Mary Khoo Gaik Hong, PhD Biochemical Sci. (Univ. of Surrey)
Dr Mazura Pisar, PhD Neuroscience (Glasgow Univ.)
Zaridah Mohd. Zaki, M Health Sc. (UKM)
Chee Beng Jin, MSc Animal & Plant Physio. (UPM)
Dr Saiful Azmi Johari, PhD Science (UiTM)
Lili Sahira Husin, MSc Health Biotech. (USM)
Norhayati Ismail, BSc (Hons) Microbiology (UPM)
Nor Datiakma Mat Amin, MSc Biotech. (UIAM)
Dr Mohd Kamal Nik Hasan, PhD Pharmacology (UiTM)
Ihsan Safwan Kamarazaman, MSc Physiology (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Shalini Markandan, BSc (Hons.) Biomedical Sci. (MSU)
Dionysia Modingin, BSc (Hons.) Forestry (UMS)
Roshan Jahn Mohd Salim, MSc Biotech. Eng. (UIAM)
Hema Thopla Govender, MSc Microbial Biotech. (UM)
Firdaus Kamarulzaman, M Health Sc. (UKM)
Nurul Hafizatul Syafiqah Mamat Azlan, BSc (Hons.)
Plant Biotech. (U. Nottingham, Malaysia Campus)

Pegawai Sains (Kontrak)/Science Officer (Contract)
Siti Nur Aisyah Mohd Hashim, BSc (Hons.) Biomedical Sci. (UKM)

Penolong Pegawai Penyelidik/Assistant Research Officer
Rohana Sahdan, Dip. Microbio. (UiTM)
Mazurah Mohamed Isa, Dip. Microbio. (UiTM)

Program Pembangunan Produk Herba/Herbal Products Development Programme

Ketua/Head
Dr Hjh Nor Azah Mohamad Ali, PhD Natural Prod. Chem. (UPM) (hingga/until 30 April 2018)
Ong Boo Kean, MSc Biotech.(UPM) (mulai/from 1 Mei 2018)

Pegawai Penyelidik/Research Officers
Mailina Jamil, MSc Pharmacy (UKM)
Saidatul Husni Saidin, MSc Sistematic Bio. (UPM)
Norulaiman Yusoff, MSc Microbial Biotech. (UPM)
Noor Rasyila Mohamed Noor, MSc Genetic Eng. & Molec. Bio. (UPM)
Dr Nor Hayati Abdullah, PhD Natural Prod. Chem. (UM)
Abdul Majid Jalil, BSc. Wood Tech. (UPM)

Pegawai Penyelidik (Kontrak)/Research Officer (Contract)
Sahrim Lias, BSc (Hons.) Electrical Eng. (UiTM)

Pegawai Sains (Kontrak)/Science Officer (Contract)
Nurhazwani Mohd Hirmizi, BSc (Hons.) Materials Tech. (UiTM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)
Mohd Shafik Yuzman Tolmanan, BSc Chem. (UiTM)

Setiausaha Pejabat/Administrative Secretary
Jesmini Mat Ali, Dip Sec. Science (UiTM)

BAHAGIAN BIOTEKNOLOGI PERHUTANAN
FORESTRY BIOTECHNOLOGY DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officer
Dato' Dr Hjh Marzalina Hj Mansor, DIMP, PhD Biotechnology – Seed Tech (UKM)

Program Bioteknologi/Biotechnology Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Norwati Muhammad, PhD Forest Genetic (Reading, UK)

Pegawai Penyelidik/Research Officers
Dr Lee Soon Leong, PhD Plant Genetic (UKM)
Dr Kevin Ng Kit Siong, PhD Pop. Genetics (UM)
Dr Lee Chai Ting, PhD Genetic Resources (UPM)
Dr Nor Hasnida Hassan, PhD Botany (UKM)
Dr Norwati Adnan, PhD Plant Genetic (UKM)
Dr Norlia Basherudin, PhD Molecular Bio. & Genetic Eng. (UPM)
Dr Ng Chin Hong, PhD Genetics (UKM)
Dr Shawn Cheng, PhD Molecular Bio. & Genetic Eng. (UPM)
Dr Tnah Lee Hong, PhD Phylogeography & Evolution (UM)
Nashatul Zaimah Noor Azman, MSc Applied Plant Sci. (London)
Nor Asmah Hassan, MSc Botany (UKM)
Noraliza Alias, MSc Systems Biology (Proteome Sci.) (UKM)
Nadiah Salmi Nadzri, BSc (Hons) Genetics (UKM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Suryani Che Seman, Dip Kejuruteraan Elektronik (UTM)
Nor Rashidah Mustapa, Dip Sains Ukur dan Geomatik (UiTM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Dr Siti Suhaila A. Rahman, PhD Plant Biotech. (UPM)
Nurul Farhanah Zakaria, MSc Plant Biotech. (UPM)
Nazirah Abdullah, BSc Biotech. (UPM)
Muhammad Fuad Yahya, B Biochem. Eng. (UIA)
Mohd. Saifuldullah Abd Wahid, BSc (Hons) Sains dan Peng. Sumber Tumb. (UNIMAS)
Nur Nabilah Alias, B Bioinformatics (MSU)

Program Hutan Ladang/Forest Plantation Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Wan Rasidah Wan Abdul Kadir, PhD Soil Chem. (Ghent)

Pegawai Penyelidik/Research Officers
Dr Ang Lai Hoe, PhD Plant and Soil Physiol. (Aberdeen)
Tuan Hj. Abd. Razak Othman, MSc Botany (UKM)
Rosdi Koter, MSc Forest Meteor. (UPM)
Dr Lok Eng Hai, PhD Silvic. & Plant Nutrition (Murdoch Uni., Perth)
Dr Ho Wai Mun, PhD Silvic. & Restor. Ecology (SNU, Seoul)
Dr V. Jeyanny Vijayanathan, PhD Soil Science (UPM)
Rozita Ahmad, BSc (Hons) Industrial Chem. (USM)
Mohamad Fakhri Ishak, BSc Forestry (UPM)
Dasrul Iskandar Darus, MSc Forestry (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Faridah Ahmad Azam, MSc Environ. & Develop. (UKM)
Nur Hafiza Abd Halim, BSc (Hons) Chemistry (UiTM)
Amirul Faiz Rosli, BSc Geology (UM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Amir Saaiffuddin Kassim, MSc Forestry (UPM)
Emlee Mohamad Taib
Zawiah Ngah, Sijil Pertanian (IPSM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)

Tang Lai Kuen, BSc Chem. & Biology (TARC)

Program Membaik Biak Tumbuhan/Plant Improvement Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Mohd Zaki Abdullah (AMP), PhD Genetics (UKM)

Pegawai Penyelidik/Research Officers
Dr Mohamad Lokmal Ngah, PhD Forest Breeding (UniSZA)
Dr Siti Salwana Hj. Hashim, PhD Genetics (UKM)
Dr Farah Fazwa Md Ariff, PhD Genetics (UKM)
Ahmad Fauzi Mohd. Shariff, BSc Agric. (UPM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Syafiqah Nabilah Samsul Bahari, BSc Biotech. (UIA)
Norhayati Saffie, BSc Agric. Biotech. (UniSZA)
Nor Fadilah Wook, BSc (Hons) Biotech. (UIA)

Penolong Pegawai Penyelidik/Assistant Research Officers
Muhammad Asri Lias, PSL
Masitah Mohd. Taini, Sijil Pertanian (IPSM)

Penolong Pegawai Penyelidik/Assistant Research Officer (Contract)
Abdul Rrazak Sahril, Dip Biotech. Industry (UNISEL)

Setiausaha Pejabat/Administrative Secretaries
Nor Fazhani Hashim, Dip Office Mgt. & Tech. (UiTM)
Salmah Abd. Karim, Sijil Trengkas Malaysia (Institut Trengkas Malaysia)

BAHAGIAN BIODIVERSITI HUTAN
FOREST BIODIVERSITY DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officer
Dr Lillian Chua Swee Lian, PhD (Bath)

Program Biodiversiti Flora/Flora Biodiversity Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
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) (cuti belajar hingga/study leave until 2021)
Ummul Nazrah Abdul Rahman, MSc (UKM)
Syahida Emiza Suhaimi, MSc (UM)
Avelinah Julius, MSc (UMS) (cuti belajar hingga/study leave until April 2019)
Siti Munirah Mat Yunoh, MSc (UKM)
Rafidah Abdul Rahman, MSc (UM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Dr E. Soepadmo, PhD (Cambridge)
Dr Ruth Kiew, PhD (Cambridge)
Dr Yap Jing Wei, PhD Biological Sc. (Queensmary Univ. of London) (hingga/until 31/7/2018)
Nadiah Idris, BSc (Hons) (UKM)
Ong Poh Teck, MSc Science (Monash University)
Norzielawati Salleh, MSc (UMK) (hingga/until 30/6/2018)
Syazwani Azeman, BSc Biol. (Botany) (USM) (hingga/until 30/6/2018)
Sarah Nabila Rosli, BSc For. (UPM)
Cheah Yih Horng, MSc (UM)
Siti Eryani Suterisno, BSc Biol. (UPM)
Aliaa Athirah Adam Malek, BSc Env. Sc &Tech (UPM) (hingga/until 31/10/2018)

Penolong Pegawai Penyelidik/Assistant Research Officer
Ahmad Firdaus Zainuddin, BSc For. (UPM) (mulai/from 1/10/2018)

Program Biodiversiti Fauna/Fauna Biodiversity Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Mohammad Shahfiz Azman, BSc (Hons) (UNIMAS)

Pegawai Penyelidik/Research Officers
Nada Badruddin, MSc (UM) (cuti belajar hingga/study leave until September 2018)
Ong Su Ping, MSc (USM)
Nur Zati Akma Mustafa, MSc (UKM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Phon Chooi Khim, PhD. (UM)
Veronica Khoo Swee Imm, MSc (USM)
Kaviarasu A/L Munian, MSc (UM)
Nor Hazwani Ahmad Ruzman, BSc (UNIMAS)
Noor Faradiana Md Fauzi, BSc. App. (Hons) UMT
Nur Alwani Zakaria, BSc. Hons (UKM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)
Muhammad Safuan Sulaiman, Dip Eng in Build. Serv. (Poli. Sultan Azlan Shah)

Program Kesihatan dan Pemuliharaan Hutan/Forest Health and Conservation Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Dr Mohd. Farid Ahmad, PhD (USM)

Pegawai Penyelidik/Research Officers
Dr Gary William Theseira, PhD (Mississippi) (dipinjamkan ke NRE/seconded to NRE)
Patahayah Mansor, MSc (UPM)
Hamidah Mamat, MSc (Geoinformatics) (UTM)
Lau Kah Hoo, MSc (UKM)
Chan Yoke Mui, PhD (UM)
Suhaida Mustafa, MSc (UM) (sehingga/until 31/10/2018, berpindah ke KBG mulai/transfer to KBG from 1/11/2018)
Thi Bee Kin, MSc (UKM)

Pegawai Penyelidik (Kontrak)/Research Officers (Contract)
Wendy Yong Sze Yee, MSc (UPM)
Wan Muhammad Azrul Wan Azhar, MSc (UPM)
Mohd. Salleh Sanusi, BSc (UiTM)
Ahmad Syazwan Samsuddin, MSc (UPM)
Siti Fariezza Khairi Thaw, BSc Env. Sc &Tech (UPM)
Ajla Rafidah Baharom, BSc Env. Sc &Tech (UPM)
Nurfarhana Hizan Hijas, BSc (Hons) (UKM)
Tan Kok Kiat, BSc (Hons) (UMS)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officers (Contract)
Abdul Rrazak Mohd Nor Rasid, Dip. Comp. Sc. (Politeknik)

Setiausaha Pejabat/Administrative Secretaries
Nor Fazhani Hashim, Dip. Office Management & Tech. (HUiTM)
Salmah Abd. Karim, Sijil Trengkas Malaysia (Inst. Trengkas Malaysia)

Program Taman Botani Kepong/Kepong Botanical Garden Programme

Ketua/Head
Pegawai Penyelidik/Research Officer
Adnan Mohammad, MSc (London)

Arkitek Landskap (Kontrak)/Landscape Architect (Contract)
Muhammad Ammar Hamzah, BSc LA (UIAM)

Pegawai Penyelidik/Research Officers
Nur Adila Rosidi, NSc Hort. (UPM) (hingga/until 31/7/2018
Khairul Anwar Ismail, BSc For, (UPM) (mulai/from 18/7/2018)
Chan Yoke Mui, PhD (UM)

Penolong Pegawai Perancang Bandar & Desa/Assistant Town Planner
Azrina Yahya, BSc Town and Reg. Plan (UiTM)

Penolong Pegawai Penyelidik/Assistant Research Officers
Mohd Shis Ibrahim, Dip. Comp. Sc. (UPM)
Ahmad Firdaus Zainuddin, BSc For. (UPM) (hingga/until 30/9/2018: berpindah ke Program Biodiversiti Flora mulai/from 1/10 2018)
Mohd Hasan Buang, Sijil Pertanian (IPSM)

Setiausaha Pejabat/Administrative Secretaries
Zanariah Nasaruddin, Dip. Sec. Sc. (UiTM)
Nur Wahida Tajudin, Dip Sec. Sc. (Poli. Sultan Haji Ahmad Shah)

BAHAGIAN KEWANGAN
FINANCE DIVISION

Pengarah/Director
Tuan Hj. Mohd Zamshari Hj Abd Rahman, CA (M), CPA (Aust), 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)
Nor Afizah Arshad, Dip in Acc. (Politek. Sultan Azlan Shah)
Norfazira Mohamad Pauzi, Dip in Acc. (Politek. Merlimau)
Hasrina Hasnor Kamaruzaman, B (Hons.) Pentad. Perniagaan (OUM)
Faizal Hassan, Cert. in Business Mgmt (Politek. Sultan Azlan Shah)

Setiausaha Pejabat/Administrative Secretary
Sarina Hussin, Dip in Sec. Sc. (UiTM)

BAHAGIAN PENTADBIRAN/ ADMINISTRATION DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officer
Liza Ismail, M (Human Res. Dev.) (UPM)

Cawangan Pentadbiran Am/General Administration Branch

Ketua/Head
Pegawai Penyelidik/Research Officer
Liza Ismail, M (Human Res. Dev.) (UPM)

Penolong Pegawai Tadbir/Assistant Administrative Officers
Mohamad Akhir Abdul Rahman
Nazly Jamaludin

Penolong Jurutera/Assistant Engineer
Idris Ahmad

Cawangan Perolehan/Procurement Branch

Ketua/Head
Pegawai Tadbir/Administrative Officer
Noorsuhanis Abdul Latif, (Corp. Admin) (Hons) (UiTM)

Penolong Akauntan/Assistant Accountants
Norli Raja Mohamad, Dip. Bus. Stud. (UiTM)
Norbaite Saharuddin, Dip. Bus. Stud. (UiTM)

Cawangan Pembangunan dan Penyelenggaraan/Development and Maintenance Branch

Ketua/Head
Jurutera/Engineer
Sharifudden Hj. Samin, MSc. Civil Eng. (Construction) (UiTM)

Penolong Juruukur Bahan/Assistant Quantity Surveyors
Jamal Abdul Razak, Dip. Qty Survey (UiTM)

Penolong Jurutera Awam/Assistant Engineer (Civil)
Mohd Sopiyan Shamsudin, Dip. Civil Eng. (Polytech)

Penolong Jurutera/Assistant Engineers
Norhusaini Abdullah, Dip. Power Elect. Eng. (UTM)
Nik Zulhisam Nik Jaafar

Penolong Pegawai Penyelidik/Assistant Research Officer
Mohd Azhar Ishak @ Asahak, Dip. Mech. Eng. (Polytech)

Penolong Pegawai Seni Bina/Tech. Assistant (Architecture)
Saiful Nizam Samrin, Dip. Architecture (Polytechnic)

Setiausaha Pejabat/Administrative Secretary
Suzrina Shamsuddin, Dip. Sec. Sc. (UiTM)

BAHAGIAN SUMBER MANUSIA
HUMAN RESOURCE DIVISION

Pengarah/Director
Basir Malan Ab. Rahman AMP, AMN, MSc Human Res. Dev. (UPM)

Cawangan Perjawatan/Establishment Branch

Ketua/Head
Pegawai Tadbir/Administrative Officer
Mohd. Asmawee Ismail, MBA (Human Res. Mgmt) (UPM)

Cawangan Perkhidmatan/Services Branch

Ketua/Head
Pegawai Tadbir/Administrative Officer
Azuarni Abdul Adzis, B (Hons) Malay Lang. and Linguist. (UPM)

Cawangan Latihan/Training Branch

Ketua/Head
Pegawai Tadbir/Administrative Officer
Zamri Mohd Zangi, MSc (Hons) (UUM)

Penolong Pegawai Penyelidik/Assistant Research Officer
Ruziah Ripin, B HRM (UPM)

Penolong Pegawai Tadbir/Assistant Administrative Officer
Nur Azani Abdul Rasid, B HRM (Hons) (UUM)

BAHAGIAN PERKHIDMATAN TEKNIKAL
TECHNICAL SERVICES DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officer
Puan Hjh Norhayati Nordin, MSc Tech. & Innov. Mgmt (Sussex)

Cawangan Penerbitan/Publications Branch
Ketua/Head
Pegawai Penyelidik/Research Officer
Mohamad Zaki Hj Mohd. Isa, M Lib. Info. Sc. (UIAM)

Pegawai Penyelidik/Research Officers
Dr Vimala Subramaniam, PhD Biotech. (UM)
Sarifah Kunju Ahmad, M Biotech. (UM)
Ida Suraini Abd. Shukor, MBA Gen. Mgmt. (UIAM)

Penolong Pegawai Penyelidik/Assistant Research Officer
Mohd Yusof Mohamed, Cert. Agri. (IPP)

Cawangan Teknologi Maklumat/Information Technology Branch

Ketua/Head
Pegawai Penyelidik/Research Officer
Wan Zahiri Wan Yaacob, B Comp. Sc. (Hons) (UTM)

Pegawai Penyelidik/Research Officers
Zahari Othman, BSc Info. Tech. (Hons.) (ITM)
Nurul Hilal A. Tarmidzi, M Eng. (UKM)
Norul Maslissa Ahmad, B Info. Tech. (Hons.) (UUM) (cuti belajar/study leave)
Maizura Ishak, BSc Comp. (Hons.) (UTM)

Pegawai Teknologi Maklumat (Kontrak)/Information Technology Officers (Contract)
Intan Dalina Rafidah Othman, B Multimedia (Hons) (UUM)
Muhamad Fetry Adzim Hamdan, BSc. Comp. Sys. (UPM)

Penolong Pegawai Teknologi Maklumat/Assistant Information Technology Officers
Siti Zaleha Abdul Goni, Dip Interact. Multimedia (UniKL)
Omar Ali Abdul Rahim, Dip Comp. Sc. (Poli. Ungku Omar)
Intan Farah Wahida Khabir, BSc. Software Eng. (UTM)
Nordaiman Shairi, Dip Comp. Sc. (UPM)
Muhamad Jeefri Govel, Cert. Electronic Eng. (Comp.) (Poli. Seberang Perai)

Penolong Pegawai Teknologi Maklumat/Assistant Information Tech. Officers (Contract)
Nur Asnida Md Thaha, Dip of Inform. Tech. (Programm.) (Poli. Tuanku Syed Sirajuddin)

Juruteknik Komputer/Computer Technichian
Mohd Khaidir Othman, Cert. Comp. Programming (UiTM)

Cawangan Perpustakaan/Library Branch

Ketua/Head
Pegawai Penyelidik/Research Officer
Mastura Buang, M Lib. Info. Sc. (UIAM)

Pegawai Penyelidik/Research Officer
Noor Atizza Hj Mansor, MSc IT (UKM)

Setiausaha Pejabat/Administrative Secretary
Norazian Syahid Tay, B Office Syst. Mgmt (UiTM)

BAHAGIAN KOMERSIALISASI DAN INOVASI
COMMERCIALISATION AND INNOVATION DIVISION

Pengarah/Director
Pegawai Penyelidik/Research Officer
Puan Hjh Norhayati Nordin, MSc Tech. & Innov. Mgmt (Sussex)

Cawangan Inovasi dan Inkubasi/Innovation and Incubation Branch

Ketua/Head
Pegawai Penyelidik/Research Officers
Mohd Shahidan Mohd Arshad, BSc (Hons) (UM)
(Dipinjamkan ke FRIM Inc. sebagai Ketua Pegawai Eksekutif mulai 4/9/2017/Seconded to FRIM Inc. as Chief Executive Officer from 4/9/2017)
Dr Fadhilah Zainudin, PhD (Birmingham)

Cawangan Pengurusan Harta Intelek/ Intellectual Property Management Branch

Ketua/Head
Pegawai Penyelidik (Kontrak)/Research Officer (Contract)
Munirah Mohd Fauzi, BSc (UiTM)

Penolong Pegawai Teknologi Maklumat (Kontrak)/
Assistant Inform. Technology Officer (Contract)
Nur Hazirah Jalaludin, Dip. Tek. Maklumat (Politeknik (PTSS)

Cawangan Inkubasi Teknologi/Incubation Technology Branch
Ketua/Head
Pegawai Penyelidik/Research Officer
Khairul Kamilah Abdul Kadir, MSc Physiology (UPM)

Pegawai Penyelidik (Kontrak)/Research Officer (Contract)
Mahmud Husni Abd. Hadi, Ijazah Sarjana Muda Kejuruteraan Bahan (UIA)

Cawangan Pengembangan Teknologi/Technology Transfer Branch

Ketua/Head
Pegawai Tadbir/Administrative Officer
Syed Othman Syed Omar, M Intellec. Prop. (UKM)

Pegawai Tadbir (Kontrak)/Administrative Officer (Contract)
Mazdiana Mohd Zain, B Corporate Admin. (Hons) (Comp. Sect) (UiTM)

Pegawai Ehwal Ekonomi (Kontrak)/Economy Officer (Contract)
Noor Syakilah Shafiee, M. Econs (UKM)

Pusat Teknologi Herba/Herbal Technology Center

Ketua/Head
Pegawai Penyelidik/Research Officer
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)
Khairol Iruwan Abdullah, B Eng. (UTM)
Muhammad Yatimi Othman, BSc (UTM)

Penolong Pegawai Penyelidik (Kontrak)/Assistant Research Officer (Contract)
Mohd Faizal Arshad, Dip. Kejuruteraan Mekanikal (PSA)

Akauntan (Kontrak)/Accountant (Contract)
Faizah Sahran, B Acc. (UPM)

Penerbitan
Publication

Penerbitan
Publication

PENERBITAN RASMI/OFFICIAL PUBLICATIONS

Bil. No.	Penerbitan Bersiri Serial Publications	Judul Title
1	Journal of Tropical Forest Science (JTFS)	*JTFS* 30(1), 30(2), 30(3), 30(4) & 30(5) Editors: Sharifah KA & Vimala S
2	Malayan Forest Records (MFR) Editor: Dr Nor Azlin Yahya	*MFR 49(7): Flora of Peninsular Malaysia Series II: Seed Plants,* Vol.7 R Kiew, RCK Chung, LG Saw & E Soepadmo
3	• FRIM Technical Information Handbook • Editor: Sarifah KA	FTIHB45: *Penyakit Layu Ceratocytis di Ladang Acacia mangium: Diagnosa & Pengurusannya,* SA Syazwan
4	• Research Pamphlet (RP) • Editor: • Dr Mary Khoo & • Dr Kevin Ng Kit Siong	RP138: *Characteristics and Properties of Jelutung Timber from the Plantation,* Mohd Khairun Anwar Uyup et al.
		RP139: *Properties and Uses of Planted Khaya ivorensis in Peninsular Malaysia*, Latifah Jasmani
		RP140: *Model Restoration of Ex-Mining Lands: Establishment of New Forests in Rahman Hydraulic Tin, Klian Intan, Perak,* Ahmad Zuhaidi Y, Jeyanny VM et al.
		RP141: *Forest Reference Emission Level for REDD+ in Pahang, Malaysia,* O Hamdan et al.
5	• FRIM Research Data (FRD) • Editor: Mohamad Zaki Mohd Isa	FRD 6: *Maklumat Asas dan Ketinggian Pokok di FRIM Menggunakan LiDAR*, Siti Yasmin Yaakub et al.
6	• Timber Technology Buletin (TTB) • ISSN: 139-258 • Editors: • Dr Mohamad MK & Dr Hamdan H	TTB76: *Surface Quality of Some Malaysian Species Against Natural Weathering,* Anwar UMK et al.
		TTB77: *Durability Performance of Timber Grown on Ex-Mining and Bris Soil,* Noor Azreida Abd Rashid
		TTB78: *Factors Influencing The Quality of Wood Adhesion — Part 2: Glue Spreading*
		FTTB79: *Wood Coatings,* Mohd Khairun Anwar Uyup
		FTTB80*: Wood Properties of Two Selected Pioneer Species: Ludai (Sapium* sp.*) and Mahang (Macaranga* sp.*),* AS Nordahlia et al.
		FTTB81*: Grade Stresses and Strength Group of Plantation Timber: Acacia mangium,* AW Mohd-Jamil
		FTTB82: *Aesthetically Pleasing Furniture from Maesopsis Eminii,* Z Zahidah et al. FTTB 84: *Feasibility of Bakau (Rhizophora* spp.*) for Glue Lamination,* SS How
		FTTB 85: *Delamination and Adhesion Strength of Selected Malaysian Timber for Glue Lamination: Pulai (Alstonia* spp.*)*,SS How & AS Nordahlia
		FTTB 86: *Wood Finishing: Finishes and Techniques*, Mohd Fahmi A et al.

Bil. No.	Penerbitan Bersiri Serial Publications	Judul Title
7	• FRIM Reports (FR) • Editor: • Dr Wan Mohd. Shukri Wan Ahmad	FR 106: *The Development of Strength Classification System of Malaysian Timbers: A Synopsis,* AW Mohd Jamil
		FR 107: *Impak Sistem Pengurusan Kualiti Terhadap Produktiviti dan Budaya Kerja Warga FRIM*, Suharti S & Nik Azyyati AK
		FR 108: *Bonding Performance of Glued Laminated Timber from Yellow Balau (Shorea falcifera),* How SS
8	• FRIM Technical Information • Editor: Chee BJ • ISSN: 0128-0694	FTI 79: *Termites: Friend or Foe?*, SP Ong & AM Nur-Zati
		FTI 80: *Checklist of Threatened Species of Commercial Timbers in Peninsular Malaysia,* Mohd Jamil Abdul Wahab
		FTI 81: *Sign of Termite Infestations*, K Roszaini
		FTI 82: *Insect Pests of Kelempayan (Neomalarckia* spp.*) in Peninsular Malaysia*, SP Ong & M Patahayah
		FTI 83: *Ceratocyctis fimbriata: A White Listed Invasive Alien Species (LAS) Causing Acacia mangium with disease in Malaysia,* Mohd Farid A et al.
9	Majalah/Brosur Magazine/Brochure	
	• FRIM in Focus (FiF) • Editor: Ida Suraini AS	FiF March 2018
		FiF June 2018
		FiF September 2018
		FiF December 2018
	Conservation Malaysia	*Conservation Malaysia* Issue 27
		Conservation Malaysia Issue 28
	Siri Kenali (SK) Editor: Nik Zanariah NM	SK 13: *Teknik Pemprosesan Biji Benih—Belinjau (Gnetum gnemon),* Fadzlinah Z
		SK 14: *Teknik Pemprosesan Biji Benih—Gelam (Malaleuca cajaputi),* Nor Rashidah M
		SK 15: *Teknik Pemprosesan Biji Benih—Sentang (Azadirachta Excelsa), Mohd Saifuldullah AW*
10	Proceeding	Judul/Title
		FP 15: *Sedekad Melestari Legasi Pegetahuan Tradisi. Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi.* 3–4 Julai 2018, Mastura Mohtar et al.

Bil. No.	Penerbitan Bersiri Serial Publications	Judul Title
11	FRIM Special Publications (FSP)	Judul/Title
		FSP 20: *Koleksi Pokok Taman Botani Kepong,* Adnan Mohamad et al. Editor: Mohamad Zaki Mohd Isa
		FSP 21: *Rizab Biosfera Tasik Chini: Penyelidikan FRIM,* Azizan A, Abd. Latif M, Siti Aisah S & Wan Mohd Shukri WA
		FSP 22: *Pictorial Guide to the Flora of Tasik Chini,* Wan Junaidi TJ, Abd. Latif M, Chew MY & Azimuddin B
		FSP 23: *Setiu New Forest: A Gift from Nature*, K Wan Rasidah et al.
		FSP 24: *Pemerkasaan Landskap Zoo Negara Malaysia,* Abd. Latif M, Nik Adlin NMS, Wan Tarmeze WA & Adnan M
		FSP 25: *Buluh dan Panda,* Abd. Razak Othman, Mohd Afendi Hussin, Adnan Mohamad, Amir Saaiffudin Kassim & Khairil Azuar Abdul Khali
		FSP 27: *Cantik Namun Beracun,* M. Abd Latif, N Zawiah, NM Nik Zanariah, H Othaman
12	Penerbitan Lain/Other Publications	Judul/Title
		Manual Sistem FACE FRIM, MJC Norsheilla et al.
		FRIM News & Events: A Compilation of Website Reports 2009–2016, Toh An Nee, Norhayati Nordin & Lim Chung Lu
		Medicinal Forest Species in FRIM, Mazura Md Pisar, Rasadah Mat Ali & Nor Azah Mohamad Ali
		Legasi Waris Rimba, Mastura Mohtar & Norini Haron
		Compendium of Facts and Figures 3rd Edition, Toh An Nee & Norhayati Nordin
		Q&A of Wood Durability, Roszaini K
		Tropical Forest Scientist: Francis S.P. Ng and FRIM 1964–1991
13	Laporan Tahunan FRIM Editor Pengurusan/Managing Editor: Nik Zanariah NM	*Laporan Tahunan FRIM/FRIM Annual Report 2017*

JURNAL/JOURNAL

Termasuk eJournal. Jika diterbitkan dalam kedua-dua bentuk iaitu bercetak dan dalam talian, makalah dalam jurnal bercetak sahaja dinyatakan. Jika dalam Internet sahaja, doi akan dinyatakan.
Including e-Journal. If article published in both i.e. printed and on-line journals, only printed article is listed. If published on-line only, the doi shall be provided.

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(Laporan kepada agensi antarabangsa, agensi kerajaan/kementerian, perundingan, mesyuarat anggota institut (AI) persatuan, organisasi penyelidikan [contohnya NIES, JIRCAS, MARDI], syarikat swasta dll. Cadangan penyelidikan, laporan mesyuarat, laporan makmal, standard, laporan kemajuan [RMK dll.], laporan kerja lapangan, laporan dalaman dan laporan/nota kursus TIDAK diambil kira sebagai laporan institusi).
(Reports to international agencies, government agencies/ministries, consultancies, meetings of AI, societies, research organisations [e.g. NIES, JIRCAS, MARDI], private companies and others. Research proposals, meeting reports, laboratory reports, standards, progress reports [RMKs etc.], field work reports, internal reports and course notes/reports are NOT considered as institutional reports).

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36	NOOR AZLIN Y. Kajian *baseline* kesedaran biodiversiti dan draf pelan tindakan *communication, education and public awareness* (CEPA) biodiversiti kebangsaan. Kertas kerja dibentangkan di Bengkel Konsultasi Pemegang Taruh "Kajian Penglibatan Komuniti Setempat Termasuk Masyarakat Pribumi dalam Ekopelancongan dan Kawasan Perlindungan di Malaysia", 5–7 Mac 2018, Putrajaya.
37	NOOR AZLIN Y. Urban forest for us, benefits to health and wellbeing. Paper presented at the Ninth World Urban Forum, 7–13 Februari 2018, Kuala Lumpur.
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40	NOR AZAH MA. Peranan FRIM dalam penyelidikan herba, pembangunan dan komersialisasi produk berkaitan. Kertas kerja dibentangkan di Program Kesedaran Herba 2.0, 26–27 Februari 2018, Taman Negara Johor, Tanjung Piai.

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55	ROHANA AR. How to conduct a feasibility study. Paper presented at the "Bengkel Pembangunan Produk Komuniti", 7–9 August 2018.

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58	SAM YY & YONG WSY. Ginger diversity as indicator of important plant areas. Paper presented at the 8th International Zingiberales Symposium Singapore, 23–27 July 2018, Singapore Botanic Gardens, Singapore. Abstract was published in Programme & Abstract Book, p. 39.
59	SITI HAJAR MM, SHARIFAH SAKINAH SA, NUR HAJAR ZS & EZZATUL FARHAIN A. 2018. A comparative study of log volume estimation by using statistical method. Paper presented at the 2nd International Conference on Intelligent and Interactive Computing 2018 (IIC 2018), 8–9 August 2018, Melaka.
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61	SITINOR ATIKAH N, ZULKIFLEE AL & HAMDAN O. 2018. Watershed transformation for crown segmentation of *Gonystylus bancanus*. Paper presented at the IEEE 7th Control and System Graduate Research Colloquium (ICSGRC 2016), 8 August 2016, UiTM Shah Alam.
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63	SYAFIQAH NABILAH SB, FARAH FAZWA MA, NORHAYATI S, JEYANNY V, MOHD ZAKI A, MOHD ASRI L & SAMSURI TH. 2018. Effect of N-P-K fertilizer, biochar and compost on the growth of *Citrus hystrix*. Paper presented at the 28th Malaysian Society of Plant Physiology Conference (MSPPC 2018), 28–30 August 2018, Kota Bharu.
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66	VALERIA L & HAMDAN O. 2018. Mangroves mapping and monitoring using free access satellite imagery as input data for mangroves information system in Sabah. Paper presented at the Malaysia Forestry Congress, 29–31 July 2018, Kuching.
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68	WAN MOHD SHUKRI WA, SAMSUDIN M, NUR HAJAR ZS & ISMAIL P. 2018. Hasil kajian berkaitan SMS: ke arah pengurusan hutan mapan. Kertas kerja dibentangkan di Bengkel Konsultansi Penambahbaikan SMS, 27–28 Ogos 2018, Bangi.
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POSTER/POSTERS

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1	ABDUL RRAZAK S, SITI SALWANA H, INTAN NURULHANI B, LOKMAL MN, MADIHAH MN, NORINI H & MOHD ZAKI A. 2018. Pengalihan dan penjagaan anak pokok hutan dari lapangan ke tapak semaian. Poster dibentangkan di Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018. 3 Julai 2018, FRIM, Kepong.
2	AHMAD ASHRIN MB, HAMDAN O, AJMAL ASRAFF I & ATTLEE BANYANG PR. 2018. Sarawak Forest Resource Inventory Project at Heart of Borneo (HoB). Poster presented at the 12th Heart of Borneo (HoB) Trilateral Meeting, 16–29 September 2018, Miri.
3	AHMAD FAUZI MS. 2018. Stesen Penyelidikan FRIM Mata Ayer Perlis. E-poster sempena Hari Inovasi FRIM, 4 Oktober 2018, FRIM, Kepong.
4	AHMAD FAUZI MS, MOHD ZAKI A, SUHAIDA M, AMIR SAAIFFUDIN K & FAIZAN ZH. 2018. Bank Germplasma Dipterokarpa Negara. Poster dibentangkan di Pameran Hari Hutan Antarabangsa Peringkat Negeri Perlis, 12 April 2018, Taman Negeri Perlis, Wang Kelian.
5	AHMAD NAZARUDIN MR, MOHD FARID A & MUHAMMAD AMIRUDDIN ZA. 2018. *In vitro* evaluation of paclobutrazol against selected pathogenic soil fungi. Poster presented at the 30th Malaysian Society of Plant Physiology Conference, 28–30 August 2018, Kota Bharu.
6	AHMAD NAZARUDIN MR, TSAN FY & NORMANIZA O. Biochemical response of *Xanthostemon chrysanthus* (golden penda) to paclobutrazol and potassium nitrate. Poster presented at the 30th Malaysian Society of Plant Physiology Conference, 28–30 August 2018, Kota Bharu.
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8	ANG LH, TANG LK, HO WM, MADZLAN Z & AZIZI W. 2018. Growing new forest on an ex-tin mine in Tronoh, Perak. Poster presented at the 28th Malaysian Society of Plant Physiology Conference (MSPPC 2018), 28–30 August 2018, Kota Bharu.
9	Cawangan Persijilan Perhutanan, Poster presented at the Export Furniture Exhibition 2018, 9–12 March 2018, Kuala Lumpur Convention Centre.
10	Chemical constituents of *Litsea* essential oils and their chemotype variations. Poster presented at the International Conference of Natural Products, 19–21 March 2018, Penang.
11	Chromatographic profiling of *Schima wallichii* (DC) Korth leaves of Cameron Highland and its radical scavenging property. Poster presented at the International Conference of Natural Products, 19–21 March 2018, Penang.
12	DASRUL ISKANDAR D, LOK EH, FARIDAH AA, ROSDI K & AMIR S. Growth performance of *Acacia* species on Beach Ridges Interspersed with Swales (BRIS) soils. Poster presented at the 28th Malaysian Society of Plant Physiology Conference (MSPPC 2018). 28–30 August, 2018, Kota Bahru.
13	FARADIANA, FAUZI NM, ALWANI, N. ZAKARIA, SHAHFIZ, M. AZMAN, KAVIARASU MUNIAN & NOR HAZWANI, A. RUZMAN. Birds in environmentally sensitive areas (ESA) of Selangor. Poster presented at the 31st International Birds Race, 30–31 March, Frasers Hill.
14	NOOR FARADIANA MF, KAVIARASU M, SHAHFIZ MA, NUR ALWANI Z & NOR HAZWANI A. RUZMAN. Herpetofauna in environmentally sensitive areas (ESA) of Selangor. Poster presented at the 31st International Birds Race, 30–31 March, Frasers Hill.

15	NOOR FARADIANA MF, SHAHFIZ MA, KAVIARASU M, NOR HAZWANI A, RUZMAN & NUR ALWANI Z. Small mammals in environmentally sensitive areas (ESA) of Selangor. Poster presented at the 31st International Birds Race, 30–31 March, Frasers Hill.
16	FARAH FAZWA MA, NORHAYATI S, SYAFIQAH NABILAH SB, NUR NAZIHAH M, MASITAH MT, SAMSURI TH & MOHD ZAINI Z. 2018. Growth responses of thirty *Labisia pumila* accessions which contained uterus contraction activity planted at five clonal bank plots. Poster presented at the 28th Malaysian Society of Plant Physiology Conference (MSPPC 2018), 28–30 August 2018, Kota Bharu.
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18	FARAH FAZWA MA, SYAFIQAH NABILAH SB, NORHAYATI S, SITI SUHAILA AR, MASITAH MT, SAMSURI TH, ROHAIDAH N, MOHD ZAINI Z, NUR IZATTY ATIKAH JS, FARA SHAZWANIE OT & AHMAD H 2018. Elite clone of *Labisia pumila* (FaFaF01). Poster presented at the 29th International Invention, Innovation & Technology Exhibition (ITEX 2018), 10–12 May 2018, Kuala Lumpur Convention Centre.
19	FARAH FAZWA MA, SYAFIQAH NABILAH SB, NORHAYATI S, SITI SUHAILA AR, MASITAH MT, SAMSURI TH, ROHAIDAH N, MOHD ZAINI Z, NUR IZATTY ATIKAH JS, FARA SHAZWANIE OT & AHMAD H 2018. Elite clone of *Labisia pumila* (kacip fatimah) and rapid mass production technique for sustainable supply of high quality planting materials. Poster presented at 29th International Invention, Innovation & Technology Exhibition (ITEX 2018), 10–12 May 2018, Kuala Lumpur Convention Centre.
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21	FARAH FAZWA MA, MARZALINA M, SYAFIQAH NABILAH SB & NORHAYATI S. 2018. Compost for acclimatization of kacip fatimah. Poster presented at the "Ekspo Inovasi Islam Kali ke-8 (8th i-Inova 2018)", 10–11 March 2018, Universiti Sains Islam Malaysia (USIM), Nilai, Negeri Sembilan.
22	FARAH FAZWA MA, NORHAYATI S, SYAFIQAH NABILAH SB, JEYANNY V, MOHD ZAKI A, MASITAH MT & MOHD ASRI L. 2018. Evaluation of macroelement and physical analysis of at five natural populations of *Chromolaena odorata* for future breeding programme. Poster presented at the 10th International Symposium on Plant-Soil Interaction at Low pH 2018, 25–29 June, 2018, Putrajaya.
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24	FARAH FAZWA MA, SYAFIQAH NABILAH SB, NORHAYATI S, & MASITAH MT. 2018. Production of total phenolic contents in *Labisia pumila* var. *alata* (clone KFeFRIM1) planted at four different locations. Poster presented at the 10th International Symposium on Plant-Soil Interaction at Low pH 2018, 25–29 June, 2018, Putrajaya.
25	FARAH SHAHANIM MM, RAJA BARIZAN RS, NASRULHAQ BOYCE A & NORMANIZA O. 2018. Biomass quantification of *Neobalanocarpus heimii* (cengal) stocks for open planting treated under different light and fertilizer treatments in nursery. Poster presented at the 15th Symposium of Malaysian Society of Applied Biology, 29 June–1 July 2018, Melaka.
26	FIRDAUS K, FADZUREENA J, NIK MUSAADAH M, KHOO MGH, CHEE BJ, ROHANA S, ADIANA MA, HANI IDAYU B, NOR HIDAYATUL KHAMARIAH ZA, AZMAN M, TAN AL, MADIHAH MN, INTAN NURULHANI B, BADARIAH M & NORINI H. Pembangunan ekstrak piawai KLL092 daripada tumbuhan ubatan orang Asli Kensiu sebagai agen antidiabetes. Poster presented at the "Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018", 3 Julai 2018, FRIM, Kepong.

27	KHOO MGH, ROHANA S, NIK MUSA'ADAH M, FADZUREENA J, ADIANA MA, LING SK, TAN AL, INTAN NURULHANI B, BADARIAH M, MADIHAH MN, MOHD. HAFIDZ HADI A, SITI KAMARIAH MH, LIM HF & NORINI H. Penilaian toksisiti secara in vitro tumbuhan ubatan berasaskan pengetahuan tradisi orang Asli di Gerik, Perak dan Gua Musang, Kelantan. Poster presented at the "Seminar Pemuliharaan & Pemerkasaan Pengetahun Tradisi 2018", 3 July 2018, FRIM, Kepong.
28	KOBAYASHI MJ, NG KKS, LEE SL, MUHAMMAD N & TANI N. 2018. Morphological, physiological and transcriptomic analyses of stem growth in a tropical timber tree species, *Shorea leprosula*. Poster presented at the 42nd New Phytologist Symposium "The Biology of Wood: from cell to trees", 10–12 July 2018, Granlibakken, Lake Tahoe, CA, USA.
29	KOBAYASHI MJ, NG KKS, LEE SL, MUHAMMAD N, TANI N. 2018. Growth analysis of dipterocarp seedlings. Poster presented at the 65th Annual Meeting of the Ecological Society of Japan, 14–18 March 2018, Sapporo.
30	MAILINA J, NOR AZAH MA, SAIDATUL HUSNI S, MOHAMMAD FARIDZ ZP, NIK MUSA'ADAH M, INTAN NURULHANI B, BADARIAH M, FADZUREENA J, TAN AL, MADIHAH MN, NURUL HUSNA Z, LIM HF & NORINI H. 2018. Kajian kimia kandungan minyak pati sampel SLJ 157 dan SBT106. Poster presented at the "Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018", 3–4 July 2018, FRIM, Kepong.
31	MAZURA MP, SITI NUR AISYAH MH, HANI IDAYU B, SITI KAMARIAH MH, FADZUREENA J, TAN AL, INTAN NURULHANI B, MADIHAH MN, AMELIA BA, NIK MUSA'ADAH M & NORINI H. 2018. Penilaian aktiviti antiradang berdasarkan pengetahuan tradisi orag asli subetnik Semelai, Jahai dan Temiar. Poster presented at the "Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018", 3–4 July 2018, FRIM, Kepong.
32	MOHD AFZANIZAM M, PHILIP E, MOHD HANIFF H & JEYANNY V. 2018. Soil CO_2 efflux and soil respiration in peat swamp forest in Pekan Pahang using a closed dynamic soil chamber. Poster presented at the International Conference on Atmospheric Composition and Climate Change in Asia (ICACCCA 2018), 27–28 March 2018, UKM, Bangi.
33	MOHD AFZANIZAM M, S AZMAN B & PHILIP E. 2018. Evaluation of biomass increment and stand dynamics of *Gonystylus bancanus* (ramin melawis) in Peat Swamp Forest, Pekan Pahang, Malaysia. Poster presented at the 28th Malaysian Society of Plant Physiology Conference (28th MSPPC 2018), 27–30 August 2018, Kota Bharu.
34	MOHD AZAHARI F, MOHD GHAZALI H & SITI AISAH S. 2018. Mapping of lotus distributions using Sentinel-2 satellite imagery in Tasik Chini. Poster presented at the Kuala Lumpur International Agriculture, Forestry and Plantation Conference 2018, 24–25 April 2018, Hotel Bangi-Putrajaya.
35	MOHD SAIFULDULLAH AW, NOR HASNIDA H, NAZIRAH A, MUHAMMAD FUAD Y, AHMAD ZUHAIDI Y, ROZIDAH K, SABARIAH R, NAEMAH H, RUKIAH M & HARITH MUHAIMIN M. Effects of different potting media on the performance of *Eucalyptus* hybrid tissue culture plantlets under nursery condition. Poster presented at the 28th Malaysian Society of Plant Physiology Conference (MSPPC 2018), 28–30 August 2018 Kota Bahru.
36	MUKRIMAH A, MOHD PARID M, FATEN NASEHA TH & LIM HF. 2018. Socio economic status of forest adjacent communities: a case of Negeri Sembilan. Poster presented at the 6th Kuala Lumpur International Agriculture, Forestry and Plantation Conference 2018, 24–25 April 2018, Bangi.
37	MyWood-ID. Poster presented at the FRIM Inc. Officiation Ceremony, 2 February 2018, FRIM, Kepong; MIFF, 8–11 March 2018 and ITEX, MITEC,10–12 May 2018, KLCC, Kuala Lumpur;
38	NASHATUL ZAIMAH NA, NORWATI M & MOHD LOKMAL N. 2018. Germination responses of *Dyera costulata* seeds to cryopreservation. Poster presented at the Third International Symposium on Plant Cryopreservation, 26–28 March 2018, Bangkok.
39	NAZIRAH A, NOR HASNIDA H, MOHD SAIFULDULLAH AW & MUHD FUAD Y. 2018. Pengenalan spesies KLL 092 ke dalam media kultur daripada eksplan spora. Poster dibentangkan di Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi, 3 Julai 2018, FRIM, Kepong.

40	NAZIRAH A, NOR HASNIDA H, MUHD FUAD Y, MOHD SAIFULDULLAH AW, ROZIDAH K, ROHANI A, SABARIAH R, NAEMAH H, RUKIAH M & NOR SAFFANA B. Mass production of *Eucalyptus* hybrid for commercial plantation. Poster presented at the 28th Malaysian Society of Plant Physiology Conference (MSPPC 2018), 28–30 August 2018, Kota Bahru.
41	NG KKS, KOBAYASHI MJ, LEE SL, HATAKEYAMA M, PAAPE T, FAWCETT J, NG CH, ANG CC, TNAH LH, LEE CT, NISHIYAMA T, SESE J, ISA MNM, ONG RC, PUTRA M, SIREGAR IZ, INDRIOKO S, IZUNO A, ISAGI Y & SHIMIZU KK. 2018. Genome sequence of an Asian dipterocarp suggests paleopolyploidization with enrichment of drought response genes. Poster presented at the 42nd New Phytologist Symposium, 10–12 July 2018, Granlibakken, Lake Tahoe, CA, USA.
42	NIK ADLIN NMS, WAN TARMEZE WA, TARIQ M, ZAIRUL AMIN R & KHAIRUL M. Modular seating system. Poster presented at the Malaysia Technology Expo (MTE 2018), 22–24 February 2018, PWTC Kuala Lumpur.
43	NOR AZAH MA, MAILINA J, ABD MAJID J, SHARIN L, SAIDATUL HUSNI S, SAM YY, MOHAMMAD FARIDZ ZP, NURLIYANA AL & NOORSIHA A. Study on essential oils of *Geostachys megaphylla, G. densiflora* and *Etlingera metriocheilos* from Cameron Highlands, Malaysia. Poster presented at the 8th International Zingiberales Symposium, Singapore, 23–27 July 2018, Singapore Botanic Gardens, Singapore. Abstract was published in Programme & Abstract Book, p. 92.
44	NOR HASNIDA H, NAZIRAH A, MUHAMMAD FUAD Y, MOHD SAIFULDULLAH AW, ROHANI A, ROZIDAH K, SABARIAH R, NAEMAH H, RUKIAH M, LING SK, ABD. RASHIH A, SITI SUHAILA AR, NORWATI M, SITI SYARIFAH MM, FADHILAH Z, NIK MUSAADAH M & HALIZA I. 2018. Sustainable production of tongkat ali bioactive compounds from hairy roots culture using bioreactor technology. Poster presented at the "Pameran ITEX", 10–12 May 2018, KLCC, Kuala Lumpur.
45	NORHAYATI I, GETHA K, LILI SAHIRA H, NIK MUSAADAH NM & FADZUREENA J. 2018. Penilaian kesan ekstrak tumbuhan ubatan berdasarkan pengetahuan tradisi orang asli terhadap aktiviti antitripanosoma. Poster dibentangkan di Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018, 3 Julai 2018, FRIM, Kepong.
46	NORHAYATI S, FARAH FAZWA MA, SYAFIQAH NABILAH SB & SITI SUHAILA AR. 2018. Growth performance and chemical properties of elite *Labisia pumila* produced by tissue culture and cutting methods. Poster presented at the 15th Symposium of The Malaysian Society of Applied Biology, 29 June–1 July 2018, Malacca.
47	NORHAYATI S, FARAH FAZWA MA, SYAFIQAH NABILAH SB & SITI SUHAILA AR. 2018. Production of high quality raw material of *Labisia pumila* (kacip fatimah) at Kampung Sagil, Ledang, Johor. Poster presented at 6th Kuala Lumpur International Agriculture, Forestry & Plantation, 24–25 April 2018, Bangi.
48	NORLIYANA A & MOHD PARID M. 2018. Habitat quality for fragmented forest area: Negeri Sembilan case study. Poster presented at the 6th Kuala Lumpur International Agriculture, Forestry and Plantation, 24–25 April 2018, Bangi.
49	NURCAHAYA KHAIRANY MA, FARAH SHAHANIM MM & RAJA BARIZAN RS. 2018. Establishing a mixed-dipterocarp species plot in a degraded site in rizab Chini, Pahang. Poster presented at the 15th Symposium of Malaysian Society of Applied Biology, 29 June – 1 July 2018, Melaka.
50	NURFARHANA-HIZAN H. 2018. Species diversity of *Brachyura* crabs in the coastal of Mersing, Johor. Poster presented at the "Pameran MyBIS sempena Sambutan Hari Bumi", Kampung Pulau Penarik, Tangkak.
51	NUR HAFIZA AH, WAN RASIDAH K, ROSAZLIN A, MOHAMAD FAKHRI I & NUR ZAHIRAH Z. 2018. Evaluations on stand health status of *Rhizophora* trees at mangrove forest in Tanjung Piai, Johor. Poster presented at the 28th Malaysian Society of Plant Physiology Conference, 28–30 August 2018, Kota Bharu.

52	NURHANAN MURNI Y, FADZUREENA J, NIK MUSAADAH M, INTAN NURULHANI B, TAN AL, ADIANA MH, BADARIAH M, MADIHAH, NORINI H & HIDAYATUL KHAMARIAH. Jawatankuasa MoU FRIM-JAKOA. Penilaian 16 spesies tumbuhan ubatan terpilih daripada subetnik Semelai, Jahai, Temiar dan Mahmeri terhadap kesan antikanser secara in vitro. Poster dibentangkan di Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018. 03 Julai 2018, FRIM, Kepong.
53	NUR NABILAH N, NORLIA B, MOHD FAIZAL AB, SYAZWAN SA & NORWATI M. 2018. *De novo* transcriptome sequencing and identification of upregulated genes involved in phenylpropanoid pathways of *Acacia mangium* in response to Ceratocystis infection. Poster presented at the MSAB 2018, The 15th Symposium of Malaysian Society of Applied Biology, 29 June–1 July 2018, Melaka.
54	PDM3: Nature inspired active ingredient for an ecofriendly multipurpose disinfectant. Poster presented at Islamic Global Innovation Festival and Talent (i-INOVA) 2018, 10– 11 March 2018, Universiti Sains Islam Malaysia (USIM), Nilai.
55	ROZITA A, MOHD. ZOBIR H, WAN RASIDAH K, SITI HALIMAH S & TAUFIQ YYH. 2018. Sustained release and phytotoxicity studies of insect pheromone delivery system based on valeric acid–zinc layered hydroxide nanohybrid. Poster presented at the 6th Kuala Lumpur International Agriculture, Forestry & Plantation Conference, 24–25 April 2018, Bangi.
56	SAIDATUL HUSNI S, NOR AZAH MA, MAILINA J, SITI NUR AISYAH MH, NORULAIMAN Y, NOR HAYATI A, NURHAZWANI MH, NIK MUSA'ADAH M, FADZUREENA J, HANI IDAYU B, NOOR RASYILA MN, TAN AL, LIM HF & NORINI H. 2018. Pembangunan produk prototaip berasaskan pengetahuan tardisi orang asli: Pengloy Semai UGG004. Poster dibentangkan di Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018, 3~~–4~~ Julai 2018, FRIM, Kepong.
57	SAM YY, TITAN Y & LEONG-ŠKORNIČKOVÁ Y. Recircumscribed *Amomum* – what is next for Peninsular Malaysian species? Poster presented at the 8th International Zingiberales Symposium, 23–27 July 2018, Singapore Botanic Gardens, Singapore. Abstract was published in Programme & Abstract Book, p. 77.
58	SHALINI M, MAZURA P & MASTURA M. Profiling of selected phytoconstituents as potential anti-aging active ingredient for cosmeceutical preparation. Poster presented at the International Conference on Antioxidant & Degenerative Diseases, 18–19 July 2018, Kuala Lumpur.
59	SHALINI M, MAZURA MP, NIK MUSAADAH M, FADZUREENA J, FIRDAUS K, SITI NUR AISYAH MH, ADIANA MA, FAUZIAH A, KHOO MGH, ROHAN S, HANI IDAYU B, JULIZA M, NOR HIDAYATUL KHAMARIAH ZA, MADIHAH MN, TAN AL, INTAN NURULHANI B, BADARIAH M & NORINI H. 2018. Potensi ekstrak piawai ABP016 sebagai agen antiinflamatori. Poster dibentangkan di Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2018, 3 Julai 2018, FRIM, Kepong.
60	SITI AISAH S & RASHIDAH H. 2018. Kajian penilaian hutan tadahan untuk sumber air bersih dan berkekalan di negeri Perak, 12 March 2018, E-poster:
61	SITI AISAH S & RASHIDAH H. 2018. Pemulihan hutan paya gambut, Hutan Simpan Ayer Hitam (U), Muar, Johor. E-poster:
62	SITI NUR AISYAH MH, MAZURA P, NIK MUSAADAH M, FADZUREENA J, ADIANA MA, TAN AL, INTAN NURULHANI B, MADIHAH MN, BADARIAH M, NURUL HUSNA Z, HANI IDAYU B, SITI KAMARIAH MH, AMIZAN M, AMELIA BH & NORINI H. 2018. Penilaian antiinflamasi spesies tumbuhan ubatan terpilih berdasarkan pengetahuan tradisi subetnik orang Asli di Kelantan. Poster dibentangkan di Seminar Pemuliharaan & Pemerkasaan Pengetahun Tradisi 2018, 3 Julai 2018, FRIM, Kepong.
63	SITI SUHAILA AR & NORWATI M. 2018. Rapid mass production of *Labisia pumila* (Fafaf01) using temporary immersion system. Poster presented at the 29th International Invention, Innovation & Technology Exhibition, 1–12 May 2018, Kuala Lumpur Convention Centre, Kuala Lumpur.
64	SITI ZALIHA A & KHAIRUL A. 2018. Furniture testing. Poster presented at the Malaysian International Furniture Fair MIFF 2018), 8–11 March 2018 MITEC, Kuala Lumpur.

65	Soil CO_2 efflux and soil respiration in peat swamp forest in Pekan Pahang using a closed dynamic soil chamber. Poster presented at the International Conference on Atmospheric Composition and Climate Change in Asia, 27–28 March 2018, UKM, Bangi.
66	SURA MAAN S, NURHANAN MURNI Y, MUHAMAD HAFFIZ J & YUSOF K. 2018. The effect of compound SNA209 on Angiotensin II- induced cardiac hypertrophy in H9c2 cardiomyocytes. Poster presented at the Int. Conf. on Molecular Medicine in Nutrition, Health and Disease, 16–17 April 2018, Shah Alam.
67	SYAFIQAH NABILAH SB, FARAH FAZWA MA & NORHAYATI S. 2018. Microscopic identification of two important varieties of *Labisia pumila* in Peninsular Malaysia. Poster presented at the 28th Malaysian Society of Plant Physiology Conference, 28–30 August 2018, Kota Bharu.
68	SYAFIQAH NABILAH SB, FARAH FAZWA MA, NORHAYATI S & MASITAH MT. 2018. Effect of compost (CompAcc) on early growth of *Labisia pumila* produced from tissue culture at nursery stage. Poster presented at the 10th International Symposium on Plant-Soil Interaction at Low pH 2018, 25–29 June 2018, Putrajaya.
69	TANG LK, ANG LH, HO WM & MADZLAN Z. 2018. Domestication of endemic, endangered and threatened rainforest tree species at slime tailings. Poster presented at the 28th Malaysian Society of Plant Physiology Conference (MSPPC 2018), 28–30 August 2018, Kota Bharu.
70	TUMIRAH K. 2018. Quality control of treated timber for construction. Poster presented at the "Pameran Ecobuilt 2018", 27–29 March 2018, KLCC Convention Centre, Kuala Lumpur.
71	WAN KHAIRUL ANUAR WA, AHMAD AZINUDDIN AR, NURUL NAJWA Z, BADRUL HISHAM I, MOHD NAZRI B, NURIN IZZATI MZ, ROSLIZA J, SITI NOOR AISHIKIN AH, MASNIRA MY, PATAHAYAH M, AMINAH M, MOHD SALLEH S & NUR SALIHA AZ. 2018. Biopesticides approach against leaf roller caterpilar, *Pyrausta panopealis* on misai kucing, *Orthosiphon stamineus* in Malaysia.Poster presented at the 28th Malaysian Society of Plant Physiology Conference, 28–30 August 2018, Kota Bharu.
72	WAN RASIDAH K, JEYANNY V, MOHAMAD FAKHRI I & SUHAIMI WC. 2018. Towards the realization of FRIM's UNESCO dream by soil scientist. E-poster presented at the "Hari Inovasi FRIM", 1 August–3 September 2018, FRIM, Kepong.
73	ZAIRUL AR & MOHD IZANI I. 2018. Natural-look furniture simply let the natural shapes. Poster presented at the Malaysian International Furniture Fair 2018, 8–11 March 2018, MATEC, Kuala Lumpur.
74	Antimicrobial, antioxidant and phytochemical screening of three *Bruguiera* species. Poster presented at the International Conference of Natural Products, 19–21 March, 2018, Penang.

Laporan & Penyata Kewangan
Financial Reports & Statement

1.0 LAPORAN KEWANGAN BAGI TAHUN BERAKHIR 31 DISEMBER 2018
FINANCIAL REPORT FOR YEAR ENDED 31 DECEMBER 2018

1.1 Tahun 2018 merupakan kali kedua akaun Institut disediakan setelah Akta Institut Penyelidikan Perhutanan Malaysia 2016 (Akta 782) dikuat kuasakan pada 1 Oktober 2016, akaun tahun lepas ialah akaun yang pertama. Oleh itu, analisis kewangan yang diberikan adalah bagi dua tahun iaitu 2018 dan 2017 sahaja. Untuk makluman juga, tempoh tahun kewangan berakhir 31 Disember 2018 ialah selama 12 bulan (1 Januari 2018 hingga 31 Disember 2018) berbanding dengan 2017 selama 15 bulan (1 Oktober 2016 hingga 31 Disember 2017). Perbezaan tempoh tahun kewangan ini menjelaskan akan sebab angka-angka perbandingan menunjukkan jumlah sedemikian.

Year 2018 is the second year that the account of the Institute was prepared after the Forest Research Institute Malaysia Act 2016 [Act 782] came into force from 1 October 2016, and last year being the inaugural account. For that reason, financial analysis presented is for two years only 2018 and 2017. It is also informed that the financial year period ended 31 December 2018 is for 12 months (1 January 2018 to 31 December 2018) whereas 2017 for 15 months (1 October 2016 to 31 December 2017). The difference in the financial period suggests the reason why comparison figures indicate as what they are.

2.0 PRESTASI KEWANGAN
FINANCIAL PERFORMANCE

2.1 Bagi tahun kewangan hingga 31 Disember 2018, FRIM mencatatkan jumlah pendapatan sebanyak RM114.4 juta. Manakala perbelanjaan pula sebanyak RM119.0 juta, menjadikan perbelanjaan telah melebihi pendapatan sebanyak RM5.4 juta. Hal ini adalah disebabkan peruntukan susut nilai (item bukan tunai) yang dikenakan bagi tahun berkenaan berjumlah RM21 juta. Akibat daripada penilaian semula hartanah FRIM pada 2016, nilai ekuiti FRIM telah meningkat dengan ketara. Namun begitu, perbelanjaan susut nilai yang dikenakan telah memberi kesan kepada prestasi kewangan semasa FRIM. Prestasi kewangan FRIM bagi tahun 2018 adalah seperti Jadual 1:

For the period ended 31 December 2018, FRIM had recorded total revenue of RM114.4. Meanwhile total expenditure was RM119.0 million, resulting in total expenditure exceeded revenue by RM5.4 million. This is mainly due to the provision for depreciation (non-cash item) allocated for the year amounting to RM21 million. Because of restatement value of property assets in 2016, FRIM equity value has increased significantly. However, the depreciation charges imposed had impacted the current financial performance of FRIM. Financial performance of FRIM for the year 2018 is as Table 1:

Jadual 1: Prestasi Kewangan FRIM Tahun 2018 Berbanding Tahun 2017
Table 1: FRIM Financial Performance for the Year 2018 compared to 2017

Butiran/Items	Tahun/Year 2018 (RM) 1/1/2018 hingga/to 31/12/2018 (12 bulan/months)	Tahun/Year 2017 (RM) 1.10.2016 hingga/to 31.12.2017 (15 bulan/months)	Perbezaan (RM) +/- Difference
Pendapatan/ Revenue	114, 391, 421	138,976,659	24,585,238
Perbelanjaan/ Expenditure	119, 015, 433	153,242,829	34,227,396
Lebihan/(Kurangan) Pendapatan sebelum cukai/ Income Surplus/(Deficit) before tax	(5,360,806)	(15,140,988)	9,642,158
Cukai Pendapatan/Income Tax	(736,794)	(874,798)	138,004
Lebihan/(Kurangan) Pendapatan selepas cukai/ Income Surplus/(Deficit) after tax	(5,360,806)	(15,140,968)	9,780,162

3.0 PENDAPATAN REVENUE

3.1 FRIM masih bergantung pada Geran Kerajaan Persekutuan bagi membiayai aktiviti-aktiviti penyelidikan dan perbelanjaan harian yang perlu ditanggung. Penggunaan geran kerajaan diterima adalah seperti Jadual 2 di bawah:

FRIM still dependent on Federal Government Grant to finance its research activities and day-to-day operation expenses. The usage of government grant received is as Table 2 below:

Jadual 2: Penggunaan Geran Kerajaan 2018 berbanding Tahun 2017
Table 2: Usage of Government Grant 2018 compared to 2017

Butiran/Item	Tahun/Year 2018		Tahun/Year 2017	
	Diterima Received	Prestasi Performance	Diterima Received	Penggunaan Performance
Geran Mengurus Kerajaan/ Government Operation Grant	65,842,600	100%	70,413,650	100%
Geran RMKe11 Kerajaan/ Government RMke11 Grant	23,374,000	99.73%	28,044,000	94.62%
Geran-geran lain Kerajaan/ Others Government Grant	4,507,373	100%	6,056,216	100%

3.2 FRIM turut memperoleh pendapatan daripada aktiviti perkhidmatan teknikal dan perundingan yang ditawarkan, jualan, sewaan, keuntungan daripada simpanan tetap dan sumbangan daripada agensi luar berjumlah RM17.9 juta. Jumlah ini menunjukkan penurunan sebanyak RM9.9 juta atau 36 peratus berbanding dengan tahun 2017 sebanyak RM27.8 juta.

FRIM also received revenue from its technical and consultancies services provided, sales, rental, profit from fixed deposits and contribution from external agencies, totalling to RM17.9 million. The figure shows a decreased of RM9.9 million or 36 percent compared with year 2017 of RM27.8 million.

4.0 PERBELANJAAN
EXPENDITURE

4.1 Pada tahun 2018, FRIM mencatatkan jumlah perbelanjaan sebanyak RM119.0 juta. Kos gaji, elaun dan faedah-faedah kewangan lain kepada pekerja menyumbang sebanyak RM56.2 juta atau 47 peratus, manakala perkhidmatan dan bekalan RM32.3 juta atau 27 peratus, dan perbelanjaan–perbelanjaan lain sebanyak RM30.5 juta atau 26 peratus daripada jumlah keseluruhan perbelanjaan. Angka-angka ini menunjukkan penurunan disebabkan tempoh perakaunan pada tahun 2018 ialah 12 bulan berbanding dengan tahun sebelumnya sebanyak 15 bulan.

In the year 2017, FRIM recorded a total expenditure of RM119.0 million. Salaries, allowances and other staff financial benefits contributed RM56.2 million or 47 percent, meanwhile supplies and services contributed RM32.3 million or 27 percent, and others expenditure constitute RM30.5 million or 26 percent of the total amount. These figures indicate a decreased because of the accounting period in 2018 is for 12 months compared to 15 months of the previous years.

4.2 Kos perkhidmatan dan bekalan termasuklah menyelenggara peralatan, kenderaan, bangunan, pembersihan, keselamatan, caj utiliti, kos perjalanan, pengangkutan, perubatan untuk staf, kos bahan mentah, kajian dan kos-kos lain. Caj susut nilai merangkumi susut nilai aset tetap FRIM dan paling ketara ialah susut nilai hartanah dengan jumlah susut nilai dikenakan pada tahun semasa sebanyak RM21.0 juta.

The cost of supplies and services includes cost to maintain machineries, vehicles, buildings, cleaning services, security services, utility cost, transportation and travelling cost, medical for staff, raw materials, researches and other costs. Depreciation includes depreciation for fixed asset and most significant is the depreciation of it property asset with the depreciation amount charged of RM21.0 million.

5.0 KEDUDUKAN ASET INSTITUT
INSTITUTE ASSET POSITION

5.1 Jumlah keseluruhan aset FRIM pada 31 Disember 2018 direkodkan sebanyak RM1,428 juta berbanding RM1,393 juta pada tahun lepas, menunjukkan peningkatan sebanyak RM35 juta. RM1,338 juta daripadanya atau 94 peratus merupakan aset bukan semasa atau aset tetap dan bakinya RM89.7 juta atau 6 peratus ialah aset semasa dengan RM84.3 juta daripadanya merupakan tunai atau kesetaraan tunai.

Total assets of FRIM as at 31 December 2018 was amounting to RM1,428 million compared to RM1,393 million in the previous year, showing an increased of RM35 million. RM1,338 million of those or 94 percent represent non-current or fixed assets and RM89.7 million or 6 percent was current assets, with RM84.3 million of those was cash and cash equivalent.

5.2 Jumlah liabiliti pula hanya RM8.1 juta yang terdiri daripada pelbagai pemiutang, deposit diterima dan peruntukan cukai pendapatan. Penyata aliran tunai menunjukkan peningkatan bersih tunai sebanyak RM8.6 juta hanya disebabkan oleh penjadualan bayaran tunai dan ia selari dengan aktiviti kewangan dalam tahun di bawah kajian.

Total liabilities is only RM8.1 million which consist of various creditors, deposits received and provision for income taxes. The cash flows statement shows an increased in cash balance of RM8.6 million, only because of the timing of cash disbursement and it is in line with the financial activities for the year under reviewed.

5.3 Sebagai badan kerajaan, FRIM akan hanya berbelanja berdasarkan kelulusan peruntukan yang diperoleh sama ada daripada Kerajaan Persekutuan atau sumber-sumber lain. FRIM tidak melakukan sebarang bentuk pinjaman untuk membiayai perbelanjaannya. Lebihan peruntukan yang belum dibelanjakan akan disimpan dalam simpanan tetap dan dilaburkan dalam instrumen kewangan yang dibenarkan oleh Kementerian Kewangan. Justeru, semua petunjuk dan nisbah kewangan FRIM tidak menunjukkan apa-apa kelemahan seperti ditunjukkan dalam Jadual 3 di bawah:

As a government agency, FRIM could only spend base on the amount approved and received from either Federal Government or other sources of income. The Institute did not finance any of its activities through loan or credit. Any committed allocation not yet spent would be invested in fixed deposit in local banks and financial institutions, and other instrument as approved by the Ministry of Finance. As such, the Institute's financial position and financial ratio indicates no weaknesses as shown in Table 3 below:

Jadual 3: Petunjuk Prestasi Kewangan pada 31 Disember 2018
Table 3: Financial Performance Indicators as at 31 December 2018

Nisbah Kewangan Financial Ratio	2018	2017
Aset Semasa/Tanggungan Semasa Current Ratio	11.13	15.36
Aset Mudah Cair/Tanggungan Semasa Liquid Ratio	10.45	14.46
Jumlah Hutang/Jumlah Aset Debt/Asset Ratio	0.14	0.14
Modal Digunakan/Jumlah Tanggungan Capital/Debtor Ratio	6.07	5.94
Modal Digunakan/Aset Tetap Capital/Asset Ratio	0.92	0.91

6.0 LAPORAN KETUA AUDIT NEGARA
AUDITORS GENERAL REPORT

6.1 Ketua Audit Negara telah memperakukan penyata kewangan Institut bagi tahun 2018 dengan memberi **Sijil Bersih Audit** dan berpendapat bahawa penyata yang dibentangkan telah memberikan gambaran sebenar dan adil mengenai kedudukan kewangan Institut Penyelidikan Perhutanan Malaysia pada 31 Disember 2018, hasil operasi dan aliran tunainya untuk tahun tersebut berdasarkan piawaian perakaunan yang diluluskan.

The Auditor General had certified the FRIM's Financial Statement for 2018 with a **Clean Audit Report** and in their opinion the statement presented had given a true and far view of the financial position of the Forest Research Institute Malaysia as at 31 December 2018, its operation and cash flows for that year in accordance with approved accounting standard.

Laporan Ketua Audit Negara Mengenai Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia Bagi Tahun Berakhir 31 Disember 2018

LAPORAN KETUA AUDIT NEGARA
MENGENAI PENYATA KEWANGAN
INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
BAGI TAHUN BERAKHIR 31 DISEMBER 2018

Laporan Mengenai Penyata Kewangan

Pendapat

Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan telah diaudit oleh wakil saya yang merangkumi Penyata Kedudukan Kewangan pada 31 Disember 2018 dan Penyata Prestasi Kewangan, Penyata Perubahan Dalam Ekuiti, Penyata Aliran Tunai serta Penyata Prestasi Bajet bagi tahun berakhir pada tarikh tersebut, ringkasan polisi perakaunan yang signifikan dan nota kepada penyata kewangan seperti dinyatakan pada muka surat 3 hingga 18.

Pada pendapat saya, penyata kewangan ini memberikan gambaran yang benar dan saksama mengenai kedudukan kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan pada 31 Disember 2018 dan prestasi kewangan serta aliran tunai bagi tahun berakhir pada tarikh tersebut selaras dengan piawaian pelaporan kewangan yang diluluskan di Malaysia dan Akta Institut Penyelidikan Perhutanan Malaysia 2016 (Akta 782).

Asas Kepada Pendapat

Pengauditan telah dilaksanakan berdasarkan Akta Audit 1957 dan *The International Standards of Supreme Audit Institutions*. Tanggungjawab saya dihuraikan selanjutnya di perenggan Tanggungjawab Juruaudit Terhadap Pengauditan Penyata Kewangan dalam laporan ini. Saya percaya bahawa bukti audit yang diperoleh adalah mencukupi dan bersesuaian untuk dijadikan asas kepada pendapat saya.

Kebebasan dan Tanggungjawab Etika Lain

Saya adalah bebas daripada Institut Penyelidikan Perhutanan Malaysia dan Kumpulan dan telah memenuhi tanggungjawab etika lain berdasarkan *The International Standards of Supreme Audit Institutions*.

Maklumat Lain Selain Daripada Penyata Kewangan dan Laporan Juruaudit Mengenainya

Anggota Institut Penyelidikan Perhutanan Malaysia dan Kumpulan bertanggungjawab terhadap maklumat lain dalam Laporan Tahunan. Pendapat saya terhadap Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan tidak meliputi maklumat lain selain daripada penyata kewangan dan Laporan Juruaudit mengenainya dan saya tidak menyatakan sebarang bentuk kesimpulan jaminan mengenainya.

Tanggungjawab Anggota Institut Terhadap Penyata Kewangan

Anggota Institut bertanggungjawab terhadap penyediaan Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan yang memberi gambaran benar dan saksama selaras dengan piawaian pelaporan kewangan yang diluluskan di Malaysia dan Akta Institut Penyelidikan Perhutanan Malaysia 2016 (Akta 782). Anggota Institut juga bertanggungjawab terhadap penetapan kawalan dalaman yang perlu bagi membolehkan penyediaan Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan adalah bebas daripada salah nyata yang ketara sama ada disebabkan fraud atau kesilapan.

Semasa penyediaan Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan, Anggota Institut bertanggungjawab untuk menilai keupayaan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan untuk beroperasi sebagai satu usaha berterusan, mendedahkannya jika berkaitan serta menggunakannya sebagai asas perakaunan.

Tanggungjawab Juruaudit Terhadap Pengauditan Penyata Kewangan

Objektif saya adalah untuk memperoleh keyakinan yang munasabah sama ada Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan secara keseluruhannya adalah bebas daripada salah nyata yang ketara, sama ada disebabkan fraud atau kesilapan, dan mengeluarkan Laporan Juruaudit yang merangkumi pendapat saya. Jaminan yang munasabah adalah satu tahap jaminan yang tinggi, tetapi bukan satu jaminan bahawa audit yang dijalankan mengikut *The International Standards of Supreme Audit Institutions* akan sentiasa mengesan salah nyata yang ketara apabila ia wujud. Salah nyata boleh wujud daripada fraud atau kesilapan dan dianggap ketara sama ada secara individu atau agregat sekiranya boleh dijangkakan dengan munasabah untuk mempengaruhi keputusan ekonomi yang dibuat oleh pengguna berdasarkan penyata kewangan ini.

Sebagai sebahagian daripada pengauditan mengikut *The International Standards of Supreme Audit Institutions*, saya menggunakan pertimbangan profesional dan mengekalkan keraguan profesional sepanjang pengauditan. Saya juga:

a. Mengenal pasti dan menilai risiko salah nyata ketara dalam Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan, sama ada disebabkan fraud atau kesilapan, merangka dan melaksanakan prosedur audit yang responsif terhadap risiko berkenaan serta mendapatkan bukti audit yang mencukupi dan bersesuaian untuk memberikan asas kepada pendapat saya. Risiko untuk tidak mengesan salah nyata ketara akibat daripada fraud adalah lebih tinggi daripada kesilapan, kerana fraud mungkin melibatkan pakatan, pemalsuan, ketinggalan yang disengajakan, representasi yang salah, atau mengatasi kawalan dalaman.

b. Memahami kawalan dalaman yang relevan untuk merangka prosedur audit yang bersesuaian tetapi bukan untuk menyatakan pendapat mengenai keberkesanan kawalan dalaman Institut Penyelidikan Perhutanan Malaysia dan Kumpulan.

c. Menilai kesesuaian dasar perakaunan yang diguna pakai, kemunasabahan anggaran perakaunan dan pendedahan yang berkaitan oleh Anggota Institut.

d. Membuat kesimpulan terhadap kesesuaian penggunaan asas perakaunan untuk usaha berterusan oleh Anggota Institut dan berdasarkan bukti audit yang diperoleh, sama ada wujudnya ketidakpastian ketara yang berkaitan dengan peristiwa atau keadaan yang mungkin menimbulkan keraguan yang signifikan terhadap keupayaan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan sebagai satu usaha berterusan. Jika saya membuat kesimpulan bahawa ketidakpastian ketara wujud, saya perlu melaporkan dalam Laporan Juruaudit terhadap pendedahan yang berkaitan dalam Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan atau, jika pendedahan tersebut tidak mencukupi, pendapat saya akan diubah. Kesimpulan saya dibuat berdasarkan bukti audit yang diperoleh sehingga tarikh Laporan Juruaudit.

e. Menilai sama ada keseluruhan persembahan termasuk pendedahan Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan memberi gambaran yang saksama.

f. Mendapatkan bukti audit yang mencukupi dan bersesuaian berkaitan maklumat kewangan entiti dan aktiviti perniagaan dalam Kumpulan untuk memberikan pendapat terhadap Penyata Kewangan Kumpulan. Saya bertanggungjawab untuk hala tuju, pengawasan dan pelaksanaan pengauditan kumpulan. Saya hanya bertanggungjawab terhadap pendapat saya.

Laporan Mengenai Keperluan Perundangan dan Peraturan Lain

Berdasarkan keperluan Akta Institut Penyelidikan Perhutanan Malaysia 2016 (Akta 782), saya juga melaporkan perkara berikut:

a. Pada pendapat saya, rekod perakaunan dan rekod lain yang diperlukan untuk disimpan oleh Institut Penyelidikan Perhutanan Malaysia telah disimpan dengan sempurna menurut peruntukan Akta 782.

b. Saya telah mempertimbangkan akaun dan Laporan Juruaudit bagi semua subsidiari yang tidak diaudit oleh saya seperti yang dinyatakan dalam Nota 7 kepada penyata kewangan yang telah dimasukkan dalam akaun disatukan.

c. Saya berpuas hati bahawa akaun subsidiari yang disatukan dengan Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dalam bentuk dan kandungan yang sesuai dan teratur bagi tujuan penyediaan Penyata Kewangan Kumpulan dan saya juga telah menerima maklumat dan penjelasan yang memuaskan sebagaimana yang dikehendaki bagi tujuan tersebut.

d. Laporan Juruaudit terhadap akaun subsidiari tidak mengandungi sebarang teguran atau pemerhatian yang boleh menjejaskan penyata kewangan.

Hal-hal Lain

Laporan ini disediakan untuk Anggota Institut dan bukan untuk tujuan lain. Saya tidak bertanggungjawab terhadap pihak lain bagi kandungan laporan ini.

(DATIN SITI ZALEHA BINTI BAKAR)
b.p. KETUA AUDIT NEGARA
MALAYSIA

PUTRAJAYA
28 OGOS 2019

Penyata Pengerusi dan Nota kepada Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia Bagi Tahun Berakhir 31 Disember 2018

PENYATA PENGERUSI DAN SEORANG ANGGOTA INSTITUT
INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA

Kami, **Datuk Zurinah binti Pawanteh** dan **Dato' Dr. Abd. Latif bin Mohmod**, yang merupakan Pengerusi dan salah seorang Anggota **Institut Penyelidikan Perhutanan Malaysia** dengan ini menyatakan bahawa, pada pendapat Anggota Institut, Penyata Kewangan yang mengandungi Penyata Kedudukan Kewangan, Penyata Prestasi Kewangan, Penyata Perubahan Dalam Ekuiti, Penyata Aliran Tunai dan Penyata Prestasi Bajet yang berikut ini berserta dengan nota-nota kepada Penyata Kewangan di dalamnya, adalah disediakan untuk menunjukkan pandangan yang benar dan saksama berkenaan kedudukan **Institut Penyelidikan Perhutanan Malaysia** pada **31 Disember 2018** dan hasil kendaliannya serta perubahan kedudukan kewangannya bagi tahun berakhir pada tarikh tersebut.

Bagi pihak Institut,

.....
Datuk Zurinah Binti Pawanteh
Pengerusi Institut
22 AUG 2019
SELANGOR DARUL EHSAN

Bagi pihak Institut,

.....
Dato' Dr. Abd. Latif Bin Mohmod
Anggota Institut/Ketua Pengarah FRIM
22 AUG 2019
SELANGOR DARUL EHSAN

PENGAKUAN OLEH PEGAWAI UTAMA YANG BERTANGGUNGJAWAB KE ATAS PENGURUSAN KEWANGAN INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA

Saya, **Mohd Zamshari Bin Hj. Abd Rahman**, pegawai utama yang bertanggungjawab ke atas pengurusan kewangan dan rekod-rekod perakaunan **Institut Penyelidikan Perhutanan Malaysia** dengan ikhlasnya mengakui bahawa Penyata Kedudukan Kewangan, Penyata Prestasi Kewangan, Penyata Perubahan Dalam Ekuiti, Penyata Aliran Tunai dan Penyata Prestasi Bajet dalam kedudukan kewangan yang berikut ini berserta dengan nota-nota kepada Penyata Kewangan di dalamnya mengikut sebaik-baik pengetahuan dan kepercayaan saya, adalah betul dan saya membuat ikrar ini dengan sebenarnya mempercayai bahawa ia adalah benar dan atas kehendak-kehendak Akta Akuan Berkanun, 1960.

Sebenarnya dan sesungguhnya)
Diakui oleh **Mohd Zamshari bin Hj. Abd Rahman**) .....
Di **Mahkamah Selayang**)
Pada 22 AUG 2019)

Di hadapan saya

PESURUHJAYA SUMPAH
A-B 047
PALANIAMAH A/L MUNUSAMY
MAHKAMAH SESYEN
&
MAJISTRET SELAYANG
01.07.2018-30.06.2021
MALAYSIA

22/8/19

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

PENYATA KEDUDUKAN KEWANGAN
PADA 31 DISEMBER 2018

	NOTA	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
ASET BUKAN SEMASA					
Hartanah, loji dan peralatan	5	1,323,779,790	1,298,674,359	1,323,676,434	1,298,667,545
Hartanah pelaburan	6	4,146,874	4,288,170	4,146,874	4,288,170
Pelaburan dalam anak syarikat	7	-	-	3,000,000	3,000,000
Pinjaman kakitangan	8	644,609	683,544	644,609	683,544
Pelaburan jangka panjang	9	9,892,964	9,578,051	9,892,964	9,578,051
Jumlah aset bukan semasa		1,338,464,237	1,313,224,124	1,341,360,881	1,316,217,310
ASET SEMASA					
Pinjaman kakitangan	8	268,338	293,892	268,338	293,892
Pelbagai penghutang, deposit dan prabayar	10	4,926,612	4,275,699	4,568,184	4,256,199
Penghutang anak syarikat		-	-	67,788	53,790
Inventori		5,401	-	-	-
Bayaran balik cukai pendapatan		131,201	-	131,201	-
Pelbagai pendahuluan	11	128,377	136,946	123,321	136,946
Simpanan tetap	12	79,682,623	71,280,267	79,682,623	71,280,267
Baki tunai dan bank	13	4,574,682	4,352,503	2,585,066	1,286,404
Jumlah aset semasa		89,717,234	80,339,307	87,426,521	77,307,498
JUMLAH ASET		1,428,181,471	1,393,563,431	1,428,787,402	1,393,524,808
LIABILITI BUKAN SEMASA					
Geran Pembangunan	14	156,703,206	159,444,992	156,703,206	159,444,992
Akaun Amanah	15	26,234,857	25,758,519	26,234,857	25,758,519
Dana Pinjaman Kakitangan	16	9,431,886	9,431,886	9,431,886	9,431,886
Manfaat Kakitangan	18	1,535,806	895,184	1,535,806	895,184
Jumlah liabiliti bukan semasa		193,905,755	195,530,581	193,905,755	195,530,581
LIABILITI SEMASA					
Pelbagai pemiutang	17	7,647,325	4,809,488	7,061,007	4,683,327
Manfaat Kakitangan	18	413,818	388,372	413,818	388,372
Cukai kena bayar		-	31,798	-	31,798
Jumlah liabiliti semasa		8,061,143	5,229,658	7,474,825	5,103,497
JUMLAH LIABILITI		201,966,898	200,760,239	201,380,580	200,634,078
ASET BERSIH		1,226,214,573	1,192,803,192	1,227,406,822	1,192,890,730
DIBIAYAI OLEH:					
Lebihan terkumpul		1,187,442,386	1,192,803,192	1,188,634,635	1,192,890,730
Rizab penilaian semula		38,772,187	-	38,772,187	-
		1,226,214,573	1,192,803,192	1,227,406,822	1,192,890,730

Nota yang disertakan di muka surat 266 hingga 276 merupakan sebahagian daripada penyata kewangan.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

PENYATA PRESTASI KEWANGAN
BAGI TAHUN KEWANGAN BERAKHIR 31 DISEMBER 2018

		KUMPULAN		INSTITUT	
	NOTA	2018	1.10.2016 - 31 DIS 2017	2018	1.10.2016 - 31 DIS 2017
		RM	RM	RM	RM
PENDAPATAN					
URUSNIAGA BUKAN PERTUKARAN					
Geran Mengurus Kerajaan		65,842,600	70,413,650	65,842,600	70,413,650
Pelunasan Geran Pembangunan Kerajaan	14	30,588,159	40,350,462	30,588,159	40,350,462
Denda		102,889	410,880	102,889	410,880
		96,533,648	111,174,992	96,533,648	111,174,992
URUSNIAGA PERTUKARAN					
Sumbangan dan bayaran organisasi luar		3,562,884	10,953,190	3,562,884	10,953,190
Bayaran perkhidmatan		7,446,375	8,776,315	6,043,729	8,653,815
Pelbagai jualan		664,222	995,435	654,619	994,205
Sewaan		1,244,635	1,541,343	1,244,635	1,541,343
Keuntungan/faedah atas simpanan tetap		3,133,964	3,664,964	3,133,964	3,664,964
Keuntungan atas pinjaman kakitangan		36,316	50,761	36,316	50,761
Hasil-hasil lain		1,769,377	1,819,659	1,750,381	1,819,659
		17,857,773	27,801,667	16,426,528	27,677,937
JUMLAH PENDAPATAN		114,391,421	138,976,659	112,960,176	138,852,929
PERBELANJAAN					
EMOLUMEN					
Gaji dan upahan		39,813,953	48,398,596	39,334,464	48,320,751
Elaun tetap		12,028,824	15,089,571	11,834,901	15,089,571
Sumbangan berkanun untuk kakitangan		1,916,937	2,196,768	1,853,189	2,189,923
Elaun lebih masa		610,474	700,345	609,370	700,345
Imbuhan tetap tahunan		1,680,100	932,500	1,680,100	932,500
Faedah-faedah kewangan lain		191,364	243,715	191,364	243,715
		56,241,652	67,561,495	55,503,388	67,476,805
PERKHIDMATAN DAN BEKALAN					
Perbelanjaan perjalanan dan sara hidup kakitangan		4,123,256	5,916,259	4,060,105	5,908,979
Pengangkutan barang-barang		4,994	31,899	4,994	24,675
Perhubungan		278,453	340,327	261,413	340,327
Utiliti		2,979,546	3,716,948	2,968,063	3,716,948
Sewaan		1,136,312	2,258,185	1,113,529	2,257,485
Bekalan bahan mentah dan bahan-bahan untuk penyelenggaraan dan pembaikan		1,820,795	2,730,434	1,820,795	2,730,434
Bekalan dan bahan-bahan lain		3,676,559	5,554,750	3,517,397	5,554,040
Penyelenggaraan dan pembaikan kecil		5,883,157	7,432,902	5,881,957	7,432,902
Perkhidmatan ikhtisas, perkhidmatan-perkhidmatan lain dan hospitaliti		12,383,087	16,589,514	10,907,155	16,494,643
		32,286,159	44,571,218	30,535,408	44,460,433
PERBELANJAAN-PERBELANJAAN LAIN					
Pencen dan ganjaran		6,648,022	8,263,392	6,648,022	8,263,392
Cukai dan insuran		1,240,706	671,499	1,227,829	671,499
Susutnilai Hartanah, Loji dan Peralatan	5	20,855,977	26,347,931	20,840,775	26,347,816
Susutnilai Hartanah Pelaburan	6	141,296	176,620	141,296	176,620
Perbelanjaan-perbelanjaan lain		1,601,621	5,650,674	1,582,760	5,634,996
		30,487,622	41,110,116	30,440,681	41,094,323
JUMLAH PERBELANJAAN		119,015,433	153,242,829	116,479,477	153,031,561
KURANGAN PENDAPATAN SEBELUM CUKAI		(4,624,012)	(14,266,170)	(3,519,301)	(14,178,632)
Cukai pendapatan	19	(736,794)	(874,798)	(736,794)	(874,798)
KURANGAN PENDAPATAN SELEPAS CUKAI		(5,360,806)	(15,140,968)	(4,256,095)	(15,053,430)

Nota yang disertakan di muka surat 266 hingga 276 merupakan sebahagian daripada penyata kewangan.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

PENYATA PERUBAHAN DALAM EKUITI BAGI TAHUN BERAKHIR 31 DISEMBER 2018

KUMPULAN	Lebihan Terkumpul	Rizab Penilaian Semula	Jumlah Ekuiti
	RM	RM	RM
Nilai saksama pengambilalihan	1,207,944,160	-	1,207,944,160
Kurangan bersih bagi tempoh semasa	(15,140,968)	-	(15,140,968)
Baki pada 31 Disember 2017	1,192,803,192	-	1,192,803,192
Penilaian semula hartanah, loji dan peralatan	-	38,772,187	38,772,187
Kurangan bersih bagi tahun semasa	(5,360,806)	-	(5,360,806)
Baki pada 31 Disember 2018	1,187,442,386	38,772,187	1,226,214,573

INSTITUT	Lebihan Terkumpul	Rizab Penilaian Semula	Jumlah Ekuiti
	RM	RM	RM
Nilai saksama pengambilalihan	1,207,994,160	-	1,207,944,160
Kurangan bersih bagi tempoh semasa	(15,053,430)	-	(15,053,430)
Baki pada 31 Disember 2017	1,192,890,730	-	1,192,890,730
Penilaian semula hartanah, loji dan peralatan	-	38,772,187	38,772,187
Kurangan bersih bagi tahun semasa	(4,256,095)	-	(4,256,095)
Baki pada 31 Disember 2018	1,188,634,635	38,772,187	1,227,406,822

Nota yang disertakan di muka surat 266 hingga 276 merupakan sebahagian daripada penyata kewangan.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

PENYATA ALIRAN TUNAI
BAGI TAHUN BERAKHIR 31 DISEMBER 2018

		KUMPULAN		INSTITUT	
	NOTA	2018 RM	1.10.2016 - 31.12.2017 RM	2018 RM	1.10.2016 - 31.12.2017 RM
ALIRAN TUNAI DARIPADA AKTIVITI OPERASI					
Kurangan pendapatan sebelum cukai		(4,624,012)	(14,266,170)	(3,519,301)	(14,178,632)
Pelarasan untuk:					
Susutnilai Hartanah, Loji dan Peralatan		20,855,977	26,347,931	20,840,775	26,347,816
Susutnilai Hartanah Pelaburan		141,296	176,620	141,296	176,620
Pelunasan geran kerajaan		(2,265,448)	(24,222,385)	(2,265,448)	(24,222,385)
Tunai digunakan dalam aktiviti operasi sebelum perubahan modal kerja		14,107,813	(11,964,004)	15,197,321	(11,876,581)
Pengurangan dalam modal kerja					
Pinjaman kakitangan		64,490	112,175	64,490	112,175
Pelbagai penghutang, deposit dan prabayar		(787,515)	960,232	(457,183)	979,732
Pelbagai pendahuluan		8,569	18,510	13,625	18,510
Pelbagai pemiutang, deposit dan akruan		3,503,905	647,468	3,043,748	467,517
		2,789,449	1,738,385	2,664,680	1,577,934
Bayaran cukai		(768,593)	(1,117,538)	(768,593)	(1,117,538)
Tunai bersih digunakan dalam aktiviti operasi		16,128,669	(11,343,157)	17,093,408	(11,416,185)
ALIRAN TUNAI DARIPADA AKTIVITI PELABURAN					
Pelaburan jangka panjang		(314,913)	(249,060)	(314,913)	(249,060)
Pelaburan dalam anak syarikat		-	-	-	(3,000,000)
Pembelian hartanah, loji dan peralatan		(7,282,113)	(8,042,634)	(7,170,369)	(8,035,705)
Pelarasan hartanah, loji dan peralatan		92,892	1,699,175	92,892	1,699,175
Tunai bersih digunakan dalam aktiviti pelaburan		(7,504,134)	(6,592,519)	(7,392,390)	(9,585,590)
Pengurangan bersih tunai dan kesetaraan tunai		8,624,535	(17,935,676)	9,701,018	(21,001,775)
Tunai dan kesetaraan tunai pada awal tahun		75,632,770	93,568,446	72,566,671	93,568,446
Tunai dan kesetaraan tunai pada akhir tahun		84,257,305	75,632,770	82,267,689	72,566,671
TERDIRI DARIPADA:					
Simpanan tetap	12	79,682,623	71,280,267	79,682,623	71,280,267
Baki tunai dan bank	13	4,574,682	4,352,503	2,585,066	1,286,404
		84,257,305	75,632,770	82,267,689	72,566,671

Nota yang disertakan di muka surat 266 hingga 276 merupakan sebahagian daripada penyata kewangan.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

PENYATA PRESTASI BAJET
BAGI TAHUN BERAKHIR 31 DISEMBER 2018

MENGURUS	Peruntukan Asal RM	Sumber Dalaman RM	Peruntukan Dipinda RM	Perbelanjaan Sebenar RM	Perbezaan RM
Emolumen	42,547,682	-	42,547,682	42,528,468	19,214
Perkhidmatan dan Bekalan	7,154,918	2,171,000	9,325,918	9,325,580	338
Belanja Modal	-	150,000	150,000	147,915	2,085
Pemberian dan Bayaran Tetap	5,220,000	344,000	5,564,000	5,561,871	2,129
Perbelanjaan-perbelanjaan lain	400,000	1,075,000	1,475,000	1,472,447	2,553
JUMLAH KESELURUHAN	55,322,600	3,740,000	59,062,600	59,036,281	26,319

Nota yang disertakan di muka surat 266 hingga 276 merupakan sebahagian daripada penyata kewangan.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

NOTA KEPADA PENYATA KEWANGAN
BAGI TAHUN BERAKHIR 31 DISEMBER 2018

1. MAKLUMAT KORPORAT

Institut Penyelidikan Perhutanan Malaysia (Institut) adalah sebuah agensi di bawah Kementerian Air, Tanah dan Sumber Asli (KATS). Institut telah ditubuhkan pada 1 Oktober 2016 selaras dengan Akta Institut Penyelidikan Perhutanan Malaysia 2016 (Akta 782) menggantikan Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia yang ditubuhkan di bawah Akta Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia 1985 (Akta 319). Berdasarkan peruntukan Akta 782, semua aset dan liabiliti Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia telah ditukarkan kepada Institut.

Fungsi utama Institut adalah seperti berikut:

(a) Merancang dan melaksanakan penyelidikan bagi pembangunan sektor perhutanan dan pemuliharaan sumber hutan;
(b) Memperoleh dan menyebarkan maklumat hasil penyelidikan bagi meningkatkan pengurusan hutan dan penggunaan hasil hutan; dan
(c) Mengadakan hubungan kerjasama penyelidikan dan pembangunan perhutanan dengan badan-badan dalam dan luar negara.

2. ASAS PENYEDIAAN

Penyata Kewangan Kumpulan dan Institut telah disediakan mengikut Akta 782 dan selaras dengan Piawaian Perakaunan Sektor Awam Malaysia (MPSAS) yang diterbitkan oleh Jabatan Akauntan Negara Malaysia.

3. DASAR-DASAR PERAKAUNAN YANG PENTING

Penyata kewangan ini telah disediakan mengikut kelaziman kos sejarah dan diselaraskan dengan penilaian semula beberapa aset tetap. Dasar-dasar penting perakaunan yang dibentangkan seperti berikut:

3.1 Asas Penyatuan

Keputusan anak syarikat disatukan mulai daripada tarikh pembelian iaitu tarikh di mana kumpulan mendapat kawalan, dan terus disatukan sehingga tarikh tamatnya kawalan tersebut. Dalam menyediakan penyata kewangan disatukan, baki antara kumpulan dan keputusan keuntungan dan kerugian belum direalisasikan akan dihapuskan semasa penyatuan. Polisi-polisi perakaunan seragam diterima pakai dalam penyata kewangan disatukan bagi semua transaksi dan peristiwa dalam keadaan yang sama. Penyata kewangan Kumpulan dan Institut telah menggabungkan jumlah aset dan tanggungan serta pendapatan dan perbelanjaan Kumpulan Wang Mengurus, Pembangunan, Amanah dan Pinjaman Kakitangan Institut.

3.2 Tempoh Penyata Kewangan

Tempoh berakhir Penyata Kewangan Institut adalah pada 31 Disember setiap tahun. Penyata yang disediakan adalah bagi satu tahun bermula pada 1 Januari 2018 hingga 31 Disember 2018.

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3.3 Pengiktirafan Geran dan Peruntukan

(i) Mengurus

Geran Mengurus yang diterima bagi membiayai perbelanjaan operasi adalah diambil kira sebagai pendapatan dalam penyata pendapatan tahun semasa.

(ii) Pembangunan

Geran Pembangunan yang diterima bagi membiayai kos projek pembangunan dan penyelidikan adalah hanya diambil kira sebagai pendapatan dalam penyata pendapatan tahun semasa digunakan atau untuk perbelanjaan modal bagi tempoh hayat aset yang diperolehi mengikut jumlah pindahan tahunan yang sepadan dengan caj susutnilai.

(iii) Amanah

Sumbangan dan bayaran yang diterima daripada badan-badan dalam dan luar negara termasuk sumbangan kerajaan untuk tujuan membiayai kos penyelidikan, seminar atau projek-projek tertentu adalah hanya diambil kira sebagai pendapatan dalam penyata pendapatan mengikut jumlah yang dibelanjakan dalam tahun ianya digunakan atau untuk perbelanjaan modal bagi tempoh hayat aset yang diperolehi mengikut jumlah pindahan tahunan yang sepadan dengan caj susutnilai.

(iv) Pinjaman Kakitangan:

(a) Pinjaman Perumahan

Geran yang diterima untuk tujuan membiayai pinjaman perumahan kepada kakitangan adalah dikreditkan ke Dana Pinjaman Kakitangan.

(b) Pinjaman Kenderaan

Geran yang diterima untuk tujuan membiayai pinjaman kenderaan kepada kakitangan adalah dikreditkan ke Dana Pinjaman Kakitangan.

(c) Pinjaman Komputer

Geran yang diterima untuk tujuan membiayai pinjaman komputer kepada kakitangan adalah dikreditkan ke Dana Pinjaman Kakitangan.

3.4 Pelaburan

Pelaburan dalam anak syarikat dan pelaburan-pelaburan lain adalah dinyatakan pada harga kos. Peruntukan rosot nilai dikenakan terhadap pelaburan yang dianggap menghadapi penurunan nilai yang tetap.

3.5 Kerja Dalam Pelaksanaan

Kos Kerja Dalam Pelaksanaan yang tidak diiktiraf sebagai perbelanjaan, diiktiraf sebagai aset dan dinyatakan pada nilai kos apabila telah siap sepenuhnya.

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3.6 Hartanah, Loji dan Peralatan

Hartanah, loji dan peralatan dinyatakan pada kos atau penilaian semula setelah ditolak susutnilai terkumpul. Polisi pengiktirafan dan pengukuran kerugian terjejas adalah seperti yang dinyatakan di Nota 3.7.

Tanah milik bebas tidak disusutnilaikan. Pelunasan bagi tanah pegangan pajakan masing-masing dikira mengikut jangkamasa antara 60 hingga 99 tahun. Bagi kerja-kerja dalam pelaksanaan atau pembinaan, perbelanjaan modal dikira berdasarkan kepada peratusan penyempurnaan. Projek-projek ini tidak disusutnilaikan sehingga ianya selesai.

Bagi semua hartanah, loji dan peralatan lain, susutnilai diperuntukkan mengikut kaedah garis lurus untuk menghapuskan kos aset atau nilai penilaian semula berkenaan sepanjang hayat kegunaannya. Kadar tahunan susutnilai adalah seperti berikut:

Bangunan	2% - 4%
Infrastruktur	4%
Kenderaan	20%
Perabot dan kelengkapan	20%
Mesin dan alat-alat	20%
Peralatan Muzium	20%

3.7 Rosotnilai aset

Nilai yang dibawa oleh aset-aset, disemak bagi tujuan rosotnilai bila ada tanda-tanda menunjukkan aset tersebut mengalami kemerosotan nilai. Rosotnilai diukur melalui membandingkan nilai yang dibawa oleh aset dengan amaun yang akan diperolehi semula. Amaun yang akan diperolehi semula adalah jumlah yang lebih tinggi di antara harga jualan bersih dan nilai kegunaannya, di mana diukur dengan merujuk kepada aliran tunai masa depan yang didiskaunkan.

Kerugian rosotnilai dikenakan di dalam penyata pendapatan serta merta, melainkan jumlah aset yang telah dibawa pada nilaian semula. Sebarang kerugian rosotnilai bagi aset yang dinilai semula dianggap sebagai penurunan penilaian semula, tetapi ianya terhad kepada lebihan penilaian semula yang diiktiraf sebelum ini untuk aset yang sama.

Peningkatan yang berikutnya di dalam amaun yang akan diperolehi semula dianggap sebagai penolakan daripada kerugian rosotnilai yang sebelum ini sehingga amaun dibawa bagi aset tersebut ditentukan (bersih daripada pelunasan dan susutnilai) tidak mempunyai kerugian rosotnilai yang diiktiraf di dalam penyata pendapatan serta merta, melainkan aset yang dinyatakan pada nilaian semula. Penolakan daripada kerugian rosotnilai atas aset yang dinilai semula dikredit secara terus kepada lebihan penilaian semula. Walau bagaimanapun, ianya terhad kepada kerugian rosotnilai bagi aset yang dinilai semula yang diiktiraf sebagai belanja dalam penyata pendapatan sebelum ini, penolakan daripada kerugian rosotnilai diiktiraf sebagai pendapatan dalam penyata pendapatan.

Bagi tahun semasa, nilai aset-aset Institut adalah pada nilai buku dan tiada tanda-tanda menunjukkan aset-aset tersebut mengalami rosot nilai.

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3.8 Hartanah Pelaburan

Hartanah pelaburan adalah hartanah yang dimiliki atau dipegang di bawah pajakan untuk mendapatkan pendapatan sewa atau untuk menambahkan nilai modal atau kedua-duanya. Hartanah pelaburan dinyatakan pada kos tolak kerugian terjejas. Nilai saksama pengambilalihan hartanah pelaburan dinyatakan pada nilai wajar, yang telah ditentukan berdasarkan penilaian pada tarikh pengambilalihan oleh penilai bertauliah bebas. Hartanah pelaburan bagi bangunan disusutnilaikan pada kadar 2% - 4% mengikut kaedah garis lurus.

3.9 Pelbagai Penghutang

Pelbagai penghutang dinyatakan berdasarkan jumlah yang diinbois atau yang dibuktikan sepatutnya diterima setelah ditolak jumlah yang tidak boleh dikutip. Anggaran untuk peruntukan hutang ragu dan hapuskira seperti yang dinyatakan di Nota 3.10.

3.10 Peruntukan Hutang Ragu dan Hapus Kira

Peruntukan Hutang Ragu diperuntukkan ke atas baki akhir penghutang perniagaan dan lain-lain akaun belum terima yang dianggarkan tidak boleh didapatkan selepas tempoh yang sepatutnya. Tiada peruntukan hutang ragu bagi tahun semasa dan tiada hutang lapuk dihapus kira.

3.11 Tunai dan Kesetaraan Tunai

Tunai dan kesetaraan tunai seperti dicatat dalam penyata aliran tunai adalah terdiri daripada baki tunai dan bank serta simpanan tetap.

3.12 Pengiktirafan Pendapatan

Pendapatan daripada hasil jualan dan perkhidmatan serta hasil-hasil lain diiktiraf berasaskan akruan.

3.13 Manfaat Kakitangan

(i) Manfaat Jangka Pendek

Upah, gaji dan bonus diiktiraf sebagai perbelanjaan pada tahun yang mana perkhidmatan berkaitan diberikan oleh kakitangan Institut.

(ii) Manfaat Jangka Panjang

a. Gantian Cuti Rehat

Peruntukan Gantian Cuti Rehat adalah berdasarkan jumlah cuti rehat yang disimpan dalam tempoh kewangan semasa oleh kakitangan Institut berstatus tetap. Pemberian ganjaran wang tunai gantian cuti rehat adalah berdasarkan 1/30 daripada gaji akhir diterima, tertakluk maksimum 150 hari.

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3.13 Manfaat Kakitangan (Sambungan)

b. Caruman Tetap

Pihak Institut telah membuat caruman kepada Kumpulan Wang Simpanan Pekerja (KWSP) sebanyak 13% daripada gaji dan elaun untuk kakitangannya yang telah memilih Skim KWSP. Institut juga telah memperuntukkan 17.5% daripada gaji pokok kepada Kumpulan Wang Amanah Pencen kepada kakitangannya yang telah memilih Skim Pencen. Caruman-caruman ini diiktiraf sebagai perbelanjaan di dalam Penyata Pendapatan seperti ditanggung dan setelah caruman dibayar pihak Institut tidak menanggung apa-apa obligasi bayaran lagi. Faedah kewangan kepada pesara tidak diperuntukkan dan akan diiktiraf sebagai perbelanjaan apabila tuntutan dibuat.

c. Peruntukan Ganjaran Tamat Kontrak

Ganjaran Tamat Kontrak merupakan faedah tamat perkhidmatan yang dibayar kepada pegawai yang telah menamatkan kontrak perkhidmatan.

3.14 Penyelidikan dan Pembangunan

Semua kos berkaitan dengan penyelidikan dan pembangunan tidak dipermodalkan dan dianggap perbelanjaan bagi tahun yang berkaitan kecuali Institut menjangkakan kos tersebut akan menjana pendapatan dimasa akan datang.

3.15 Peruntukan Cukai

Pengecualian cukai berkuatkuasa mulai tahun taksiran 2001. Mulai tahun taksiran 2002 pengecualian cukai pendapatan akan diberi secara "blanket" melalui satu perintah pengecualian cukai pendapatan ke atas pendapatan-pendapatan berikut:

(a) Geran Kerajaan;
(b) Yuran untuk perbelanjaan operasi; dan
(c) Sumbangan dan derma yang diterima.

4. INSTRUMEN KEWANGAN

Objektif Pengurusan Risiko Kewangan Kumpulan dan Institut adalah bertujuan memastikan sumber kewangan dan bukan kewangan mencukupi untuk menjalankan operasi-operasinya dengan lancar. Kumpulan dan Institut telah membiayai operasinya dengan dana geran Kerajaan, sumbangan agensi luar serta dana dalaman dan tidak mempunyai pinjaman. Oleh itu, tidak terdedah kepada risiko kadar faedah dari pinjaman bank. Kumpulan dan Institut tidak melabur di dalam saham disebutharga dan oleh itu, tidak terdedah kepada risiko pasaran akibat turun naik instrumen kewangan berikutan perubahan harga pasaran. Kumpulan dan Institut juga tidak terdedah kepada risiko mata wang asing yang serius memandangkan tiada urus niaga yang ketara menggunakan mata wang asing.

(i) Risiko Mudah Tunai

Pihak Institut mengamalkan pengurusan risiko mudah tunai yang berhemah untuk meminimumkan ketidakpadanan aset dan liabiliti kewangan dan untuk mewujudkan tahap tunai dan bersamaan tunai yang mencukupi bagi memenuhi keperluan modal kerja.

(ii) Nilai Saksama

Nilai dibawa tunai bersamaan tunai, pelbagai penghutang, deposit dan prabayar dan lain-lain pemiutang, pelbagai pemiutang, deposit dan akruan menunjukkan nilai saksama kerana sifat instrumen kewangan yang berjangka pendek.

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5. HARTANAH, LOJI DAN PERALATAN

KUMPULAN	Tanah	Bangunan	Infrastruktur	Kenderaan	Perabot dan Kelengkapan	Mesin dan Alat-alat	Peralatan Muzium	Kerja-kerja dalam pelaksanaan	Jumlah
	RM	RM	RM	RM	RM	RM	RM	RM	RM
Kos									
Pada 1 Januari 2018	1,198,861,582	93,839,828	16,581,560	1,814,095	3,552,520	10,261,098	12,817	98,790	1,325,022,290
Penambahan	-	-	647,815	392,861	839,469	1,782,334	-	3,619,634	7,282,113
Pelarasan dan pelupusan	38,772,187	(5,000)	67,028	(2)	(9,387)	(83,543)	-	(98,790)	38,642,493
Pada 31 Disember 2018	1,237,633,769	93,834,828	17,296,403	2,206,954	4,382,602	11,959,889	12,817	3,619,634	1,370,946,896
Susutnilai terkumpul									
Pada 1 Januari 2018	16,618,189	3,193,737	620,419	482,923	1,503,380	3,924,234	5,049	-	26,347,931
Susutnilai dikenakan	13,686,190	2,556,460	525,593	441,380	996,990	2,647,364	2,000	-	20,855,977
Pelarasan dan pelupusan	-	(250)	3,351	-	(5,690)	(34,213)	-	-	(36,802)
Pada 31 Disember 2018	30,304,379	5,749,947	1,149,363	924,303	2,494,680	6,537,385	7,049	-	47,167,106
Nilai Bawaan									
Pada 31 Disember 2018	1,207,329,390	88,084,881	16,147,040	1,282,651	1,887,922	5,422,504	5,768	3,619,634	1,323,779,790
Pada 31 Disember 2017	1,182,243,393	90,646,091	15,961,141	1,331,172	2,049,140	6,336,864	7,768	98,790	1,298,674,359

INSTITUT	Tanah	Bangunan	Infrastruktur	Kenderaan	Perabot dan Kelengkapan	Mesin dan Alat-alat	Peralatan Muzium	Kerja-kerja dalam pelaksanaan	Jumlah
	RM	RM	RM	RM	RM	RM	RM	RM	RM
Kos									
Pada 1 Januari 2018	1,198,861,582	93,839,828	16,581,560	1,814,095	3,545,591	10,261,098	12,817	98,790	1,325,015,361
Penambahan	-	-	647,815	392,861	727,725	1,782,334	-	3,619,634	7,170,369
Pelarasan dan pelupusan	38,772,187	(5,000)	67,028	(2)	(9,387)	(83,543)	-	(98,790)	38,642,493
Pada 31 Disember 2018	1,237,633,769	93,834,828	17,296,403	2,206,954	4,263,929	11,959,889	12,817	3,619,634	1,370,828,223
Susutnilai terkumpul									
Pada 1 Januari 2018	16,618,189	3,193,737	620,419	482,923	1,503,265	3,924,234	5,049	-	26,347,816
Susutnilai dikenakan	13,686,190	2,556,460	525,593	441,380	981,788	2,647,364	2,000	-	20,840,775
Pelarasan dan pelupusan	-	(250)	3,351	-	(5,690)	(34,213)	-	-	(36,802)
Pada 31 Disember 2018	30,304,379	5,749,947	1,149,363	924,303	2,479,363	6,537,385	7,049	-	47,151,789
Nilai Bawaan									
Pada 31 Disember 2018	1,207,329,390	88,084,881	16,147,040	1,282,651	1,784,566	5,422,504	5,768	3,619,634	1,323,676,434
Pada 31 Disember 2017	1,182,243,393	90,646,091	15,961,141	1,331,172	2,042,326	6,336,864	7,768	98,790	1,298,667,545

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6. HARTANAH PELABURAN	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
Bangunan				
Baki Awal / Nilai saksama pengambilalihan	4,288,170	4,464,790	4,288,170	4,464,790
Susutnilai semasa	(141,296)	(176,620)	(141,296)	(176,620)
Nilai buku	4,146,874	4,288,170	4,146,874	4,288,170

Nilai saksama pengambilalihan hartanah pelaburan dinyatakan pada nilai wajar, yang telah ditentukan berdasarkan penilaian pada tarikh pengambilalihan oleh penilai bertauliah bebas. Hartanah pelaburan bagi bangunan disusutnilaikan pada kadar 2% - 4% mengikut kaedah garis lurus.

7. PELABURAN DALAM ANAK SYARIKAT	INSTITUT 2018 RM	INSTITUT 2017 RM
Pelaburan dalam FRIM Incorporated Sdn. Bhd.	3,000,000	3,000,000

Institut mempunyai pegangan tunggal (100%) ke atas FRIM Incorporated Sdn. Bhd. berkuatkuasa pada tarikh penubuhan syarikat iaitu pada 4 Ogos 2017. Aktiviti utama FRIM Incorporated Sdn. Bhd. adalah di dalam bidang perkhidmatan perundingan berkaitan perhutanan, pengkomersialan hasil penyelidikan dan penjualan produk.

8. PINJAMAN KAKITANGAN	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
Pinjaman yang perlu dibayar selepas 12 bulan	644,609	683,544	644,609	683,544
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	268,338	293,892	268,338	293,892
	912,947	977,436	912,947	977,436
a. Pinjaman Perumahan				
Pinjaman yang perlu dibayar selepas 12 bulan	180,463	279,844	180,463	279,844
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	99,381	99,284	99,381	99,284
	279,844	379,128	279,844	379,128
b. Pinjaman Kenderaan				
Pinjaman yang perlu dibayar selepas 12 bulan	453,837	389,892	453,837	389,893
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	162,092	188,984	162,092	188,984
	615,929	578,876	615,929	578,876
c. Pinjaman Komputer				
Pinjaman yang perlu dibayar selepas 12 bulan	10,309	13,808	10,309	13,808
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	6,865	5,624	6,865	5,624
	17,174	19,432	17,174	19,432
	912,947	977,436	912,947	977,436

Institut menawarkan tiga jenis kemudahan pinjaman kepada kakitangannya dengan kadar keuntungan sebanyak 4% setahun ke atas baki pokok bulanan

9. PELABURAN JANGKA PANJANG	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
Amanah Raya Berhad	7,808,787	7,566 187	7,808,787	7,566,187
Affin Hwang Asset Management Berhad	2,084,177	2,011,864	2,084,177	2,011,864
	9,892,964	9,578,051	9,892,964	9,578,051

Kadar dividen kasar boleh terima oleh Institut ialah diantara 4% hingga 5% setahun dan tempoh matang pelaburan ialah tiga tahun.

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10. PELBAGAI PENGHUTANG, DEPOSIT DAN PRABAYAR	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
Pelbagai penghutang perniagaan	2,088,624	1,997,159	1,730,196	1,977,659
Peruntukan hutang ragu	(22,400)	(24,050)	(22,400)	(24,050)
Cukai barang dan perkhidmatan boleh dituntut	2,195,864	1,784,731	2,195,864	1,784,731
Faedah terakru (simpanan tetap)	541,250	426,945	541,250	426,945
Pelbagai penerimaan lain	123,274	90,914	123,274	90,914
	4,926,612	4,275,699	4,568,184	4,256,199

11. PELBAGAI PENDAHULUAN	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
Pendahuluan diri kakitangan	102,861	115,361	102,861	115,361
Deposit dibayar	25,516	21,585	20,460	21,585
	128,377	136,946	123,321	136,946

12. SIMPANAN TETAP	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
Simpanan dengan bank berlesen	54,927,499	50,245,800	54,927,499	50,245,800
Simpanan dengan institusi kewangan yang diluluskan	24,755,124	21,034,467	24,755,124	21,034,467
	79,682,623	71,280,267	79,682,623	71,280,267

Kadar keuntungan yang diterima bagi simpanan tetap bagi tempoh berakhir 31 Disember 2018 adalah diantara 2.8% sehingga 4.18% setahun bagi tempoh diantara satu bulan sehingga setahun.

13. BAKI TUNAI DAN BANK	KUMPULAN 2018 RM	KUMPULAN 2017 RM	INSTITUT 2018 RM	INSTITUT 2017 RM
Baki di Bank	4,545,682	4,324,803	2,556,066	1,258,704
Baki Tunai	29,000	27,700	29,000	27,700
	4,574,682	4,352,503	2,585,066	1,286,404

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14. GERAN PEMBANGUNAN

	KUMPULAN		INSTITUT	
	2018 RM	2017 RM	2018 RM	2017 RM
Baki Awal	159,444,992	-	159,444,992	-
Nilai Saksama Pengambilalihan	-	165,695,238	-	165,695,238
Terimaan:				
Terimaan daripada RMKe11 KATS	23,374,000	28,044,000	23,374,000	28,044,000
Lain-lain terimaan	4,472,373	6,056,216	4,472,373	6,056,216
	27,846,373	34,100,216	27,846,373	34,100,216
Pelunasan:				
Pelunasan bagi geran daripada RMKe11 KATS	19,762,586	22,161,171	19,762,586	22,161,171
Lain-lain Pelunasan	10,825,573	18,189,291	10,825,573	18,189,291
	30,588,159	40,350,462	30,588,159	40,350,462
Baki Akhir	156,703,206	159,444,992	156,703,206	159,444,992

Lain-lain terimaan adalah terdiri daripada penerimaan geran daripada pelbagai Kementerian selain RMKe11 KATS.

15. AKAUN AMANAH

	KUMPULAN		INSTITUT	
	2018 RM	2017 RM	2018 RM	2017 RM
Baki Awal	25,758,519	-	25,758,519	-
Nilai Saksama Pengambilalihan	-	29,796,108	-	29,796,108
Terimaan	4,690,338	7,346,887	4,690,338	7,346,887
Pelunasan	(4,214,000)	(11,384,476)	(4,214,000)	(11,384,476)
Baki Akhir	26,234,857	25,758,519	26,234,857	25,758,519

16. DANA PINJAMAN KAKITANGAN

	KUMPULAN		INSTITUT	
	2018 RM	2017 RM	2018 RM	2017 RM
Dana pinjaman perumahan:				
Baki pinjaman perumahan belum terima	279,844	379,128	279,844	379,128
Pinjaman belum digunakan	3,852,042	3,752,758	3,852,042	3,752,758
	4,131,886	4,131,886	4,131,886	4,131,886
Dana pinjaman kenderaan:				
Baki pinjaman kenderaan belum terima	615,929	578,876	615,929	578,876
Pinjaman belum digunakan	4,184,071	4,221,124	4,184,071	4,221,124
	4,800,000	4,800,000	4,800,000	4,800,000
Dana pinjaman komputer:				
Baki pinjaman komputer belum terima	17,174	19,432	17,174	19,432
Pinjaman belum digunakan	482,826	480,568	482,826	480,568
	500,000	500,000	500,000	500,000
JUMLAH	9,431,886	9,431,886	9,431,886	9,431,886

17. PELBAGAI PEMIUTANG

	KUMPULAN		INSTITUT	
	2018 RM	2017 RM	2018 RM	2017 RM
Pemiutang dan akruan	6,641,868	4,445,355	6,055,550	4,499,194
Deposit diterima	1,005,457	364,133	1,005,457	364,133
	7,647,325	4,809,488	7,061,007	4,863,327

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
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NOTA KEPADA PENYATA KEWANGAN BAGI TAHUN BERAKHIR 31 DISEMBER 2018

18. MANFAAT KAKITANGAN

	KUMPULAN		INSTITUT	
	2018	2017	2018	2017
	RM	RM	RM	RM
a. Peruntukan Gantian Cuti Rehat				
Baki Awal	937,849	-	937,849	-
Peruntukan	709,408	937,849	709,408	937,849
Pembayaran	(637,257)	(461,659)	(637,257)	(461,659)
Pelarasan	588,307	461,659	588,307	461,659
Baki Akhir	1,598,307	937,849	1,598,307	937,849
Ganjaran yang perlu dibayar selepas 12 bulan	1,535,806	895,184	1,535,806	895,184
Ganjaran yang perlu dibayar dalam tempoh 12 bulan	62,501	42,665	62,501	42,665
	1,598,307	937,849	1,598,307	1,598,307
b. Peruntukan Ganjaran Tamat Kontrak				
Baki Awal	345,707	202,215	345,707	202,215
Peruntukan	359,403	426,951	359,403	426,951
Pembayaran	(262,322)	(224,390)	(262,322)	(224,390)
Pelarasan	(91,472)	(59,069)	(91,472)	(59,069)
Baki Akhir	351,317	345,707	351,317	345,707
Ganjaran yang perlu dibayar dalam tempoh 12 bulan	351,317	345,707	351,317	345,707
JUMLAH	1,949,624	1,283,556	1,949,624	1,283,556

19. CUKAI PENDAPATAN

	KUMPULAN		INSTITUT	
	2018	2017	2018	2017
	RM	RM		RM
Cukai Pendapatan	736,794	874,798	736,794	874,798
Kurangan pendapatan sebelum cukai	(4,624,012)	(14,266,170)	(3,519,301)	(14,178,632)
Cukai pada kadar berkanun 24%	(1,109,763)	(3,423,881)	(844,632)	(3,402,872)
Perbelanjaan tidak dibenarkan cukai	2,134,189	2,533,790	2,134,189	2,533,790
Elaun modal diserap	(1,273,332)	(1,234,566)	(1,273,332)	(1,234,566)
Pendapatan tidak dikenakan cukai	855,816	2,978,446	855,816	2,978,446
Terkurang peruntukan cukai tahun sebelumnya	(135,247)	-	(135,247)	-
Cukai tertunda tidak dinyatakan dalam penyata kewangan	265,131	21,009	-	-
Cukai tahun semasa	736,794	874,798	736,794	874,798

20. PENGLIBATAN MODAL

Penglibatan modal bagi kontrak-kontrak dalam pelaksanaan yang tidak diiktiraf bagi tahun berakhir 31 Disember 2018 berjumlah RM1,396,252 (31 Disember 2017: RM75,710).

21. BILANGAN KAKITANGAN

Bilangan kakitangan tetap (tidak termasuk Anggota Institut) pada 31 Disember 2018 adalah seramai 647 orang (31 Disember 2017: 654 orang).

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
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22. TRANSAKSI PIHAK BERKAITAN

Untuk tujuan penyata kewangan ini, pihak dianggap berkaitan dengan Kumpulan jika Kumpulan mempunyai keupayaan, secara langsung atau tidak langsung, untuk mengawal parti atau menjalankan pengaruh penting terhadap parti dalam membuat keputusan kewangan dan operasi, atau sebaliknya.

(a) Urusniaga Pihak Berkaitan

FRIM Incorporated Sdn Bhd

	KUMPULAN		INSTITUT	
	2018	2017	2018	2017
	RM	RM	RM	RM
Pendapatan perkhidmatan	18,200	-	18,200	-
Sewaan	12,000	-	12,000	-
	30,200	-	30,200	-

(b) Ganjaran Kepada Ahli Lembaga Pengarah	KUMPULAN		INSTITUT	
	2018	2017	2018	2017
	RM	RM	RM	RM
Elaun Anggota Institut	283,732	496,490	283,732	496,490
Elaun Ahli Lembaga Pengarah Anak Syarikat	55,500	29,131	-	-
	339,232	525,621	283,732	496,490

Elaun Pengerusi dan Ahli Anggota Institut adalah masing-masing sebanyak RM6,116 dan RM1,834 sebulan serta sebanyak RM500 dan RM300 bagi elaun kehadiran Mesyuarat.

23. ANGKA PERBANDINGAN

Maklumat dalam penyata kewangan tidak boleh dibandingkan kesan daripada perbezaan tempoh semasa berakhir 31 Disember 2018 dengan tempoh sebelum berakhir 31 Disember 2017 iaitu 12 bulan bagi tempoh semasa berbanding 15 bulan bagi tempoh sebelum.

24. PENGESAHAN PENYATA KEWANGAN

Penyata Kewangan ini telah dibentangkan dalam Mesyuarat Anggota Institut Penyelidikan Perhutanan Malaysia (FRIM) pada 9 Ogos 2019 dan telah dipersetujui oleh semua Anggota Institut.

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