



LAPORAN TAHUNAN ANNUAL REPORT 2023

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia (FRIM)

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Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia
(FRIM)



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2024

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CHAIRMAN'S REPORT



Melastoma malabathricum

Laporan Pengerusi

Chairman's Report

Saya berasa sangat bersyukur dan ingin merakamkan ucapan terima kasih kepada YB Tuan Nik Nazmi Nik Ahmad yang telah memberi kepercayaan kepada saya untuk memikul tanggungjawab sebagai Pengerusi FRIM sekali lagi.

Saya juga mengambil kesempatan ini untuk merakamkan setinggi-tinggi penghargaan serta selamat maju jaya kepada Anggota Institut yang telah menamatkan penggal iaitu Encik Jack anak Liam. Saya mengalu-alukan Anggota Institut baharu yang terdiri daripada Dr Mohd Nor Zamri Mat Amin, Encik Wan Ahmad Asmady Wan Md. Din, Encik Aman Shah Siraj, Puan Salina Muhamad Sali Luddin, Tuan Haji Happysupina Sait dan Encik Saiful Bahri Salleh; serta kepada yang masih kekal sebagai Anggota Institut iaitu Dato' Abdul Wahid Abu Salim, Dr Selvaraj Ramasamy Abdullah, Encik Che Kodir Baharum, Dato' Indera Mohd Ridza Awang, Dr Robert Cyril Ong Kim Leong, Datu Hamden Mohammad, Datuk Wira Sheikh Othman Sheikh Abdul Rahman, Tuan Haji Lokman Mohamad, Dr Ismail Haji Parlan, Dr Arthur Chung Yaw Chyang, Dato' Hj Zahari Ibrahim, Puan Norsham Abdul Latip dan Puan Habibah Ahmad untuk bersama-sama memberi sokongan dan nasihat kepada FRIM supaya terus relevan serta berdaya saing dalam menjalankan penyelidikan dan pembangunan (R&D) dalam bidang perhutanan tropika.

Saya amat berbangga dengan beberapa pencapaian FRIM terutamanya bagi anugerah dan pengiktirafan yang diterima di peringkat kebangsaan dan antarabangsa. Disamping itu FRIM juga meneruskan kerjasama pintar dan strategik dengan agensi luar bagi memenuhi keperluan pemegang taruh dari semasa ke semasa.

I am very grateful and would like to express my appreciation to YB Tuan Nik Nazmi Nik Ahmad who has entrusted me to lead FRIM as the Chairman.

I take this opportunity to thank outgoing Members of the Institute, Mr Jack anak Liam. A warm welcome to new Members, Dr Mohd Zamri Mat Amin, Mr Wan Ahmad Asmady Wan Md. Din, Mr Aman Shah Siraj, Ms Salina Muhamad Sali Luddin, Mr Happysupina Sait, and Mr Saiful Bahri Salleh. As for current Members of the Institute, Dato' Abdul Wahid Abu Salim, Dr Selvaraj Ramasamy Abdullah, Mr Che Kodir Baharum, Dato' Indera Mohd Ridza Awang, Dr Robert Cyril Ong Kim Leong, Datu Hamden Mohammad, Datuk Wira Sheikh Othman Sheikh Abdul Rahman, Mr Lokman Mohamad, Dr Ismail Haji Parlan, Dr Arthur Chung Yaw Chyang, Dato' Hj Zahari Ibrahim, Ms Norsham Abdul Latip and Ms Habibah Ahmad, please join me in supporting FRIM to remain relevant and competitive in research and development (R&D) in tropical forestry.

I am proud of various achievements, especially for the awards and recognitions received at the national and international levels. In addition, FRIM has also continued smart and strategic partnerships with external agencies to fulfil the needs of stakeholders from time to time.

Anugerah dan Pengiktirafan

Syabas dan tahniah kepada FRIM kerana saban tahun menerima penghargaan dan pengiktirafan daripada pelbagai organisasi di peringkat kebangsaan dan antarabangsa, antaranya:

a. Anugerah Saintis Penyelidikan Terbaik

Pencapaian seorang lagi penyelidik FRIM, Dr Mohd Khairun Anwar Uyub yang telah menerima Anugerah Saintis Penyelidikan Terbaik Malaysia (TRSM) daripada Akademi Sains Malaysia (ASM) amat dibanggakan. Dr Mohd Khairun Anwar merupakan saintis FRIM keempat menerima anugerah TRSM, selepas mantan Ketua Pengarah, Datuk Dr Abd Latif Mohmod yang menerima anugerah ini pada 2013, Dr Nor Azah Mohamad Ali pada 2015 dan Dr Lee Soon Leong pada 2022.

Award and Recognition

Each year, FRIM has been recognised and appreciated by various organisations nationally and internationally. Thus, I would like to congratulate FRIM for receiving various awards and recognitions in 2023, including:

a. Top Research Scientist Award

The achievement of another top FRIM researcher, Dr Mohd Khairun Anwar Uyub who has received the Top Research Scientist Malaysia (TRSM) from the Academy of Science Malaysia (ASM) is has to be proud of. He is the fourth FRIM scientist to receive the TRSM award, following former Director-General Datuk Dr Abd Latif Mohmod (2013), Dr Nor Azah Mohamad Ali (2015), and Dr Lee Soon Leong (2022).



b. International Invention, Innovation & Technology Exhibition Malaysia (ITEX Malaysia) 2023

FRIM telah memenangi satu (1) pingat emas dan tiga (3) perak di International Invention, Innovation & Technology Exhibition Malaysia (ITEX Malaysia) 2023 pada 11-12 Mei 2023.

FRIM has won one (1) gold medal and three (3) silver medals at the International Invention, Innovation & Technology Exhibition Malaysia (ITEX Malaysia) 2023. ITEX'23, held on May 11-12, 2023, received 700 entries from 19 countries.

Pingat Emas/Gold Medal:

1. 'The effect of *Clitoria ternate* towards Alzheimers diseases/memory deficit and Parkinson disease (Product name; Neurovit)' - Muhammad Danial Che Ramli (MSU), Anita Zara Weinheimner (MSU), Mahathir Mohd Uzir (MSU), Husin Muhammad (IMR), Mohd Kamal Nik Hasan (FRIM), Syntyche Seow Ling Sing (Ganofarm), Nur Arissa Syazwani (MSU) & Hani Qistina Dayana (MSU)

Pingat Perak/Silver Medal:

1. 'BambooNxtor' - Dr Wan Tarmeze Wan Ariffin, LAr Dr Nik Adlin Nik Mohamed Sukri & Dr Khairul Awang
2. 'r-Agaresin (Rapid Agarwood Resin Content Determination)' – Dr Abd Majid Jalil, Sahrim Lias, Saidatul Husni Saidin, Mailina Jamil, Mohammad Faridz Zoll Patah dan Theresa Luli Anak Rerang
3. 'Floating Lotus' - Mohd Rizuwan Mamat, Dr Marryanna Lion, Dr Wan Mohd Shukri Wan Ahmad, Dr Siti Aisah Shamsuddin, Mohd Azahari Faidi, Abdul Razak Abd Rahman, Rashidah Hasnim @ Hashim, Nurul Faihira Kamaruzaman, Mohd Hahazami Md. Tahar, Azam Shah Mat Rata, Khairul Anuar Mohamed, Wan Adanan Wan Ishak, Zamri Mohd Zain & Hamidul Muhsi Mohd Salleh

c. Seoul International Invention Fair (SIIF 2023)

FRIM telah menerima masing-masing satu pingat perak dan gangsa serta Anugerah Khas pada SIIF 2023 yang diadakan di COEX Seoul, Korea Selatan pada 1-4 November 2023.

FRIM has recieved the silver and bronze awards as well as the Special Award at the Seoul International Invention Fair (SIIF 2023) which was held at COEX Seoul, South Korea from 1-4 November 2023.

Pingat Perak/Silver Medal:

1. 'r-Agaresin (Rapid Resin Content Determination for Agarwood Grading Classification) - Dr Abd Majid Jalil, Sahrim Lias, Mailina Jamil, Saidatul Husni Saidin, Noor Rasyila Mohamed Noor, Theresa Luli Anak Rerang, Mohammad Faridz Zoll Patah, Wan Muhammad Syafiq Wan Mat & Hazandy Abdul Hamid

Inovasi ini turut menerima Anugarah Khas daripada Vietnam Fund for Supporting Technological Creations (VIFOTEC).

This innovation has also received the Special Prize from Vietnam Fund for Supporting Technological Creations (VIFOTEC).

Pingat Gangsa/Bronze Medal:

1. 'Goutree: Aspiring A New Antigout Botanical Drug' - Dr Fadzureena Jamaludin, Siti Nur Aisyah Mohd Hashim, Dr Zunoliza Abdullah, Dr Fadhilah Zainudin, Khairul Iruwan Abdullah, Saidatul Husni Saidin, Khairul Kamilah Abd Kadir, Mohd Shahidan Mohamad Arshad & Dr Farah Fazwa Md Ariff

d. Malaysia Technology Expo (MTE) 2023

Di MTE 2023, FRIM telah memenangi dua Pingat emas dan dua Pingat perak bagi kategori International Innovation Awards (IIA) serta satu Special Award from International Federation of Inventors Associations - IFIA for Best Invention Medal di Malaysia Technology Expo (MTE) 2023 pada 16-18 Mac 2023.

FRIM won two gold and two silver awards in the International Innovation Awards (IIA) category, as well as a Special Award from the International Federation of Inventors' Associations (IFIA) for the Best Invention Medal at the Malaysia Technology Expo (MTE) 2023, held on 16-18 March 2023.

Pingat Emas/Gold Medal:

1. 'Ciéra: Nature Inspired Eco Friendly Hand Wash Product' - Dr Mastura Mohtar, Mohd Ramdan Parman, Wan Sabariah Shuib, Saiful Azmi Johari, Mazurah Mohd Isa & Hannan Abdul Wahab. Turut menerima Anugerah Khas IFIA untuk Best Invention Medal.
2. 'Floating Lotus' - Mohd Rizuwan Mamat, Dr Marryanna Lion, Dr Wan Mohd Shukri Wan Ahmad, Dr Siti Aisah Shamsuddin, Mohd Azahari Faidi, Abdul Razak Abdul Rahman, Rashidah Hasnim @ Hashim & Nurul Faihira Kamaruzaman

Pingat Perak/Silver Medal:

1. 'Nano Crystalline Cellulose (NCC) from Kombucha pellicles' - Abd Rashid Li, Muhammad Khair Mohd Ayob, Saidatul Husni Saidin, Dr Maryam Husain, Nor Hidayatul Khamariah Zainul Abidin & Nursyafinatul Nadhirah Mohd Azizi
2. 'Portable Sensor CLTM' - Gs. Dr Azian Mohti, Nurul Ain Abdul Manaf, Dr Nik Norafida Nek Ali @ Nik Ali & Dr Wan Mohd Shukri Wan Ahmad

e. Anugerah Institut Kimia Malaysia (IKM)

FRIM telah menerima Anugerah Kecemerlangan Makmal (Laboratory Excellence Awards) pada majlis Malam Kimia anjuran Institut Kimia Malaysia (IKM) pada 1 Disember 2023 di Petaling Jaya:

- Makmal Pengujian Komposit Kayu FRIM: Anugerah kecemerlangan Platinum (IKM Laboratory Excellence Platinum Award) atas kejayaan mengekalkan kecemerlangan makmal selama 20 tahun berturut-turut
- Makmal Analisis Awetan Kayu, Makmal Kimia Tanah dan Makmal Kawalan Kualiti Hasil Semula Jadi atas kecemerlangan makmal bagi 2023.

f. Anugerah Buku Negara 2023

Tahun ini FRIM sekali lagi menerima Anugerah Buku Negara 2023 Kategori Perdana: Institusi Penyelidikan Terbaik di majlis anugerah yang diadakan pada 27 Mei 2023 bagi menghargai sumbangan FRIM dalam memperbanyakkan penerbitan ilmiah tentang penjagaan dan perlindungan hutan tropika, biodiversiti hutan, penggunaan kayu-kayan dan lain-lain khazanah, penanaman semula pokok-pokok hutan serta perlindungan alam sekitar.

Selain itu, FRIM turut menerima Anugerah Buku Negara 2023 (Sidang 2) bagi buku penerbitan berjudul 'Bunga-bunga yang boleh dimakan' untuk Kategori Industri: Buku Umum Terbaik (Flora & Fauna) pada 22 Disember 2023. Buku ini dihasilkan oleh Zawiah Ngah, Dasrul Iskandar Darus dan Dr Rosdi Koter serta disunting oleh Ida Suraini Abd Shukor dan Chee Beng Jin.

g. Malaysia Book of Records (MBR)

Saintis tanah FRIM, Dr V. Jeyanny Vijayanathan telah menerima pengiktirafan Malaysia Book of Records (MBR) bagi 'First Malaysian Soil Scientist to be Selected As Panel for Food and Agriculture Organization (FAO) Intergovernmental Technical Panel of Soils (ITPS)'. Kejayaan Dr V. Jeyanny ini menjadikan FRIM memperoleh 46 rekod MBR keseluruhannya.

Kerjasama Penyelidikan (Mou/Perjanjian)

Kepakaran penyelidik FRIM dalam pelbagai bidang penyelidikan telah diakui dan banyak membantu menyelesaikan isu dan

e. IKM Award

FRIM received the Laboratory Excellence Awards at the Chemistry Night event organised by the Malaysian Institute of Chemistry (IKM) on 1 December 2023, in Petaling Jaya:

- FRIM Wood Composite Testing Laboratory: Platinum Excellence Award (IKM Laboratory Excellence Platinum Award) for maintaining laboratory excellence for 20 consecutive years
- Wood Preservation Analysis Laboratory, Soil Chemistry Laboratory, and Natural Product Quality Control Laboratory for laboratory excellence in 2023.

f. National Book Award 2023

FRIM has received the National Book Award 2023 in the Prime Category: Best Research Institution at the award ceremony held on 27 May 2023, to recognise FRIM's contribution to increasing scientific publications on the conservation and protection of tropical forests, forest biodiversity, the use of wood and other resources, reforestation, and environmental protection.

Additionally, FRIM also received the National Book Award 2023 (Session 2) for the publication entitled 'Bunga-bunga yang boleh dimakan' in the Industry Category: Best General Book (Flora & Fauna) on 22 December 2023. This book was written by Zawiah Ngah, Dasrul Iskandar Darus, and Dr Rosdi Koter and edited by Ida Suraini Abd Shukor and Chee Beng Jin.

g. Malaysia Book of Records (MBR)

FRIM soil scientist, Dr V. Jeyanny Vijayanathan, has been recognised by the Malaysia Book of Records (MBR) as the 'First Malaysian Soil Scientist to be Selected as a Panel for Food and Agriculture Organization (FAO) Intergovernmental Technical Panel of Soils (ITPS)'. With the achievement by Dr V. Jeyanny, FRIM now has a total of 46 MBR certificates.

Research Collaboration (Mou/Agreement)

The expertise of FRIM researchers in various research fields has been recognised in assisting to resolve issues and problems faced by

masalah yang dihadapi oleh pihak-pihak berkepentingan. Melalui kerjasama menang-menang, para penyelidik FRIM dengan rakan kerjasama dapat bersama-sama menyumbangkan kepakaran, teknologi baharu serta dapat memperluaskan ilmu dalam bidang penyelidikan perhutanan tropika. FRIM telah mengadakan satu memorandum persefahaman (MoU) dengan agensi luar iaitu:

MoU dengan Lembaga Perbadanan Labuan

MoU yang ditandatangani pada 26 September 2023 bagi melaksanakan kerjasama dalam pengurusan hutan bandar serta hutan paya laut di Wilayah Persekutuan Labuan dengan FRIM memberikan khidmat kepakaran teknikal dalam aspek pengurusan hutan bandar dan arborikultur.

Di samping itu, FRIM juga telah menyambung dua MoU dan satu perjanjian pada tahun 2023. Penyambungan kerjasama ini disambut baik oleh FRIM untuk meneruskan aktiviti-aktiviti yang dirancang, selain dilihat dapat memberi kesan dan impak positif bagi kedua-dua pihak. MoU tersebut termasuklah:

- a. MoU dengan Japan International Research Centre for Agricultural Sciences (JIRCAS)
- b. MoU dengan Universiti Kebangsaan Malaysia (UKM)
- c. Perjanjian dengan East Coast Economic Region Development (ECERDC)

Saya turut berbangga dengan usaha dan inisiatif FRIM bersama FRIM Inc. dalam merealisasikan komersialisasi dan aplikasi hasil-hasil dan teknologi penyelidikan yang telah dijalankan bagi menjana pendapatan. Pelbagai anugerah dan pengiktirafan yang diterima FRIM pada 2023 juga wajar dibanggakan. Ini menunjukkan sumbangan FRIM dalam penyelidikan perhutanan tropika dihargai dan diiktiraf oleh pelbagai pihak, di peringkat kebangsaan mahupun antarabangsa. Justeru, saya berharap penyelidik FRIM akan terus berusaha untuk meningkatkan keupayaan dalam menghasilkan R&D berkualiti serta memenuhi kehendak pemegang taruh. Kerjasama penyelidikan juga perlu dikembangkan lagi, di samping meningkatkan usaha komersialisasi hasil-hasil R&D agar FRIM terus unggul seiring dengan institusi-institusi penyelidikan perhutanan dunia yang lain.

Dato' Haji Rosli Isa

Pengerusi / **Chairman**

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

stakeholders. Through win-win collaborations, FRIM researchers and collaborators can contribute their expertise and latest technologies and, expand knowledge in tropical forestry research. FRIM has signed an MoU with external agencies as follows:

MoU with Board of Labuan Corporation

The MoU was signed to collaborate in the implementation of urban and peat swamp forests management in the Federal Territory of Labuan where FRIM will provide technical expertise in the aspect of urban forest management and arboriculture.

In addition, FRIM has also extended two MoUs and one agreement in 2023. The continuation of these collaborations will allow FRIM to conduct the planned activities continuously besides benefiting both parties. The MoUs/agreement included:

- a. MoU with Japan International Research Centre for Agricultural Sciences (JIRCAS)
- b. MoU with Universiti Kebangsaan Malaysia (UKM)
- c. Agreement with East Coast Economic Region Development (ECERDC)

I am proud of the efforts and initiatives by FRIM together with FRIM Inc. in realising the commercialisation and application of research findings and technologies for generating income. FRIM should be proud to receive various awards and recognitions in 2023. This shows that the contributions of FRIM to tropical forestry research are highly recognised and appreciated by national and international parties. Hence, I hope that FRIM researchers will continue to enhance efforts in conducting R&D to fulfil the needs of stakeholders. Research partnerships should be further explored besides increasing efforts in commercialisation of R&D outputs so that FRIM will continue to excel and stay on par with other forest research institutes in the world.

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(hingga/**until** 30 April 2023)
YBrs Tuan Haji/**Mr** Happysupina Sait (Ahli Silih Ganti/**Alternate Member**)
(mulai/**from** 30 September 2023)

Kementerian Ekonomi
Ministry of Economy
YBrs Encik/**Mr** Che Kodir Baharum
YBrs Puan/**Ms** Salina Muhamad Sali Luddin (Ahli Silih Ganti/**Alternate Member**)

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**

YBrs Dr Ismail Haji Parlan

Jabatan Perhutanan Semenanjung Malaysia

Forestry Department of Peninsular Malaysia

YBhg Dato' Indera Mohd Ridza Awang, DIMP

YBhg Dato' Zahari Ibrahim, DPSK (Ahli Silih Ganti/**Alternate Member**)

Jabatan Perhutanan Sabah

Sabah Forestry Department

YBrs Dr Robert Cyril Ong Kim Leong, ADK

YBrs Dr Arthur Chung Yaw Chyang (Ahli Silih Ganti/**Alternate Member**)

Persatuan Pengusaha Kayu Kayan dan Perabot Bumiputra Malaysia

Association of Malaysian Bumiputra Timber and Furniture Entrepreneurs (PEKA)

YBrs Tuan Haji/**Mr** Lokman Mohamad

Kementerian Sumber Asli, Alam Sekitar dan Perubahan Iklim

Ministry of Natural Resources, Environment and Climate Change

YBrs Puan/**Ms** Norsham Abdul Latip

Institut Penyelidikan Perhutanan Malaysia

Forest Research Institute Malaysia

YBrs Dr Norwati Muhammad

JAWATANKUASA KOMERSIALISASI

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Members and Alternate Members

Kementerian Ekonomi

Ministry of Economy

Pengerusi/Chairman

YBrs Encik/Mr Che Kodir Baharum

Kementerian Sumber Asli, Alam Sekitar dan Perubahan Iklim

Ministry of Natural Resources, Environment and Climate Change

YBrs Puan/Ms Norsham Abdul Latip

Kementerian Perlindungan dan Komoditi

Ministry of Plantation and Commodities

YBrs Encik/Mr Wan Ahmad Asmady Wan Md. Din

YBrs Puan/Ms Habibah Ahmad (Ahli Silih Ganti/Alternate Member)

Persatuan Pekilang Panel Malaysia

Malaysian Panel-Products Manufacturer's Association (MPMA)

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

Persatuan Pengusaha Kayu Kayan dan Perabot Bumiputra Malaysia

Association of Malaysian Bumiputra Timber and Furniture Entrepreneurs (PEKA)

YBrs Tuan Haji/Mr Lokman Mohamad

Institut Penyelidikan Perhutanan Malaysia

Forest Research Institute Malaysia

YBrs Dr Norwati Muhammad

FRIM Incorporated Sdn. Bhd.

YBrs Encik/Mr Wan Jusaini Rizal Wan Nasruddin

JAWATANKUASA PEROLEHAN

PROCUREMENT COMMITTEE

Ahli dan Ahli Silih Ganti Members and Alternate Members

Kementerian Sumber Asli, Alam Sekitar dan Perubahan Iklim
Ministry of Natural Resources, Environment and Climate Change
Pengerusi/Chairman
YBhg Dato' Abdul Wahid Abu Salim, DSPN

Kementerian Sumber Asli, Alam Sekitar dan Perubahan Iklim
Ministry of Natural Resources, Environment and Climate Change
YBrs Puan/Ms Norsham Abdul Latip

Perbendaharaan Malaysia, Kementerian Kewangan
Treasury Malaysia, Ministry of Finance (MOF)
YBrs Dr Selvaraj Ramasamy Abdullah

Lembaga Perindustrian Kayu Malaysia
Malaysian Timber Industries Board (MTIB)
YBrs Dr Mohd Nor Zamri Mat Amin, KMN

Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia (FRIM)
YBrs Dr Ismail Haji Parlan
YBrs Dr Noor Azlin Yahya (Ahli Silih Ganti/Alternate Member)
(hingga/until 13 Mei 2023)
YBrs Dr Lillian Chua Swee Lian (Ahli Silih Ganti/Alternate Member)
(mulai/from 19 Mei 2023)

JAWATANKUASA TATATERTIB

DISCIPLINARY COMMITTEE

Keahlian Jawatankuasa adalah berdasarkan kategori pegawai dan bidang kuasa.
The committee membership is based on the jurisdiction and officer category.



LAPORAN KETUA PENGARAH

DIRECTOR GENERAL'S REPORT

Stereospermum fimbriatum

LAPORAN TAHUNAN

ANNUAL REPORT

Laporan Ketua Pengarah Director General's Report

Pertamanya, izinkan saya mengucapkan syukur kehadiran Allah swt kerana dengan izinnya FRIM dapat meneruskan kecemerlangan dalam teras perkhidmatannya iaitu penyelidikan, pembangunan, komersialisasi dan inovasi (R,D,C&I) perhutanan tropika. Sebagai sebuah institusi penyelidikan dalam bidang sains perhutanan tropika yang penting, FRIM akan terus memainkan peranan dalam memacu kemajuan sektor perhutanan negara dengan komitmen untuk terus memperluaskan dan memperkasakan bidang-bidang penyelidikan, pembangunan, pengkomersialan, dan inovasi (R,D,C&I) serta memastikan bahawa ia sentiasa bersama dengan perkembangan sains dan teknologi global.

Secara keseluruhannya, tahun 2023 merupakan tahun kejayaan yang terus memacu kecemerlangan FRIM. Komitmen terhadap misi dan visi, fungsi FRIM telah diperluas kepada enam teras yang merangkumi penyelidikan dan pembangunan, penyebaran maklumat hasil penyelidikan, hubungan kerjasama penyelidikan, pengkomersialan dapatan penyelidikan, program latihan dan kesedaran awam serta pengukuhan tadbir urus insitut.

Pencapaian Penyelidikan dan Pembangunan

FRIM sentiasa komited dalam meningkatkan kualiti penyelidikan agar terus relevan sebagai sebuah institusi penyelidikan perhutanan terunggul di dunia. Pada tahun 2023, sebanyak 136 projek telah dijalankan yang mana sebanyak 29 projek penyelidikan baharu telah diluluskan, yang merangkumi penaja luar dan geran dalaman dengan nilai RM21,059,806.00. Ini menunjukkan penurunan berbanding tahun 2022 dengan 48 projek penyelidikan bernilai lebih RM26 juta.

First and foremost, allow me to express my gratitude to Allah swt, with His permission FRIM continues to excel in its core business which are research, development, commercialisation and innovation (R,D,C&I) in tropical forestry. As an important research institution in the field of tropical forestry science, FRIM will continue to play a role in driving the progress of the country's forestry sector with a commitment to continue expanding and empowering the fields of research, development, commercialization, and innovation (R,D,C&I) and ensuring it is abreast with the development of global science and technology.

Overall, 2023 is a successful year that continues to drive FRIM to be excellence. Its commitment to the mission and vision, FRIM's functions have been expanded to six thrusts that include research and development, dissemination of research findings, research collaborations, commercialization of research findings, training and public awareness programmes as well as strengthening institutional governance.

Achievements of Research and Development

FRIM is committed to improve the quality of research in order to stay relevant as world renowned forestry research institution. A total of 136 projects were conducted in 2023 in which 29 research projects were newly approved from external and internal funds amounting to RM21,059,806.00 displaying a decrease as compared to year 2022 with 43 new projects amounting more than RM26 million.

FRIM telah menghantar 46 dokumen cadangan penyelidikan dalam usaha mendapatkan tajaan dana penyelidikan luar bagi melaksanakan aktiviti-aktiviti yang berkaitan dengan R,D,C&I. Untuk itu, FRIM menghargai sokongan dana berterusan daripada pelbagai agensi/organisasi kerajaan dan swasta dari dalam dan luar negara seperti Skim Geran Penyelidikan NKEA Herba, Dana Inovasi Sosial Malaysia, Jawatankuasa Teknikal Mengenai Penyelidikan dan Pembangunan, Tabung Amanah Konservasi Sumber Asli Nasional serta dana di bawah RMKe-12. Antara projek R&D yang mencapai hasil memberangsangkan pada 2023 ialah:

FRIM has intensified its efforts by submitting 46 research proposals to secure funding for the implementation of research activities related to R,D,C&I. Therefore, FRIM appreciates the continuous support of funds from various government and private agencies/organisations from local or overseas including NKEA Herbal Research Grant Scheme, Malaysia Social Innovation Fund, state governments, federal government, Fundamental Research Grant Scheme, Technical Committee on Research and Development as well as National Conservation Trust Fund under the 12th Malaysia Plan. Among the R&D projects with interesting findings in the year 2023 are:



a. Penilaian Kawasan Hutan Bandar dan Hutan Rekreasi untuk Pengurusan Hutan Bersepadu ke arah Kesejahteraan Rakyat

Kawasan hutan bandar khususnya taman awam bandaran mempunyai faedah dan fungsi daripada aspek ekologi, rekreasi dan nilai estetika. Taman awam bandaran juga merupakan tempat untuk masyarakat beristirehat, beriadah bersama keluarga serta melakukan aktiviti sosial dan kemasyarakatan. Selain menawarkan peluang untuk rekreasi, taman awam juga penting untuk tujuan pendidikan alam sekitar dan pemuliharaan biodiversiti. Kajian bertajuk Penilaian Kawasan Hutan Bandar dan Hutan Rekreasi untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat telah dijalankan di tiga taman awam terpilih di negeri Kelantan dengan kerjasama Majlis Perbandaran Kota Bharu Bandar Raya Islam (MPKB-BRI) dan Majlis Daerah Kuala Krai (MDKK). Lokasi kajian adalah di Taman Perbandaran Tengku Anis (TPTA), di daerah Kota Bharu, serta Taman Tasik Krai (TTK) dan Taman Chintawangsa (TC) di daerah Kuala Krai.

Hasil kajian inventori maklumat flora mendapati Indeks Kepelbagaian Spesies (SDI) di tiga taman kajian mencatatkan bacaan yang tinggi iaitu antara 0.88 sehingga 0.96. Komposisi spesies pokok di taman-taman awam tersebut yang ditanam sebagai pokok landskap dan teduhan terdiri daripada spesies tempatan dan eksotik. Pemerhatian kajian menunjukkan bahawa kawasan taman awam amat sesuai menjadi habitat kepada pelbagai jenis fauna dan penting untuk pemeliharaan biodiversiti bandar. Kajian juga menunjukkan pokok yang mempunyai sila yang padat dan indeks keluasan daun (LAI) yang tinggi memberikan lebih teduhan, menurunkan suhu, mengurangkan silau matahari serta meningkatkan kelembapan bandingan. Faktor-faktor ini mempengaruhi keselesaan pengunjung yang mengunjungi sesuatu taman awam. Kajian persepsi

and exotic species planted as landscape and shade trees. The observations also indicated that urban public park is suitable as a habitat for a wide variety of fauna and is important for the protection of urban biodiversity. Studies have also shown that trees with dense canopy and high leaf area index (LAI) provide more shade, lower temperatures, reduce sun glare and increase comparative humidity. These are some of the factors that affect the comfort of visitors while visiting a public park. The majority of respondents agreed that a visit to a public park is a quality leisure activity as well as providing health and social benefits. In terms of economic benefits of the parks, the estimated value of visitors' Willingness to Pay (WTP) for park conservation at TPTA was between RM3,349,715 to RM3,970,032 per year, while in TTK and TC, it

a. Assessment of Urban and Recreational Forest for Integrated Management towards Community Well-being

Urban forest areas especially urban public parks provide benefits and functions in terms of ecology, recreation and aesthetic value. The urban public park is also a place for leisure for the community and to carry out recreational and social activities. In addition to recreation, public parks are also important for environmental education and biodiversity conservation purposes. A study entitled Assessment of Urban and Recreational Forest for Integrated Management towards Community Well-being was conducted at Tengku Anis Municipal Park (TPTA), in Kota Bharu district, Krai Lake Park (TTK) and Chintawangsa Park (TC), both in Kuala Krai district.

The results of the flora inventory found that the Species Diversity Index (SDI) in all 3 study areas recorded high readings ranging from 0.88 to 0.96. The tree species composition in all 3 public parks consisted of local



Anggaran nilai tingkat kesanggupan membayar (WTP) pengunjung untuk pemuliharaan taman di TPTA adalah antara **RM3,349,715** sehingga **RM3,970,032 setahun**, manakala di TTK dan TC antara **RM2,110,480** dan **RM2,131,681 setahun**.

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pengunjung menunjukkan majoriti responden bersetuju bahawa kunjungan ke taman awam adalah satu aktiviti pengisian masa lapang yang berkualiti selain memberi faedah dari aspek kesihatan dan nilai sosial. Untuk faedah ekonomi, anggaran nilai tingkat kesanggupan membayar (Willingness to Pay - WTP) pengunjung untuk pemuliharaan taman di TPTA adalah antara RM3,349,715 hingga RM3,970,032 setahun, manakala di TTK dan TC antara RM2,110,480 hingga RM2,131,681 setahun. Sistem Maklumat Inventori Flora & Fauna (SMIFF) telah dibangunkan bagi mewujudkan satu pangkalan data yang sistematik untuk merekod dan menyimpan maklumat hasil kajian bagi membantu pihak MPKB-BRI dan MDKK di dalam pengurusan taman dan penyelenggaraan aset hidup tumbuhan.

b. Tindak Balas Kandungan Air Tanah dan Sejatpeluhan Terhadap Keadaan Sangat Kering di Hutan Tanah Pamah Tropika, Hutan Simpan Pasoh, Negeri Sembilan

Hutan dipterokarpa tanah pamah tropika menerima jumlah hujan yang tinggi sepanjang tahun. Walau bagaimanapun, dinamik iklim seperti perubahan iklim, fenomena El Nino, dan perubahan monsun menyebabkan hutan ini mengalami tekanan air, yang mempunyai kesan ketara ke atas ekosistemnya. Hutan terpaksa mengeluarkan air walaupun kandungan air tanah berkurangan kerana ia perlu melakukan proses fisiologi penting seperti fotosintesis dan transpirasi. Proses ini membantu hutan menyerap karbon dioksida dari udara dan membebaskan wap air ke atmosfera, yang menyejukkan alam sekitar dan menyumbang kepada pembentukan hujan. Kajian ini bertujuan untuk memahami kesan kemarau terhadap ekosistem hutan di Hutan Simpan Pasoh, Negeri Sembilan dengan menggunakan kaedah pemantauan melalui menara fluks untuk memerhati secara berterusan perubahan ciri meteorologi tempatan. Ini merupakan kaedah pemantauan pertama di hutan dipterokarpa tanah pamah tropika di zon kering Semenanjung Malaysia.

Dapatan kajian menunjukkan jika hutan tidak menerima hujan selama sepuluh hari berturut-turut, maka simpanan air bawah tanahnya akan berkurangan sebanyak 0.5%. Keadaan ini dijangka bertambah

as between RM2,110,480 and RM2,131,681 per year. A Flora & Fauna Inventory Information System (SMIFF) was developed to create a database to systematically record and store information of the studies. This system will assist MPKB-BRI and MDKK in the management of the park as well as the maintenance of plant living assets.

b. The Responses of Soil Water Content and Evapotranspiration to an Extremely Dry Condition in Lowland Tropical Forest at Pasoh Forest Reserve, Negeri Sembilan

Tropical lowland dipterocarp forests receive high amount of rainfall throughout the year. However, climate dynamics such as climate change, the El Niño Phenomenon and monsoon changes cause these forests to experience water stress, which has a significant impact on their ecosystems. The forest is forced to release water even if the soil water content decreases because it needs to perform essential physiological processes such as photosynthesis and transpiration. This process helps the forest absorb carbon dioxide from the air and releases water vapour into the atmosphere, which cools the environment and contributes to the formation of rain. This study used the flux tower to monitor changes in local meteorological characteristics. This is the first monitoring method in tropical lowland dipterocarp forests in the dry zone of Peninsular Malaysia.

According to this study, if the forest does not receive rain for 10 consecutive days, then its soil water storage will decrease by 0.5%. This situation is expected to worsen during a strong El Niño Phenomenon, which can cause hotter temperatures and dry air. Information on the dynamics of local climate characteristics is also important for management of watersheds in the forest. This will ensure the availability of water resources in a watershed area and predict future water resources, not only for human consumption but also to guarantee the sustainability of the forest ecosystem. Long term research on water and climate in forest landscape is crucial to understand the potential impact and resilience of a forest. The findings in this study provides new knowledge to forestry and environmental science as reference for the general public, researchers and policymakers in particular.

buruk semasa fenomena El Nino yang kuat, yang boleh menyebabkan suhu lebih panas dan udara kering. Maklumat mengenai dinamik perubahan ciri iklim tempatan juga penting bagi pengurusan hutan untuk kawasan tadahan air. Ini akan memastikan ketersediaan sumber air di kawasan tadahan air dan meramalkan sumber air masa hadapan, bukan sahaja untuk kegunaan manusia tetapi juga untuk menjamin kelestarian ekosistem hutan. Penyelidikan jangka panjang mengenai air dan iklim dalam landskap hutan adalah penting untuk memahami potensi impak dan daya tahan hutan. Penemuan baharu dalam kajian ini juga merupakan tambahan ilmu kepada sains perhutanan dan alam sekitar yang menjadi rujukan kepada orang awam, penyelidik dan penggubal dasar khususnya.

c. Protokol Pemantauan Biodiversiti, Perkhidmatan Ekosistem dan Stok Karbon

Protokol Pemantauan Biodiversiti di Landskap Central Forest Spine (PPBioD) telah diterbitkan pada tahun 2021 dalam versi Bahasa Inggeris dan Bahasa Malaysia pada tahun 2022, diikuti dengan Manual Pemantauan Biodiversiti pada tahun 2023. Objektif utama protokol ini diterbitkan adalah untuk memantau lapan kumpulan berfungsi yang sensitif terhadap sebarang perubahan kepada satu-satu ekosistem khususnya di koridor ekologi Central Forest Spine (CFS). Lapan kumpulan berfungsi ini adalah pokok, tumbuhan herba, semut, kumbang najis, kupu-kupu, herpetofauna (amfibia dan reptilia), mamalia kecil dan mamalia besar.

Protokol ini telah dicadangkan untuk dilaksanakan khususnya dalam menyokong usaha pengurusan sumber hutan secara mampan. Cadangan ini telah melalui tiga peringkat pembentangan yang dimulai dengan Jawatankuasa Penyelarasan Penyelidikan Perhutanan (JPPP), diikuti dengan Majlis Urusan Hutan dan Silvikultur (MAJURUS) yang ke-59 dan Persidangan Pengarah-Pengarah Perhutanan Negeri Semenanjung Malaysia ke-43. Selain itu, Protokol berkaitan Perkhidmatan Ekosistem dan Stok Karbon telah diterbitkan pada tahun 2023. Aplikasi InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) telah digunakan dalam memberikan penilaian perkhidmatan ekosistem seperti kualiti habitat, risiko habitat untuk hidupan liar, potensi rekreasi dan stok karbon. Dengan adanya protokol-protokol yang dibangunkan ini dapat menjadi panduan dan rujukan

c. Biodiversity Monitoring, Ecosystem Services and Carbon Stock Protocols

The Biodiversity Monitoring Protocol in the Central Forest Spine Landscape (PPBioD) was published in 2021 in English and in Bahasa Malaysia in 2022 followed by the publication of Biodiversity Monitoring Manual in 2023. The main objective of this protocol is to monitor eight functional groups that are sensitive to any changes to one ecosystem, particularly in the CFS ecological corridor. These eight functional groups are trees, herbaceous plants, ants, dung beetles, butterflies, herpetofauna (amphibians and reptiles), small mammals and large mammals.

This protocol was proposed to be implemented specifically in support of sustainable forest resource management efforts. Therefore, this Proposal has gone through three stages of presentation beginning with the Forestry Research Coordination Committee (JPPP) 1/2023 on 15 May 2023, followed by the 59th Forest and Silvicultural Affairs Council (MAJURUS) on 20 June 2023 and the 43rd State Forestry Directors Conference of Peninsular Malaysia on 23–27 September 2023. Besides these, a protocol related to Ecosystem Services and Carbon Stocks was published in 2023. The Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) has been used in providing valuation of ecosystem services such as habitat quality, habitat risk for wildlife, recreational potential and carbon stocks. Therefore, it is hoped that it will provide guidance and reference to stakeholders in making decisions on ecosystem services that are intended to be proposed especially at the state level.

d. Establishment of the Multilocational Progeny Trial of *Shorea parvifolia* (Meranti Sarang Punai) For the Production of Genetically Improved Planting Materials

Shorea parvifolia Dyer, locally known as meranti sarang punai or light red meranti as a trade name, belongs to the family of Dipterocarpaceae. IUCN Red List (2018) and Malaysia Plant Red List (2021) classified *S. parvifolia* as *Least Concern* (LC). As *S. parvifolia* is a species of interest for timber among light red meranti group, it is under threat due to selective logging. An improvement program via progeny trial for *S. parvifolia* has been initiated to ensure a sustainable supply of quality planting

kepada pihak-pihak berkepentingan dalam membuat keputusan berkaitan perkhidmatan ekosistem yang ingin dicadangkan khususnya di pihak negeri.

d. Penghasilan Bahan Tanaman Berkualiti Meranti Sarang Punai (*Shorea parvifolia*) Melalui Kajian Progeni dan Penubuhan Bank Germplasma

Shorea parvifolia Dyer atau dikenali sebagai meranti sarang punai tergolong dalam keluarga Dipterokarp. Senarai Merah IUCN (2018) dan Senarai Merah Tumbuhan Malaysia (2021) mengklasifikasikan *S. parvifolia* sebagai *Least Concern* (LC), namun memandangkan spesies ini merupakan antara spesies dagangan yang berharga, ia berada di bawah ancaman pembalakan terpilih. Usaha membaikbiak dan pemuliharaan bagi meranti sarang punai dilaksanakan melalui kajian percubaan progeni dan penubuhan bank germplasma untuk memastikan bekalan bahan tanaman berkualiti yang mampan, terutamanya dalam usaha penanaman semula dan pemulihan kawasan hutan yang terdegradasi. Penanaman menggunakan bahan tanaman yang diperbaiki secara genetik telah terbukti dapat meningkatkan hasil sekurang-kurangnya 15%.

Dalam kajian ini benih dikumpul daripada 17 pokok terbaik terpilih yang berasal dari 11 kawasan hutan simpan di Semenanjung Malaysia. Dua plot percubaan progeni telah ditubuhkan di Stesen Penyelidikan FRIM (SPF) di Segamat, Johor dan Mata Ayer, Perlis dengan jumlah anak pokok yang ditanam di SPF Segamat ialah 280 pokok meliputi kawasan seluas 0.6 ha dan sejumlah 260 anak pokok ditanam di kawasan seluas 0.31 ha di SPF Mata Ayer. Selain itu, bank germplasma berkonsepkan *common garden* telah ditubuhkan di SPF Jeli, Kelantan dengan sejumlah 350 anak pokok ditanam di kawasan seluas 0.42 ha. Program membaikbiak bagi spesies pokok mengambil masa yang panjang untuk mendapatkan data yang konklusif kerana tempoh kematangan pokok adalah lebih lama. Kini, koleksi gen *S. parvifolia* dari 17 pokok terbaik telah pun diperolehi dari lapan negeri di Semenanjung Malaysia. Data prestasi pertumbuhan yang dikumpul daripada kajian ini dapat memberikan maklumat penting bagi membolehkan pemilihan baka pokok yang baik. Di samping itu, penubuhan plot-plot ini juga menyumbang kepada pemerkasaan bank germplasma negara.

materials especially for reforestation and rehabilitation of degraded forest areas. Using genetically improved planting materials has been proven to increase yield by at least 15%.

In this study, seeds were collected from 17 selected plus trees originating from 11 forest reserves in Peninsular Malaysia. Two progeny trial plots have been established at FRIM Research Station in Segamat, Johor with a total of 280 saplings planted across 0.6 ha and at FRIM Research Station in Mata Ayer, Perlis, a total of 260 saplings were planted over 0.31 ha. Additionally, a germplasm with a common garden concept has been established at FRIM Research Station in Jeli, Kelantan with a total of 350 saplings planted over 0.42 ha. Tree breeding programmes will take a significant amount of time to obtain reliable results as the period of maturity is long. There is now a collection of gene pool for *S. parvifolia* from 17 selected plus trees collected from eight different states in Peninsular Malaysia. The growth performance data collected from this study will be able to provide important information for future research. In addition, the establishment of these plots also contributed to the empowerment of the nation's germplasm bank.



e. Pelan Penyelamatan Kelip-kelip Sungai Selangor

Populasi kelip-kelip daripada spesies *Pteroptyx tener* yang hidup di sepanjang tebing Sungai Selangor di daerah Kuala Selangor terkenal dengan kerlipan cahaya yang dihasilkan oleh kelip-kelip jantan sepanjang tahun. Secara tidak langsung spesies ini telah menyumbang kepada kedatangan pelancong ke daerah Kuala Selangor serta membantu meningkatkan sumber pendapatan komuniti setempat melalui aktiviti ekopelancongan. Populasi kelip-kelip di Sungai Selangor yang bilangannya mencecah sehingga beribu-ribu individu bergantung kepada pokok *Sonneratia caseolaris* (berembang) serta habitat pokok bakau untuk kemandiriannya. Selain daripada daerah Kuala Selangor, populasi *P. tener* juga terdapat di Sg. Kerian, Sg. Sepetang, Sg. Linggi di pantai barat dan Sg. Chukai, Sg. Kemaman dan Sg. Cherating di pantai timur Semenanjung Malaysia. Namun, populasi kelip-kelip di Kuala Selangor merupakan populasi yang terbesar di Malaysia. Disebabkan statusnya yang ikonik dan fungsinya sebagai indikator kesihatan ekosistem sungai, maka Lembaga Urus Air Selangor (LUAS) telah melantik FRIM untuk membangunkan kaedah dan teknik baharu untuk memulihara populasi kelip-kelip dan habitatnya di Sg. Selangor. Dengan bantuan daripada penyelidik Institut Genom dan Vaksin Malaysia serta Universiti Malaya, FRIM telah menganalisa kepelbagaian genetik serta aliran gen antara populasi *P. tener* di sepanjang persisiran Sg. Selangor untuk mengenal pasti sama ada populasi ini telah menjadi semakin terpisah antara satu sama lain. Selain memahami proses genetik populasi yang telah memberi impak kepada *P. tener*, FRIM juga menggunakan teknik penderiaan jauh dengan satelit dan dron untuk menilai kualiti dan integriti ekosistem yang didiami oleh kelip-kelip *P. tener*.

Dapatan kajian menunjukkan kebanyakan individu kelip-kelip di Sg. Selangor mempunyai konstitusi genetik yang agak sama antara satu sama lain, manakala analisa gen mitokondria pula menunjukkan kehadiran varian-varian genetik nadir di beberapa lokasi di persisiran Sg. Selangor yang dikaji. Selain itu, kajian menunjukkan kebolegunaan teknik penderiaan jauh untuk memantau dan menilai kesihatan habitat atau ekosistem bakau yang

e. Genetic Rescue Plan for Selangor River Fireflies

Populations of the estuarine firefly, *Pteroptyx tener*, which inhabit the banks of the Selangor River, Kuala Selangor, are famed for the spectacular displays of synchronised flashing by males of the species all-year round. They are an important tourist attraction in Selangor providing enterprising locals with the opportunity to provide guided tours so that tourists can view them up close from the river. The populations here, which number in thousands of individuals, depend on both *Sonneratia caseolaris* and the mangrove habitat lining the Selangor River for their survival. Apart from Kuala Selangor, populations of *P. tener* can also be found in Kerian, Sepetang and Linggi Rivers on the west coast; and Chukai, Kemaman and Cherating Rivers on the east coast of Peninsular Malaysia. Kuala Selangor is, however, home to the largest firefly population in the country. Because of its iconic status and realisation of its role as an indicator of ecosystem health, Lembaga Urus Air Selangor (LUAS) commissioned FRIM to embark on a year-long study to develop new methods and techniques to conserve and rehabilitate this species and its habitat. With the assistance of researchers from Malaysia Genome and Vaccine Institute and University of Malaya, FRIM undertook the task of assessing genetic diversity and gene flow in- and between- populations of *P. tener* inhabiting different sections of the Selangor River in order to characterise their diversity and determine if populations inhabiting the different sections of the Selangor River were slowly becoming isolated from one another. Apart from population genetic processes impacting *P. tener*, this project employed remote sensing tools such as satellite imaging and drone imaging to analyse the quality and integrity of the mangrove ecosystem.

Results showed that populations of *P. tener* in Kuala Selangor appear to be genetically similar to one another. Separately, mitochondrial DNA gene sequencing results showed many rare genetic variants among firefly individuals inhabiting some sections of the Selangor River. In addition, through the use of remote sensing technology, the researchers were able to evaluate and demonstrate the use of this method to monitor land use change and habitat encroachment, as well as to determine

didiami oleh *P. tener*. FRIM berhasrat untuk terus membantu LUAS serta pemegang taruhnya untuk meningkatkan kesihatan habitat kelip-kelip serta membangunkan kaedah baharu untuk memulihara populasi kelip-kelip di Sg. Selangor.

f. Pembangunan Sebatian Pyrrolidone Berdasarkan Tumbuhan Baharu yang Berpotensi sebagai Agen Anti-MRSA

Staphylococcus aureus rintang-metisilin (MRSA) adalah bakteria yang biasa dijumpai di hospital dan terkenal dengan sifat rintang terhadap pelbagai antibiotik dan agen antimikrob yang berlainan struktur. Baru-baru ini, *S. aureus* telah dikenal pasti sebagai punca utama kematian disebabkan oleh bakteria di 135 negara yang mana bakteria MRSA sahaja secara langsung mengakibatkan lebih daripada 100,000 kematian pada tahun 2019. Dari segi ekonomi, kos penggunaan antibiotik sistemik di hospital-hospital di Malaysia terus meningkat daripada RM381 juta pada tahun 2011 kepada RM408 juta pada tahun 2016. Ironinya, pembangunan antibiotik baharu telah hampir terhenti apabila hanya dua kelas antibiotik yang baharu (oxazolidinone dan lipopeptide) terhadap MRSA telah diluluskan oleh FDA dalam tempoh 60 tahun yang lalu. Jelas sekali, terdapat keperluan yang mendesak untuk penghasilan kelas antimikrob baharu dan alternatif bagi mencegah atau sekurang-kurangnya mengurangkanjangkitan MRSA di seluruh dunia.

Alkaloid polihidroksi pyrrolidone semula jadi telah dikenal pasti mempunyai sifat antimikrob yang sangat baik. Melalui kajian ini, satu sebatian terbitan pyrrolidone berhalogen baharu, HCD1, yang mempamerkan aktiviti perencatan yang baik dengan nilai kepekatan perencatan minimum (MIC) kurang daripada 8 µg/ml terhadap satu panel pencilan MRSA telah berjaya dihasilkan. HCD1 telah diuji melalui penilaian ketoksikan, keberkesanan perlindungan anti-MRSA dan integriti sel MRSA. Analisis mikroskopi elektron pengimbasan (SEM) mendedahkan bahawa terdapat kerosakkan terhadap struktur membran dan struktur sitoplasmik pada sel MRSA yang dirawat dengan HCD1 berbanding sel MRSA yang tidak dirawat. HCD1 berpotensi untuk dibangunkan sebagai agen antibakteria baharu yang selamat dan berkesan terhadap MRSA.

the quality of the mangrove vegetation inhabited by *P. tener*. FRIM's ultimate aim is to assist LUAS and its stakeholders improve the health of the firefly habitat and to co-develop solutions to ensure that the Selangor River fireflies continue to be preserved.

f. Development of a Novel Plant-Based Pyrrolidone Compound as a Potential Anti-MRSA Agent

Methicillin-resistant *Staphylococcus aureus* (MRSA) is nosocomial-related bacteria that have been known to display multidrug-resistance properties towards a wide range of structurally-unrelated antibiotics and antimicrobial agents. Recently, *S. aureus* has been identified as the leading cause of bacterial death in 135 countries in which MRSA alone are directly responsible for more than 100,000 deaths in 2019. Economically, the cost of systemic antibiotics usage in Malaysian Hospitals has steadily risen from RM381 million in 2011 to RM408 million in 2016. Ironically, development of novel antibiotics has been dwindling almost to a halt as only two new classes of anti-MRSA drugs (oxazolidinone and lipopeptide) have been approved by the FDA in the last 60 years. Clearly, there is a dire need for a novel and alternative class of antimicrobials to prevent or at least reduces MRSA infections worldwide.

Natural polyhydroxy pyrrolidone alkaloids are known to display remarkable antimicrobial properties. In this study, a novel halogenated codonopsinine derivative, HCD1, that exhibited a good inhibitory action with minimum inhibitory concentrations (MIC) value of less than 8 µg/ml against a panel of MRSA isolates has successfully been synthesized. HCD1 were subjected to various toxicity, anti-MRSA protection efficacy and MRSA cell integrity evaluations. Scanning electron microscopy (SEM) analysis revealed structural and cytoplasmic membrane disruptions on MRSA cells treated with HCD1 as compared to the untreated bacterial cells.

g. Pembangunan Ekstrak Piawai daripada *Azadirachta excelsa* (sentang) untuk Pembangunan Biopestisid

Racun serangga berasaskan bahan kimia digunakan secara meluas di seluruh dunia. Namun, penggunaannya berpotensi menimbulkan masalah kesihatan dan alam sekitar. Untuk mengatasi masalah ini, pendekatan harus diubah kepada sumber semula jadi demi kesihatan dan keselamatan pengguna dan alam sekitar. Pokok *Azadirachta excelsa* atau dikenali dengan nama tempatannya, sentang adalah sejenis pokok besar berkayu yang terdapat di Semenanjung Malaysia. Beberapa kajian tentang *A. excelsa* untuk sifat biopestisidnya telah dilaporkan. Disebabkan penemuan yang menarik ini, kajian menyeluruh tentang spesies ini telah dijalankan untuk mendalami keistimewaannya yang boleh dikembangkan lagi.

Kajian di FRIM menunjukkan *A. excelsa* mengandungi sebatian terpenoid yang merupakan komponen aktif larvasida untuk nyamuk aedes dan anai-anai. Kajian keberkesanan ke atas serangga perosak anai-anai *Captothermes curvignathus* dan serangga vector penyakit nyamuk denggi *Aedes aegypti* mendapati ekstrak piawai yang tinggi kandungan triterpenoid menunjukkan keputusan keberkesanan yang lebih tinggi dan konsisten berbanding ekstrak tidak diapiawaikan. Ekstrak piawai daripada daun *A. excelsa* mendapati mampu menghalang anai-anai *C. curvignathus* daripada makan dan ia juga boleh membunuh larva nyamuk *A. aegypti* dengan jauh lebih berkesan berbanding ekstrak bukan piawai. Bahan semula jadi berasaskan tumbuhan ini selamat untuk pengguna dan tidak mempunyai sebarang kesan negatif terhadap alam sekitar dan berpotensi untuk diformulasikan bagi tujuan komersial.

h. Karbon Teraktif Buluh Sebagai Elektrod Superkapasitor

Bahan lignoselulosa contohnya kayu, tempurung kelapa, buluh dan sekam padi adalah antara sumber semula jadi yang berpotensi untuk dijadikan bahan yang boleh diperbaharui untuk keperluan masyarakat dan industri pada hari ini. Ketersediaan dan lambakan hasil sampingan pertanian, seperti buluh dan tempurung kelapa, menjadikan ianya sumber bahan mentah yang mudah didapati untuk pembuatan karbon teraktif (AC) di Malaysia. Penukaran biojisim daripada bahan lignoselulosa yang agak murah, mudah diproses dan didapati serta mesra alam sebagai produk nilai tambah telah dianggap sebagai alternatif untuk AC komersial. AC ialah sejenis karbon yang diproses bagi

g. Production of a Standardised Extract from *Azadirachta excelsa* (Sentang) for the Development of Biopesticides

Chemical-based pesticides are widely used around the world. However, the use of these types of pesticides can have detrimental impacts on health and the environment. To overcome these problems, people resort to natural approaches to address this problem. *Azadirachta excelsa* or locally known as sentang is a woody plant that can be found in Malaysia. It is better for in the wood industry than for its bioactive properties. A few studies on biopesticidal properties of *A. excelsa* have been reported. Due to the interesting findings, a comprehensive study of this species was carried out to search for potential activities that could be further developed into products.

A study conducted in FRIM shows that *A. excelsa* contains terpenoid compounds that are active against termites and *Aedes* mosquitoes. The standardised extract was more effective against *Captothermes curvignathus* termite and *Aedes aegypti* mosquito as compared to the non-standardised extract. The standardised extract is able to inhibit or prevent termite *C. curvignathus* from feeding and it also could kill the larvae of mosquitoes *A. aegypti* more effectively as compared to the non-standardised extract. A natural plant-based material that is safe for users and does not have any negative effects on the environment.

h. Bamboo Activated Carbon as Supercapacitor Electrode

Lignocellulosic materials such as wood, coconut shell, bamboo and rice husk are among the most promising natural resources that are renewable and necessary for today's industrial society. The availability and abundance of agricultural by-products such as bamboo and coconut shell make them a readily available source of raw materials for the manufacturing of activated carbon (AC) in Malaysia. The conversion of inexpensive, easily processed, abundant and eco-friendly lignocellulosic biomass as value-added products has been considered as an alternative for the commercialization of AC. AC is a form of carbon that is processed to have small and low-volume pores, which increase the surface area available for adsorption. It is commonly used to filter contaminants

mempunyai liang kecil dan berisipadu rendah, yang meningkatkan luas permukaan untuk proses penyerapan. Ia biasanya digunakan untuk menapis bahan cemar daripada air dan udara dan juga boleh berfungsi dalam aplikasi termaju.

Penyelidikan di FRIM telah dimulakan untuk penghasilan AC daripada biojisim buluh melalui proses pengaktifan kimia dan stim. Kajian awal mendapati kaedah ini tidak dapat menghasilkan luas permukaan AC yang optimum dan hanya sesuai untuk aplikasi sederhana dan rendah seperti rawatan pencemaran udara dan pembersihan air. Penyelidikan kemudian tertumpu kepada pembangunan dan peningkatan luas permukaan AC yang lebih tinggi melalui proses pengubahsuaian untuk aplikasi elektronik. Luas permukaan AC yang lebih tinggi kemudiannya berjaya diperolehi dengan menggunakan pelbagai kaedah pengkarbonan dan pengaktifan serta pelbagai jenis agen pengaktifan kimia. Hasilnya, AC buluh ini dapat menghasilkan nilai kapasitans spesifik yang optimum dan berada dalam nilai ideal untuk superkapasitor daripada bahan lignoselulosa. AC buluh ini menunjukkan prestasi elektrokimia yang baik dan berpotensi dalam aplikasi superkapasitor. Namun, lebih banyak kajian perlu dilakukan dari segi ketahanan dan kitaran hayat bahan elektrod bagi meningkatkan prestasi AC untuk digunakan sebagai komponen dalam elektrod superkapasitor.

i. BambooNxtor – Penyambung Buluh Serbaguna

Penyambungan batang-batang buluh dalam pembinaan sentiasa menjadi cabaran kerana saiz dan bentuk diameter batang buluh yang secara semula jadinya tidak seragam. Biasanya, dalam usaha untuk menghasilkan sambungan yang sempurna dan selamat, bahagian di hujung batang buluh perlu diketam, dipotong atau digerudi, dan kadang-kadang diisi dengan tuangan konkrit yang akan dibiarkan mengeras. Proses ini memakan masa dan biasanya akan melemahkan bahagian batang buluh tersebut. Pada tahun 2020, FRIM mencipta sejenis alat penyambung, iaitu BambooNxtor bagi menyelesaikan isu di atas, justeru, menjadikan sambungan batang-batang buluh lebih mudah berbanding sebelum ini. Hujung batang-batang buluh yang hendak disambung dimasukkan ke dalam BambooNxtor dan diketatkan menggunakan sepasang pengepit berbentuk V. Konsep 'kepit dan ketat' ini membolehkan bebanan disebar secara seragam di bahagian hujung batang buluh tersebut, sekaligus dapat mengelakkan risiko buluh akan pecah, terkoyak, patah dan sebagainya.

from water and air and also for high end applications.

FRIM initiated a research in the production of AC from bamboo biomass using chemical and steam activation process. Preliminary studies demonstrated that AC produced by this method could only achieve lower surface area and only suitable for air pollution treatment and water purification, which are medium- and low-end applications. Research was then focused on creating high surface area AC through modification process for high-end electronic application. Higher surface area AC was successfully obtained using various methods of carbonization and activation and different types of chemical activating agents. As a result, this higher surface area of bamboo AC could produce good specific capacitance value within the ideal value for supercapacitor from lignocellulosic material. These bamboo ACs demonstrated good electrochemical performances for supercapacitor application but more study need to be conducted to test its durability and life cycle of electrode material to improve AC performance to be utilized as a component in the supercapacitor electrode.

i. BambooNxtor – A Versatile Bamboo Connector

Bamboo poles connection in building construction has always been a challenge due to the inconsistency of natural bamboo diametrical sizes and shapes. In the efforts to produce a perfect and secured connection, a portion at the pole ends are usually shaved, cut or drilled, and sometimes filled with concrete that will be left to harden. These processes are time consuming and will usually weaken the bamboo. In 2020, FRIM invented a connector named BambooNxtor to solve the above issues by eliminating the needs to further process the bamboo. Hence, making bamboo poles connection easier than ever. The ends of the bamboo poles to be connected are inserted into the BambooNxtor and tightened using a pair of V-shaped clamps. This 'clamp and tighten' concept allows the load to be distributed uniformly at the ends of the bamboo poles, thus avoiding the risk of the bamboo breaking, tearing, shearing and etc.

Proses mengaplikasi BambooNxtor dalam binaan buluh telah dijalankan sepanjang 2021 dan 2022 melibatkan pembinaan 3 gazebo di pusat peranginan Tadam Hill, Banting dan di Taman Botani Kepong, FRIM. Menurut pekerja-pekerja binaan yang diupah untuk membina gazebo-gazebo tersebut, BambooNxtor jenis asas tapak sangat berkesan di dalam memudahkan dan mempercepatkan proses menetapkan lokasi dan mendirikan tiang-tiang buluh pada permukaan lantai. Tiang-tiang buluh yang berdiri tegak dan tegap telah memudahkan pemasangan dan penyambungan lain-lain komponen gazebo seperti rasuk, penyangga, kekuda bumbung dan tunjuk langit. Lazimnya, sekiranya kaedah tuangan konkrit digunakan untuk mendirikan tiang, pekerja perlu menunggu sehingga tiga hari untuk memastikan konkrit kering sepenuhnya sebelum lain-lain komponen dapat dipasang. BambooNxtor telah ditambah baik dari masa ke semasa supaya ia dapat digunakan untuk lain-lain produk seperti kubah geodesik, tempat perlindungan bantuan bencana, kiosk jualan dan panel pameran. Ciptaan ini telah didaftarkan bagi tujuan pengiktirafan paten (MyIPO PI 2021002142, PCT_MY2022_050026).

The application of BambooNxtor in bamboo construction was carried out throughout 2021 and 2022, involving the building of 3 gazebos at the Tadam Hill resort, Banting and at the Kepong Botanic Garden (KBG), FRIM. According to the construction workers who were hired to build the gazebos, BambooNxtor footing connector is very effective in facilitating and speeding up the process of setting the location and erecting the bamboo poles on the floor surface. The upright and sturdy bamboo poles made it easier to install and connect other components of the gazebo such as beams, bracers, roof trusses and finial. If the concrete pouring method was used to erect the columns, workers will have to wait up to 3 days to ensure the concrete is completely dry before other components can be installed. BambooNxtor has been improved over time so that it can be used for other products such as geodesic domes, disaster relief shelters, sales kiosks and display panels. This invention is pending patent recognition (MyIPO PI 2021002142, PCT_MY2022_050026).

j. Kajian Penilaian Ekonomi Berasaskan Pendekatan Kos di Hutan Simpanan Kekal (HSK) Negeri Kedah

FRIM dengan kerjasama Bahagian Perancangan dan Ekonomi Hutan, Jabatan Perhutanan Semenanjung Malaysia dan Universiti Utara Malaysia (UUM) telah menjalankan kajian Penilaian Ekonomi Berasaskan Kos di Hutan Simpanan Kekal (HSK) Negeri Kedah. Antara objektif kajian adalah untuk mengenal pasti kepentingan atau justifikasi keperluan hutan sebagai penyedia perkhidmatan pembekalan dan kawal selia di samping mengganggu nilai kos yang dikeluarkan agensi dan penyedia perkhidmatan akibat perubahan guna tanah di kawasan HSK Negeri Kedah. Penilaian ekonomi berasaskan pendekatan kos ini merupakan salah satu kaedah penilaian yang mengambil kira kos-kos alam sekitar yang terlibat, disebabkan kerosakan atau kehilangan perkhidmatan ekosistem hutan. Keperluan untuk mendapatkan kos-kos ini adalah untuk mengkaji sebanyak mana kos yang perlu ditanggung oleh kerajaan untuk membaiki pulih kerosakan atau mengganti perkhidmatan ekosistem sedia ada bagi kestabilan dan kelestarian alam sekitar untuk kesejahteraan masyarakat.

j. An Economic Evaluation Study of Cost-Based Approach in the Permanent Reserved Forest (PRF) State of Kedah

FRIM in collaboration with the Department of Forestry in Peninsular Malaysia and Universiti Utara Malaysia (UUM) conducted a cost-based economic evaluation study in the Permanent Reserved Forest (PRF) in Kedah. Among the objectives of the study are to identify the importance or justification of the need for forest as a provider of supply and regulatory services, and to estimate the value of costs incurred by agencies and service providers due to land use changes in the PRF area of the State of Kedah. Economic evaluation based on cost approach is one of the evaluation methods that takes into account the environmental costs involved, due to the damage or loss of forest ecosystem services. The need to obtain these costs is to study how much cost the government has to bear to repair damage or replace existing ecosystem services for the stability and sustainability of the environment for the well-being of the community.

As a conclusion, the Kedah PRF plays an important role for water catchment for

Kesimpulannya, HSK Negeri Kedah memainkan peranan penting untuk tadahan air bagi kegunaan domestik, pengairan pertanian dan berfungsi sebagai mencegah hakisan dan banjir. Kajian ini juga secara saintifik telah mengukur status dan hubungan penutupan kanopi hutan oleh hutan yang dibalak dengan kualiti air. Menghubungkan perubahan kualiti air semasa musim hujan adalah perlu untuk melihat kesan rejim kualiti air dengan lebih mendalam. Konsep penilaian ekonomi yang dijalankan adalah untuk menyediakan anggaran kos kerosakan alam sekitar di HSK Negeri Kedah. Walaupun terdapat had dalam menetapkan kos sebenar dalam bentuk kewangan atau 'monetary' untuk kemerosotan alam sekitar, namun anggaran tersebut diharap dapat dijadikan panduan kepada pihak pengurusan untuk membuat pilihan atau alternatif baharu bagi penggunaan HSK.

k. Penilaian Ekonomi Aset Semula Jadi ke Arah Perakaunan Hijau

Hutan hujan tropika Malaysia merupakan salah satu aset semula jadi yang menawarkan 22 perkhidmatan ekosistem yang diklasifikasikan kepada empat kategori utama iaitu pembekalan (makanan, air, bahan mentah, sumber genetik, sumber ubatan dan sumber bahan hiasan); pengawalan (rawatan sisa, kawalan hakisan, kawalan kualiti udara, kesuburan tanah kawalan iklim, kawalan aliran air, kawalan biologi, kawalan bencana alam dan pendebungaan); sokongan (habitat kepelbagaian spesies dan perlindungan kepelbagaian genetik); dan budaya (maklumat estetik, rekreasi/eko pelancongan, sumber inspirasi budaya, seni dan reka bentuk, maklumat pembangunan kognitif dan pengalaman kerohanian).

Kajian ini bertujuan untuk menilai hutan melangkaui balak (*forest beyond timber*) dengan mengambil kira penilaian stok hutan, kebergantungan komuniti dan aktiviti ekonomi hiliran yang terlibat di Hutan Simpan Kekal Ulu Muda, Kedah. Nilai ekonomi perkhidmatan ekosistem hutan yang diperolehi ini digabungkan dengan nilai-nilai ekonomi perkhidmatan ekosistem hutan yang telah dijalankan di hutan-hutan lain di Malaysia di dalam satu pangkalan data yang dinamakan MyTEV. MyTEV akan dipaparkan di laman sesawang sebagai sumber rujukan berpusat mengenai nilai ekonomi perkhidmatan ekosistem hutan di Malaysia. Maklumat ini boleh diakses dan digunakan oleh pihak pembuat keputusan dalam menilai kepentingan hutan

domestik, agriculture irrigation and function to prevent erosion and flood. This project also scientifically measured the status and relationship of forest canopy density by forest logged to water quality. Correlating changes in water quality during raining seasons is necessary to see the effects of water quality regime in more depth. The concept of the economic assessment that was carried out is to provide an estimate of the cost of environmental damage in the Kedah PRF. Although there are limitations in setting of the actual cost in financial form or 'monetary' for environmental degradation, it is hoped that the estimate can be used as a guide for the management to make new choices or alternatives for the use of PRF.

k. Economic Valuation of Natural Capital towards Green Accounting

Malaysia's tropical rainforests are one of the natural assets that offer 22 ecosystem services that are classified into four main categories which are supply (food, water, raw materials, genetic resources, medicinal resources and decorative material resources); control (waste treatment, erosion control, air quality control, soil fertility, climate control, water flow control, biological control, natural disaster control and pollination); support (species diversity habitat and protection of genetic diversity); and culture (aesthetic information, recreation/ecotourism, cultural inspiration, art and design, cognitive development information and spiritual experiences).

This study aims to assess forest beyond timber by taking into account forest stock assessment, community dependency and downstream economic activities which involved in the Ulu Muda Permanent Forest Reserve, Kedah. The economic value of forest ecosystem services obtained is combined with the economic values of forest ecosystem services that have been carried out in other forests in Malaysia in a database called MyTEV. MyTEV will be displayed on the a website as a centralised reference source for the economic value of forest ecosystem services in Malaysia. This information can be accessed and used by decision makers in assessing the importance of forests to the economy, society and the environment. This information can also be

terhadap ekonomi, sosial dan alam sekitar. Maklumat ini juga boleh digunakan sebagai asas integrasi sistem perakaunan hijau negara. Kajian ini menunjukkan keperluan menghargai sumbangan perkhidmatan ekosistem agar dapat diambil kira dalam perancangan dasar dan pembuatan keputusan dengan menunjukkan nilai dan kepentingannya kepada kesejahteraan masyarakat dan perkembangan ekonomi negara.

used as a basis for the integration of the country's green accounting system. This study shows the need to appreciate the contribution of ecosystem services so that they can be taken into account in policy planning and decision-making by showing their value and importance to the well-being of the community and the economic development of the country.



FRIM telah menawarkan **40 khidmat** perundingan berjumlah kira-kira **RM3.15 juta**, dengan lapan projek bernilai melebihi **RM100,000**

FRIM offered **40 consultancy** services amounting to **RM3.15 million** with **eight projects** valued over **RM100,000**

Aktiviti Komersialisasi

Aktiviti komersialisasi antaranya menjalankan khidmat perundingan, menandatangani perjanjian komersial, menghasilkan inovasi dan rekacipta serta menghasilkan teknologi dan pakej teknologi untuk kegunaan pihak industri merupakan salah satu teras utama dalam KPI FRIM.

Kepakaran FRIM terus diiktiraf menerusi pelbagai khidmat perundingan yang diselia bersama FRIM Inc. FRIM telah menawarkan 40 khidmat perundingan berjumlah kira-kira RM3.15 juta, dengan lapan projek bernilai melebihi RM100,000; iaitu Pembangunan denai alam semula jadi di Universiti Teknologi Petronas (RM644,522.40), Kajian perkhidmatan ekosistem di negeri Pahang (RM291,508.48), *Passive water treatment study by the utilization of biochar and native species as bioremediation technique for removal of arsenic and heavy metals* (RM228,000.00), Kajian hydrodynamic modelling kawasan pesisir pantai hutan paya laut negeri Pulau Pinang di bawah PSR Ecology Offset Masterplan (PEOM) (RM249,561.10), Penyediaan pelan induk pembangunan Taman Eko-Rimba Kuala Lumpur (TERKL, Hutan Simpan Bukit Nanas, Kuala Lumpur 2023-2032 (RM199,942.50), *Study, sampling, analysis and Reporting on Suitability of water treatment plant residual as potential soil amendment for forest and landscape seeding* (RM177,465.00), Survei dan pengekaman flora fauna di parcel A dan B, Kuala Lumpur Golf and Country (KLGCC) Resort, Bukit Kiara untuk Sime Darby Property (Golfhome) Sdn. Bhd. (RM161,226.00) dan *Forest carbon stock assessment (CSA) Study at 500 ha conservation*

Commercialisation Activities

Commercialisation activities which include consultancy services, signing of commercial agreements, inventions and innovations as well as the production of technology and technology packages for industry used is one of the main thrust in FRIM's Quality Objectives.

Expertise in FRIM is continuously recognised through various consultancy services which are facilitated by FRIM Inc. FRIM offered 40 consultancy services amounting to RM3.15 million with eight projects valued over RM100,000; i.e. Development of nature trail at Universiti Teknologi Petronas (RM644,522.40), Study on the ecosystem services in Pahang (RM291,508.48), Passive water treatment study by the utilization of biochar and native species as bioremediation technique for removal of arsenic and heavy metals (RM228,000.00), *Kajian hydrodynamic modelling kawasan pesisir pantai hutan paya laut negeri Pulau Pinang di bawah PSR ecology offset masterplan (PEOM)* (RM249,561.10), *Penyediaan pelan induk pembangunan Taman Eko-Rimba Kuala Lumpur (TERKL, Hutan Simpan Bukit Nanas, Kuala Lumpur 2023-2032* (RM199,942.50), Study, sampling, analysis and reporting on suitability of water treatment plant residual as potential soil amendment for forest and landscape seeding (RM177,465.00), *Survei dan pengekaman flora fauna di parcel A dan B, Kuala Lumpur Golf and Country (KLGCC) Resort, Bukit Kiara untuk Sime Darby Property (Golfhome) Sdn. Bhd.* (RM161,226.00), and Forest carbon stock assessment (CSA) study at 500 ha conservation forest in Piah Forest



Bilangan khidmat perundingan menunjukkan **peningkatan** berbanding tahun 2022 dengan **37 khidmat** perundingan yang bernilai kira-kira **RM1.91 juta**.

The number of consultancy services **increased** as compared to 2021 with **37 consultancy** projects worth of about **RM1.91 million**.



Skim Pensijilan Perabot Hijau dan Dokumen **Kriteria Hijau FRIM PCS** telah dilancarkan oleh YAB Timbalan Perdana Menteri Malaysia, **YAB Dato' Sri Hj Fadillah Haji Yusof** pada **21 November 2023** di Putrajaya.

The FRIM PCS Green Furniture Certification **Scheme and Green Criteria** Document were launched by YAB Deputy Prime Minister, **YAB Dato' Sri Hj Fadillah Haji Yusof** on **21 November 2023** in Putrajaya.

forest in Piah Forest Reserve, Perak (RM106,106.00). Bilangan khidmat perundingan menunjukkan peningkatan berbanding tahun 2022 dengan 37 khidmat perundingan yang bernilai kira-kira RM1.91 juta.

FRIM berjaya mendaftarkan 37 pendedahan reka cipta (invention disclosure, ID) pada 2023 berbanding 45 ID pada 2022. Enam belas teknologi baharu atau teknologi sedia ada yang ditambah baik bagi keperluan industri turut dihasilkan. Peningkatan bilangan teknologi ini menunjukkan R&D FRIM kebanyakannya telah matang. Di samping itu, FRIM juga telah menandatangani empat perjanjian komersial bagi memastikan bebolehpasaran aset harta intelek FRIM.

Pencapaian Perkhidmatan Pensijilan Produk FRIM (FRIM PCS)

Skim Pensijilan Perabot Hijau dan Dokumen Kriteria Hijau FRIM PCS telah dilancarkan oleh YAB Timbalan Perdana Menteri Malaysia, YAB Dato' Sri Hj Fadillah Haji Yusof pada 21 November 2023 di Putrajaya. Pada majlis tersebut, sebanyak enam syarikat telah menerima pengiktirafan sebagai syarikat perintis perabot hijau FRIM PCS iaitu Coway (Malaysia) Sdn Bhd, Regal Bonus (Malaysia) Sdn Bhd, RuffnTuff Sdn Bhd, Apex Office Furniture Exporter Sdn Bhd, Meranti Marshal Sdn Bhd dan Anggun Sofa & Interior Sdn Bhd. Daripada enam syarikat ini, dua syarikat iaitu Coway (Malaysia) Sdn Bhd dan Regal Bonus Sdn Bhd telah berjaya memperoleh Sijil Kepatuhan Perabot Hijau pada tahun ini bagi 5 produk yang dikeluarkan oleh kedua-dua syarikat tersebut. Majlis turut dihadiri oleh YB Menteri Sumber Asli dan Perubahan Iklim, YB Tuan Nik Nazmi Nik Ahmad. Simposium Perabot Hijau Kebangsaan bertemakan "Melestarikan Industri Ke Arah Ekonomi Kitaran" juga diadakan selama dua hari dari 21 hingga 22 Disember 2023.

Reserve, Perak (RM106,106.00). The number of consultancy services increased as compared to 2021 with 37 consultancy projects worth of about RM1.91 million.

FRIM had registered 37 invention disclosure (ID) in 2023 compared to 45 in 2022. Sixteen new or improved existing technologies were developed according to the needs of the industry. The technology increment showed that most of the FRIM's R&D has already matured. In addition, FRIM has also signed four commercial agreements to ensure the marketability of the intellectual property assets.

Achievements of FRIM Product Certification Services (FRIM PCS)

The FRIM PCS Green Furniture Certification Scheme and Green Criteria Document were launched by YAB Deputy Prime Minister, YAB Dato' Sri Hj Fadillah Haji Yusof on 21 November 2023 in Putrajaya. A total of six companies received recognition as FRIM PCS green furniture pioneer companies, namely Coway (Malaysia) Sdn Bhd, Regal Bonus (Malaysia) Sdn Bhd, RuffnTuff Sdn Bhd, Apex Office Furniture Exporter Sdn Bhd, Meranti Marshal Sdn Bhd and Anggun Sofa & Interior Sdn Bhd. Of these six companies, two companies namely Coway (Malaysia) Sdn Bhd and Regal Bonus Sdn Bhd have successfully obtained Green Furniture Compliance Certificates for 5 products produced by both companies this year. The ceremony was also attended by YB Minister of Natural Resources and Climate Change, YB Tuan Nik Nazmi Nik Ahmad. The National Green Furniture Symposium themed "Sustaining the Industry Towards a Circular Economy" was also held for two days from 21 to 22 December 2023. There are 5 new companies that have successfully obtained the

Terdapat 5 syarikat baharu telah berjaya memperoleh sijil kepatuhan produk FRIM PCS bagi Skim Pensijilan Produk Perabot, manakala dua syarikat telah digugurkan kerana tidak berminat untuk meneruskan pensijilan. Senarai syarikat dan sijil yang aktif sehingga Disember 2023 adalah sebanyak 87 syarikat dengan 251 sijil.

Skim Pensijilan Pintu Rintangan Api pula menyaksikan pertambahan satu syarikat pembuat pintu rintangan api iaitu Jurusanwa Enterprise Sdn Bhd, yang menyertai skim ini pada tahun ini. Secara kumulatif enam (6) syarikat telah memperoleh Sijil Kepatuhan Produk Pintu Rintangan FRIM PCS bagi 15 produk yang dihasilkan.

FRIM PCS juga menyertai program Meet and Greet bersama Menteri Kewangan pada 15 Februari, pameran Malaysia International Furniture Fair (MIFF) pada 1-4 Mac, Export Furniture Exhibition pada 7-10 Mac, dan Simposium Perabot Hijau Kebangsaan pada 21-22 November 2023. Selain itu, beberapa latihan dan perbincangan bersama pemegang taruh juga turut diadakan sepanjang tahun 2023.

Program Pengembangan

Dalam usaha menyebarkan hasil-hasil R&D kepada pihak yang berkepentingan termasuk pihak industri dan orang awam, FRIM telah menganjur dan menyertai 85 kursus/bengkel/dialog/seminar/persidangan. Antara program pemindahan teknologi yang telah dijalankan sepanjang 2023 ialah Kursus Forensik Perhutanan, Bengkel Teknik Asas Kultur Tisu Tumbuhan, Kursus Penghasilan Anak Pokok, APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources, Bengkel Kajian Pengurusan Kelip-Kelip Sungai Selangor Bersama Pihak Berkepentingan, Kursus Pengecaman Kayu, Kursus Asas Landskap dan Penyelenggaraan Pokok, Bengkel Pendidikan Alam Sekitar (BEE@FRIM 2023), Bengkel Pemudahcara Program Pendidikan Biodiversiti, Program Sains Masyarakat dan Bengkel Kesedaran Pemeliharaan Pengetahuan Tradisi (TK).

Perkhidmatan Ujian

FRIM berjaya menjalankan sebanyak 4,155 bilangan ujian pada tahun 2023. Perkhidmatan ujian yang ditawarkan oleh FRIM antaranya termasuklah analisis GCMS, Ujian Penyaringan Fitokimia, Analisis HPLC – Analisis kualitatif dan kuantitatif, Xanthine Oxidase Inhibitory Assay, Analisis Nitrogen, Ujian Rintangan Api, Ujian Formaldehyde, pengecaman

FRIM PCS product compliance certificate for the Furniture Product Certification Scheme, while two companies have been dropped because they are not interested in continuing with the certification. Until December 2023, there are 87 companies with 251 certificates that are active.

The Fire Resistance Door Certification Scheme showed the addition of one fire resistance door manufacturer, i.e. Jurusanwa Enterprise Sdn Bhd, which joined the scheme this year. Cumulatively six (6) companies have obtained the FRIM PCS Resistance Door Product Compliance Certificate for 15 products produced.

FRIM-PCS has also participated in the Meet and Greet with the Minister of Finance programme on 15 February, the Malaysia International Furniture Fair (MIFF) exhibition on 1-4 March, the Export Furniture Exhibition on 7-10 March, and the National Green Furniture Symposium on 21-22 November 2023. In addition, several training and discussions with stake holders were also held throughout 2023.

Outreach Programme

In an effort to disseminate R&D outputs to stakeholders including industries and general public, FRIM had organised and participated in 85 courses/ workshops/ dialogues/ seminars/ conferences. Among courses organised in 2023 were Forestry Forensic, Basic Plant Tissue Culture, Seedling Production, APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources, Sungai Selangor Fireflies Management Studies with the Stakeholder, Wood Identification, Basic Landscape and Tree maintenance, Citizen Science and Awareness of Traditional Knowledge Preservation.

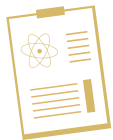
Testing Services

FRIM has conducted a total of 4,155 number of tests in 2023. Among the testing services provided by FRIM are GCMS analysis, phytochemical screening, HPLC – qualitative and quantitative analysis, Xanthine Oxidase inhibitory assay, nitrogen analysis, fireproof resistant testing, Formaldehyde testing, identification of herbal and aromatic plants, DNA sequencing, DNA barcoding, soil texture as well as identification of



Pada tahun **2023**, **FRIM** telah **berjaya** menghasilkan sejumlah **825** **penerbitan** berbanding **722** pada tahun **2022**.

In **2023**, **FRIM** has published a total of **815** **publications** as compared to **722** in **2022**.



Sejumlah **390** **kertas saintifik** dan **teknikal** (termasuk poster) telah dibentangkan oleh para saintis FRIM di persidangan, seminar, simposium, serta bengkel di **peringkat kebangsaan** dan **antarabangsa**.

A total of **390** **scientific** and **technical papers** (including posters) were presented by FRIM scientists at conferences, seminars, symposia, and workshops (excluding courses and meetings) at **national** and **international levels**.

nama saintifik tumbuhan ubatan dan beraroma, penjujukan DNA, kod jalur DNA, tekstur tanah serta pengecaman kayu dan serangga.

Penerbitan

FRIM sangat menggalakkan pegawai-pegawainya untuk menghasilkan penulisan untuk diterbitkan dalam siri-siri penerbitan FRIM serta menekankan penulisan saintifik dalam jurnal tempatan dan antarabangsa. Pada tahun 2023, FRIM telah berjaya menghasilkan sejumlah 815 penerbitan berbanding 722 pada tahun 2022. FRIM terus menerbitkan empat jilid Journal of Tropical Forest Science, empat keluaran surat berita—FRIM in Focus, 106 kertas saintifik dalam pelbagai jurnal tempatan dan antarabangsa (termasuk jurnal elektronik), pelbagai laporan institusi serta Laporan Tahunan FRIM 2022.

Beberapa judul buku baharu telah diterbitkan, antaranya "The Red List of Dipterocarpaceae", "Guidelines for the Establishment of Aquilaria malaccensis Arboratum in Peninsular Malaysia", "A Pocket Guide to Avifauna of Sime Darby Plantation", "Ecosystem Services Assessment in CFS Corridors using InVEST" dan "Kajian Nilai Enapan Air Sungai Kesan Daripada Aktiviti Pengusahaan Hutan Dalam Hutan Simpanan Kekal (HSK) Di Semenanjung Malaysia".

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wood and insect.

Publications

FRIM encourages its staff to publish in FRIM publications and urges them to publish in scientific journal locally and internationally. In 2023, FRIM has published a total of 815 publications as compared to 722 in 2022. FRIM continues to publish four volumes of Journal of Tropical Forest Science, four issues of FRIM in Focus, 106 scientific papers in various local and international journals (including electronic journals), institutional reports and FRIM Annual Report 2022.

Several new books published include "The Red List of Dipterocarpaceae", "Guidelines for the Establishment of Aquilaria malaccensis Arboratum in Peninsular Malaysia", "A Pocket Guide to Avifauna of Sime Darby Plantation", "Ecosystem Services Assessment in CFS Corridors using InVEST" and "Kajian Nilai Enapan Air Sungai Kesan Daripada Aktiviti Pengusahaan Hutan Dalam Hutan Simpanan Kekal (HSK) Di Semenanjung Malaysia".

A total of 390 scientific and technical papers (including posters) were presented by FRIM scientists at conferences, seminars, symposia, and workshops (excluding courses and meetings) at national and international levels. FRIM also disseminated information on R,D,C&I through social media platforms including FRIM's official site in Facebook.

Tanggungjawab Sosial Korporat

FRIM turut melaksanakan pelbagai aktiviti berkaitan pendidikan alam sekitar dan pemuliharaan hutan bersama-sama institusi pendidikan bagi memenuhi tanggungjawab sosial korporat bagi mewujudkan kesedaran terhadap kepentingan dan penjagaan alam sekitar dalam kalangan komuniti pendidikan. Pada tahun 2023, FRIM telah menjalankan aktiviti berkaitan pendidikan alam sekitar dan pemuliharaan hutan bersama 92 organisasi termasuklah institusi pendidikan awam dan swasta, yang merangkumi sekolah kebangsaan, sekolah rendah jenis kebangsaan, sekolah menengah kebangsaan, Maktab Rendah Sains MARA, sekolah menengah agama, maahad tahfiz dan akademi bakat yang melibatkan aktiviti kem biodiversiti dan program kesedaran alam.

Selain itu, FRIM turut menjalankan aktiviti CSR dengan 18 organisasi bagi aktiviti penanaman pokok dalam menyokong kempen menanam 100 juta pokok Malaysia. Penglibatan organisasi korporat menunjukkan peningkatan daripada tahun sebelumnya iaitu sebanyak 18 badan korporat berbanding 16 dan sejumlah 717 pokok berbanding 580 telah berjaya ditanam.

Rencana dan Berita dalam Media

Pelbagai aktiviti berkaitan R&D dan CSR FRIM mendapat liputan luas daripada media elektronik dan media cetak. Pada tahun 2023, sebanyak 74 (berbanding 96 pada 2022) rencana dan berita berkenaan R&D FRIM telah disiarkan oleh media termasuk di Sabah dan Sarawak dengan nilai perhubungan awam (PR value) menunjukkan penurunan berjumlah RM9.00 juta berbanding dengan RM12.3 juta pada 2022.

Kesimpulan

Secara keseluruhannya, aktiviti-aktiviti utama FRIM pada 2023 yang merangkumi penjanaan output dan keberhasilan berkualiti daripada aktiviti R&D, penghasilan dan komersialisasi produk serta teknologi, pelaksanaan khidmat perundingan dan pemindahan teknologi, pembangunan sumber manusia serta penerbitan buku-buku FRIM telah dilaksanakan dengan jayanya.

Aktiviti CSR dan pengembangan untuk meningkatkan kesedaran terhadap kepentingan alam sekitar serta inisiatif berkongsi maklumat tentang aktiviti dan pencapaian FRIM dengan pihak awam melalui media massa dan secara

Corporate Social Responsibility

FRIM has also carried out numerous activities on environmental education and forest conservation with educational institutions as part of FRIM's corporate social responsibility (CSR) to create awareness on importance of protecting the environment. In 2023, FRIM has carried out activities on environmental education and forest conservation with 92 organisations including public and private educational institutions namely national primary schools, national-type primary schools, national secondary schools, MARA Junior Science College, religious secondary schools, maahad tahfiz and talent academies.

In addition, FRIM has conducted the CSR activities on tree planting with 18 organisations to support the National 100 million Tree Planting Campaign. The involvement of corporate organisations showed an increment as compared to the previous year where 18 corporate bodies compared to 16 and a total of 717 trees compared to 580 was successfully planted.

Articles and News in Media

Various R&D and CSR activities of FRIM has received wide coverage from electronic and print media. In 2023, 74 (compared to 96 in 2022) articles and news about R&D of FRIM were reported by the media including in Sabah & Sarawak with Public Relation (PR) value decreases to RM9.00 million compared to RM12.3 million in 2022.

Conclusion

Overall, the main activities of FRIM in 2023 including generating quality outputs from R&D, commercialisation of products and technologies, provision of consultancy services and technology transfer, human resources development and publication of books had been successfully accomplished.

CSR and the expansion activities for increasing awareness on importance of the environment as well as sharing of information on activities and achievements of FRIM with the public through mass media and online are excellent. The

dalam talian adalah sangat baik. Pencapaian objektif kualiti FRIM dan penghasilan output utama seperti penerbitan, khidmat perundingan dan perkhidmatan ujian pada 2023 dilihat sangat memberangsangkan.

Akhir sekali, saya menyeru seluruh warga kerja FRIM untuk menggembeng tenaga, menanam iltizam dan memberikan sepenuh kerjasama dan komitmen bagi memastikan FRIM terus kekal relevan dan berdaya saing dalam menjalankan penyelidikan perhutanan tropika.

achievement of objectives and outputs in 2023 such as publications, consultation and testing services is very encouraging.

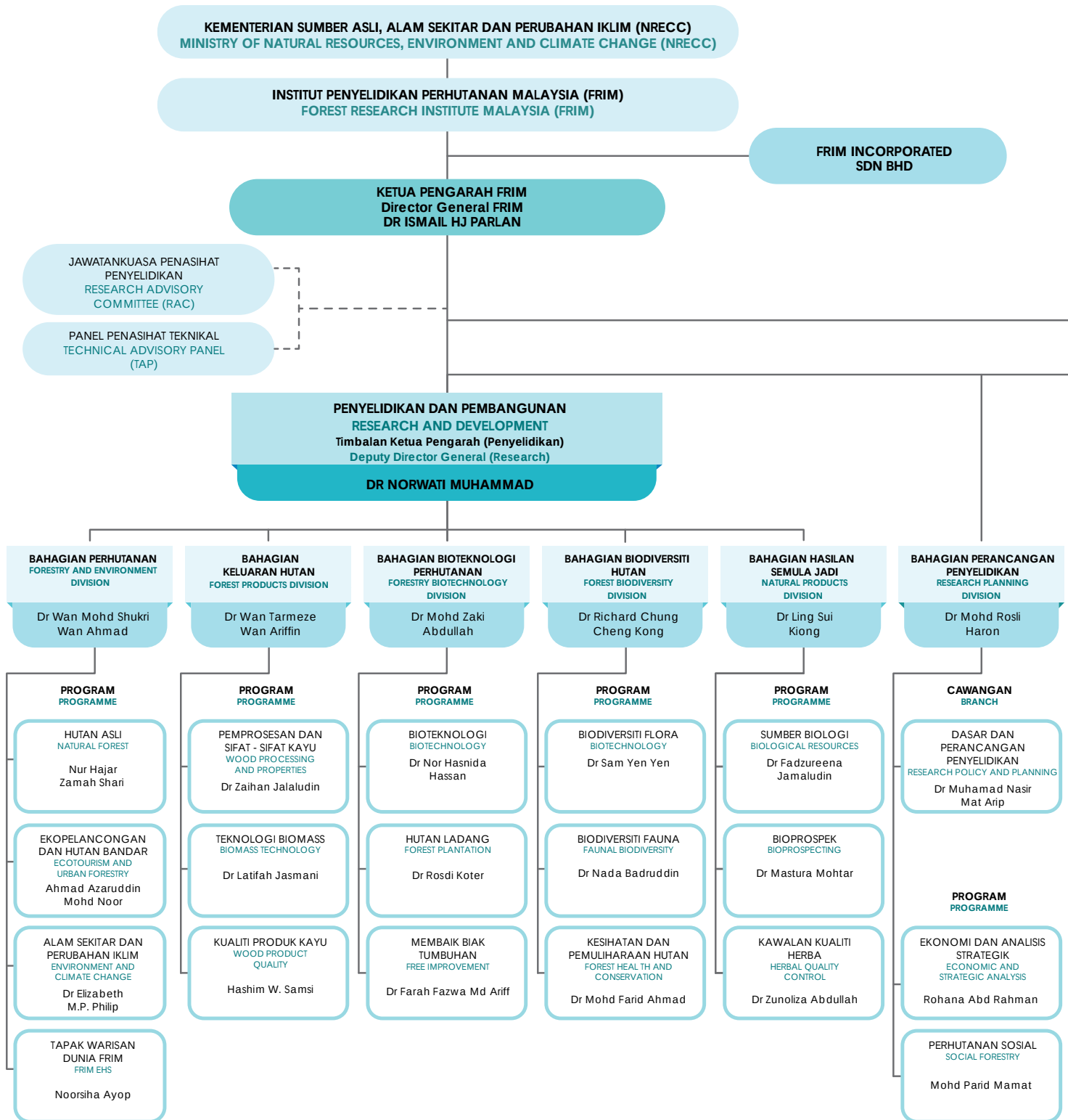
Last but not least, I would like to urge all FRIM staff to give your full support and commitment so that FRIM remains relevant and competitive in tropical forestry research.

DR ISMAIL HJ PARLAN

Ketua Pengarah/Director General
Institut Penyelidikan Perhutanan Malaysia
Forest Research Institute Malaysia

CARTA ORGANISASI ORGANISATIONAL CHART

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA (FRIM) 2023 FOREST RESEARCH INSTITUTE MALAYSIA (FRIM) 2023



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OPERATIONAL AND CORPORATE AFFAIRS
 Timbalan Ketua Pengarah (Operasi)
 Deputy Director General (Operation)

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INTERNAL AUDIT UNIT
 Ilyani Mazlan

UNIT UNDANG-UNDANG
LEGAL AFFAIRS UNIT
 Nor Azura Ahmad Murad

UNIT KOMUNIKASI KORPORAT
CORPORATE COMMUNICATION
UNIT
 Toh An Nee

UNIT INTEGRITI
INTEGRITY UNIT
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 Yusof

PERKHIDMATAN
PENSIJIAN PRODUK
PRODUCT CERTIFICATE
SERVICES
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BAHAGIAN
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DIVISION

Sarifah
 Kunju Ahmad

BAHAGIAN INOVASI DAN
KOMERSIALISASI
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COMMERCIALISATION DIVISION

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PEMBANGUNAN DAN
PENYELENGGARAAN
DEVELOPMENT AND
MAINTENANCE
 Sharifudden Samin

PENGURUSAN KUALITI
QUALITY MANAGEMENT
 Nor Haliyan Tan Shilan

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KEWANGAN DAN
BELANJAWAN
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 Ramle

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STOR DAN AKAUN
ASSET, STORE AND
ACCOUNT
 Zainorasri Yahya

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 Abdul Rasid

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 Azuarni Abd. Adzis

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INFORMATION TECHNOLOGY
 Zahari Othman

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 Ida Suraini
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PERPUSTAKAAN
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 Norain Mohd Arif

PROGRAM
PROGRAMME

INOVASI DAN INKUBASI
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 Mohamad Arshad

PENGURUSAN
PERKHIDMATAN
SERVICES MANAGEMENT
 Abdul Jabbar Hj. Sabli

PENGURUSAN TERTINGGI

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Deputy Director General (Research and Development)

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Dr Lillian Chua Swee Lian

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Dr Wan Mohd Shukri Wan Ahmad

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Director Forestry Biotechnology Division

Dr Mohd Zaki Abdullah

Pengarah Bahagian Keluaran Hutan

Director Forest Products Division

Dr Wan Tarmeze Wan Ariffin

Pengarah Bahagian Perancangan Penyelidikan

Director Research Planning Division

Dr Mohd Rosli Haron

Pengarah Bahagian Biodiversiti Hutan

Director Forest Biodiversity Division

Dr Richard Chung Cheng Kong

Pengarah Bahagian Hasil Semula Jadi

Director Natural Products Division

Dr Ling Sui Kiong

Pengarah Bahagian Inovasi dan Komersialisasi

Director Innovation and Commercialisation Division

Encik/Mr Mahmudin Saleh

Pengarah Bahagian Kewangan

Director Finance Division

Puan/Ms Jumaaton Abu Bakar

Pengarah Bahagian Sumber Manusia
Director Human Resource Division
Encik/**Mr** Mohd Asmawee Ismail

Pengarah Bahagian Perkhidmatan Teknikal
Director Technical Services Division
Puan/**Ms** Sarifah Kunju Ahmad

Pengarah Bahagian Pentadbiran
Director Administration Division
Puan/**Ms** Liza Ismail



Dari kiri/From left: Abdul Jabbar Sabli, Jumaaton Abu Bakar, Mohd Asmawee Ismail, Dr Wan Tarmeze Wan Ariffin, Sarifah Kunju Ahmad, Dr Norwati Muhammad, Dr Ismail Hj Parlan, Mahmudin Saleh, Dr Wan Mohd Shukri Wan Ahmad, Dr Mohd Rosli Haron, Dr Richard Chung Cheng Kong, Dr Mohd Zaki Abdullah, Liza Ismail dan/**and** Dr Ling Sui Kiong. Tiada dalam gambar/ **Not in the picture:** Dr Lillian Chua Swee Lian

PROFIL KORPORAT CORPORATE PROFILE

Sejarah FRIM / FRIM History

Institut Penyelidikan Perhutanan (IPP), setelah memperoleh perkenan Sultan Selangor telah ditubuhkan di sebuah kawasan tapak bekas lombong bijih timah di Kepong yang diusahakan sebagai kebun sayur pada tahun 1925. Setahun kemudiannya, Dr FW Foxworthy, pegawai penyelidik pertama dalam bidang perhutanan, telah memulakan usaha penyelidikan perhutanan dengan penubuhan tapak semaian hutan serta petak percubaan penanaman pokok secara besar-besaran.

The Regent of Selangor approved the establishment of a Forest Research Institute (FRI) in an area that was stripped of its original forest cover for vegetable farming and mining activities at Kepong in 1925. A year later, Dr FW Foxworthy, the first forest research officer, started set up a forest nursery and an experimental plantation on a large scale.



Tetuan McCartney dan Whitty telah membuat tinjauan ke atas 1,500 ekar tanah lombong lama di Kepong pada tahun 1922 dan mencadangkan kawasan tersebut sebagai tapak untuk sekolah hutan dan ladang percubaan

Messrs. McCartney and Whitty made a plane-table survey of 1,500 acres of old mining land in Kepong in 1922 and suggested the areas as a possible site for a forest school and experimental plantations

Bangunan pejabat pertama IPP yang menempatkan muzium, makmal, bilik kerja, ruang pejabat, herbarium dan perpustakaan ini siap dibina pada tahun 1929. Aktiviti penyelidikan perhutanan di bangunan ini pada ketika itu merangkumi botani, silvikultur, ekonomi, kimia dan zoologi.

Tapak semaian IPP yang ditubuhkan pada tahun 1929 merupakan pusat penyemaian biji benih pokok hutan sebelum benih-benih atau anak pokok hutan ini dibekalkan untuk aktiviti penanaman.

Aktiviti penanaman bagi penubuhan petak percubaan penanaman pokok secara besar-besaran telah dimulakan seawal tahun 1926 dengan menggunakan 100 spesies pokok asli dan eksotik.

The Institute's main office building, housing laboratories, the library, herbarium and museum in addition to staff quarters were occupied in 1929. The sanction for the building was first given in 1927. The research activities carried out were chemistry, silviculture, botany, economy and zoology.

The Institute's nursery – the “first stop” for species introduced from the wild and grown under observation before being recommended for field planting – was established in 1929.

The activities to establish extensive experimental plantations in the campus in Kepong has begun in 1926. The plantation trials covered about 100 indigenous and exotic species.



Bangunan dua tingkat berbentuk 'U' dibina berdasarkan rekaan kolonial dengan ciri-ciri tropika serta mempunyai elemen tiang yang tebal dan ruang siling yang tinggi

The U-shaped building was designed in a tropical colonial style with thick pillars and high ceilings

JG Watson yang berkhidmat di bawah Dr FW Foxworthy sebagai Timbalan Pemelihara dan Ahli Ekonomi Hutan; telah memulakan usaha pembangunan arboreta atau koleksi tumbuhan hidup di FRIM pada tahun 1929. Dua arboretum pertama di FRIM ialah Arboretum Dipterokarpa dan Arboretum Bukan-Dipterokarpa.

JG Watson, who served under Dr FW Foxworthy as a Deputy Conservator and Forest Economist, initiated the development of the arboreta at FRIM in 1929. The first two arboreta were the Dipterocarp Arboretum and the Non-Dipterocarp Arboretum; Dipterocarp – for the trees of family Dipterocarpaceae; Non-Dipterocarp – for other families of trees.

FRI/FRIM juga dikenali sebagai Ringyo Shikenjyo atau 'Stesen Percubaan Perhutanan' ketika penaklukan Jepun di Malaya (1942–45). Ketika itu, seramai 37 orang pekerja Jabatan Perhutanan telah terkorban. Menurut Anon, 1954, nama setiap pekerja yang terkorban semasa penaklukan Jepun telah diabadikan pada plak peringatan yang ditempatkan di FRI pada 6 Mac 1954.

Pada 1 Oktober 1985, IPP menjadi badan berkanun di bawah Akta Lembaga Penyelidikan dan Pembangunan Perhutanan Malaysia (MFRDB). Institut ini kemudiannya dinamakan sebagai Institut Penyelidikan Perhutanan Malaysia (FRIM) dan Tan Sri Dr Salleh Mohd Nor dilantik sebagai Ketua Pengarah FRIM yang pertama.

FRI/FRIM was known as the Ringyo Shikenjyo or Forestry Experimental Station during the Japanese occupation in Malaya (1942-45). However, during the World War II, 37 Forest Department staff lost their lives. Their names were etched on a war memorial headstone; installed on FRI ground on 6 March 1954.

The Forest Research Institute became autonomous under the Malaysian Forestry Research and Development Board (MFRDB) Act on 1 October 1985. The Institute was renamed Forest Research Institute Malaysia (FRIM) and Tan Sri Dr Salleh Mohd Nor was appointed as the first Director-General.



Arboretum Dipterocarpa pada tahun 1939
[The Dipterocarp Arboretum in 1939](#)

Sumber: Laman sesawang FRIM
[Source: FRIM website](#)

Latar Belakang

Background

Institut Penyelidikan Perhutanan Malaysia (Forest Research Institute Malaysia, FRIM) ditubuhkan pada 1926, 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 (NRE) pada 2004. Akta FRIM 2016 (Akta 782) yang diwartakan pada 30 September 2016 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) manakala pada 9 Mac 2020, KATS distruktur semula sebagai Kementerian Tenaga dan Sumber Asli (KeTSA). Selepas Pilihan Raya Umum ke-15 pada 2022, KeTSA distruktur semula sebagai Kementerian Sumber Asli, Alam Sekitar dan Perubahan Iklim (NRECC) dan kemudiannya kepada Kementerian Sumber Asli dan Kelestarian Alam (NRES) pada tahun 2023.

The Forest Research Institute Malaysia (FRIM) founded in 1926 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) and in March 2020, KATS was reorganised to form the Ministry of Energy and Natural Resources (KeTSA). After the 15th General Election in 2022, the KeTSA was restructured to form the Ministry of Natural Resources, Environment and Climate Change (NRECC) and later to form the Ministry of Natural Resources and Environmental Sustainability (NRES) in 2023.

Visi

Menjadi peneraju dalam penyelidikan, pembangunan, komersialisasi dan aplikasi perhutanan tropika menjelang tahun 2030.

Misi

Memperkasakan penyelidikan dan pembangunan, pemindahan teknologi dan penyelesaian permasalahan industri secara saintifik bagi memenuhi keperluan perhutanan tropika masa kini dan akan datang.

Fungsi

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;
3. Mengadakan hubungan kerjasama penyelidikan dan pembangunan perhutanan dengan badan-badan dalam dan luar Malaysia;
4. Mengkomersial dapatan penyelidikan bagi pembangunan; serta menyediakan perkhidmatan nasihat teknikal, perundingan dan perkhidmatan lain berhubung dengan hutan dan industri berasaskan hutan;
5. Menyediakan program latihan dan meningkatkan kesedaran awam terhadap kepentingan alam sekitar dan pemuliharaan kepelbagaian biologi hutan; dan
6. Memperkukuhkan tadbir urus institut bagi menokong R,D,C&I.

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.

Vision

To be a leader in advancing the country's tropical forestry research, development, commercialisation and application by 2030.

Mision

To strengthen research and development, technology transfer and provision of solution for industry to fulfil the current and future needs of the tropical forestry.

Functions

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.
4. Commercialising research findings for development; as well as providing technical advisory services, consultancy, and other services in relation to forests and forest-based industries;
5. Providing training programs; and increasing public awareness of the importance of the environment and conservation of forest biodiversity; and
6. Strengthening the governance of institute to support R,D,C&I.

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.

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 Memaklumkan keputusan kelulusan menjalankan projek perundingan dalam tempoh 5 hari bekerja kepada syarikat terbitan FRIM,
- 2 Memastikan 100% laporan akhir projek dihantar kepada penaja dalam tempoh tiga (3) bulan selepas projek tamat.
- 3 Memproses pembayaran bil dan invois dalam tempoh 14 hari dari tarikh penerimaan dokumen yang lengkap,
- 4 Memastikan 100% keputusan perkhidmatan ujian diserahkan kepada pelanggan dalam tempoh yang dijanjikan,
- 5 Memastikan 100% laporan pembekalan perkhidmatan diserahkan kepada pelanggan dalam tempoh yang dijanjikan,
- 6 Memastikan semua maklum balas berhubung aduan dan pertanyaan pelanggan diberikan jawapan dalam tempoh lima (5) hari bekerja,
- 7 Memastikan semua maklumat terkini di laman web FRIM dimuat naik dalam tempoh 24 jam waktu bekerja,
- 8 Memastikan semua maklum balas berhubung permohonan latihan industri/sangkut diberi dalam tempoh lima hari bekerja,
- 9 Memastikan maklum balas berhubung semua permohonan sewaan ruang/ kawasan/ peralatan diberi dalam tempoh tiga hari bekerja, dan
- 10 Memastikan 100% bahan jualan diserahkan kepada pelanggan dalam tempoh yang dijanjikan.

Clients' Charter

We pledge to develop and enhance the utilisation of forest resources and produces on a sustainable basis through research, development and application.

- 1 100% notice of acceptance of consultancy services to FRIM Inc. within five working days,
- 2 100% project's end reports sent to funder within three months of project completion,
- 3 Payment for bills and invoices processed within 14 working days upon receipt of a complete documentation,
- 4 100% test reports submitted to clients within stipulated period,
- 5 100% service reports submitted to clients within stipulated period,
- 6 Feedback on complaints and inquiries provided within five working days,
- 7 News for FRIM portal uploaded within 24 working hours,
- 8 Feedback on application for industrial training/ attachment is given within five working days,
- 9 Feedback on application for rental of building/ area/ equipment is given within three working days, and
- 10 100% purchased items delivered to customer within stipulated time.

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 tentukan, 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.

Slogan Kualiti

**Kualiti teras kecemerlangan;
inovasi kunci keunggulan**

**Slogan Persekitaran Berkualiti
Persekitaran berkualiti pemangkin
kecemerlangan produktiviti**

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.

Quality Slogan

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

**Quality Environment Slogan
Quality environment as catalyst
to excellence in productivity**

Pelan Strategik Menuju 2050

Pelan Strategik FRIM berdasarkan enam teras:

1. FRIM sebagai pusat rujukan utama mengenai pemuliharaan dan pengurusan hutan tropika
2. FRIM sebagai institusi penyelidikan utama dalam perhutanan tropika, alam sekitar, keluaran hutan dan hasil semula jadi
3. FRIM sebagai pembekal perkhidmatan teknikal dan pensijilan yang boleh dipercayai kepada pihak berkepentingan
4. FRIM sebagai pusat kecemerlangan bagi inovasi, aplikasi, pengkomersialan dalam hutan tropika dan hasil hutan
5. FRIM sebagai destinasi warisan hutan, rekreasi dan pendidikan alam yang terkenal
6. FRIM diperkukuh sebagai institut penyelidikan utama

Sepuluh program kerja dibangunkan bagi melaksanakan teras tersebut, iaitu:

1. Ketahanan hutan
2. Pengurusan hutan mampan dan perubahan iklim
3. Bekalan bahan mentah
4. Penggunaan sumber yang cekap
5. Perhutanan/perladangan komuniti
6. Pemerkasaan Orang Awam serta Penduduk Asli dan Komuniti Setempat
7. Perkhidmatan teknikal dan pensijilan
8. Aplikasi dan komersialisasi
9. Destinasi hutan terkenal
10. Pengukuhan institut

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

Strategic Plan Towards 2050

FRIM Strategic Plan is based on six thrusts:

1. FRIM as a premier reference centre on tropical forest conservation and management
2. FRIM as a global leading R&D institute in tropical forestry, environment, forest and natural products
3. FRIM as a reliable technical and certification service provider to the stakeholders
4. FRIM as centre of excellence for innovation, application and commercialisation in tropical forestry and forest products
5. FRIM as a renowned forest heritage, recreational and nature education destination
6. FRIM is strengthen institutionally as a premier research institute

Ten work programmes were designed to implement the thrust:

1. Forest resilience
2. Sustainable forest management and climate change
3. Supply of raw materials
4. Efficient resource utilisation
5. Community forest/farming
6. Empowerment of Public and Indigenous & Local Community (ILC)
7. Technical services and certification
8. Application and commercialisation
9. Renowned Forest destination
10. Strengthened institute

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

OBJEKTIF KUALITI

QUALITY OBJECTIVES

Bil No.	KENYATAAN STATEMENT	PENCAPAIAN/TAHUN ACHIEVEMENT/YEAR	
		2022	2023
1	Menjalankan projek penyelidikan Conduct research projects	157	136
2	Menghasilkan penerbitan untuk keperluan pihak berkepentingan Produce publications for the needs of stakeholders	722	815
3	Menandatangani perjanjian komersial bagi memastikan kebolehpasaran asset harta intelek FRIM Sign commercial agreements to ensure the marketability of FRIM intellectual property assets	4	4
4	Menjalankan khidmat perundingan ke arah penjana pendapatan bersama FRIM Inc Conduct consultancy services towards income generation together with FRIM Inc	37	40
5	Menjana pendapatan melalui khidmat perundingan untuk keperluan kelestarian pembangunan FRIM Generate income from consultation services for sustainability of FRIM's development needs	RM1.91 juta/ million	RM3.15 juta/ million
6	Mengekalkan akreditasi dan pengiktirafan daripada Badan Kebangsaan dan Antarabangsa Maintain accreditation and recognition from national and international bodies	33	33
7	Menghasilkan inovasi/reka cipta daripada penyelidikan dan pembangunan kepelbagaian perhutanan tropika Produce innovation/inventions from biodiversity research and development	45	37
8	Memperkasa dan meningkatkan tahap ketersediaan teknologi (TRL) inovasi/reka cipta Empower and increase the Technology Readiness Level of innovation/invention	5	4
9	Menyertai pameran bagi tujuan sebaran hasil penyelidikan dan pembangunan Participate in exhibitions for disseminating research and development achievements	21	29
10	Menghasilkan artikel dan rencana di media massa berkenaan penyelidikan dan pembangunan serta sumbangan FRIM kepada pihak berkepentingan (Nilai PR) Publish news and articles on FRIM research and development, and contributions to stakeholders in the mass media (PR value)	RM12.3 juta/ million	RM9.00 juta/ million

Bil No.	KENYATAAN STATEMENT	PENCAPAIAN/TAHUN ACHIEVEMENT/YEAR	
		2022	2023
11	Menganjurkan seminar, bengkel, dialog dan latihan berkaitan kepakaran FRIM kepada pelanggan <i>Organise seminars, workshops, dialogues, and trainings related to FRIM expertise for customer</i>	103	85
12	Menghasilkan teknologi yang berpotensi untuk kegunaan industri <i>Produce viable research outputs to the industry</i>	10	16
13	Mengemukakan pemfailan paten bagi penemuan baharu penyelidikan dan pembangunan untuk keperluan industri <i>File patents for research and development new discoveries for the industries</i>	3	1
14	Menjalankan khidmat ujian yang diiktiraf oleh badan kebangsaan dan antarabangsa kepada pelanggan dalam bidang perhutanan tropika <i>Conduct testing services to client in the field of tropical forestry recognised by local and international bodies</i>	7,119	4,155
15	Menjalankan khidmat perundingan dalam bidang kepakaran FRIM kepada pihak berkepentingan (bernilai melebihi RM100,000) <i>Provide consultancy services of FRIM expertises to stakeholders (worth more than RM100,000)</i>	4	8
16	Menandatangani memorandum persefahaman/perjanjian dengan agensi tempatan dan antarabangsa <i>Sign memoranda of understandings/agreements with local and international agencies</i>	6	4
17	Menjalankan aktiviti CSR pemuliharaan hutan bersama-sama agensi tempatan dan antarabangsa <i>Conduct CSR activities on forest conservation with local and international agencies</i>	17	18
18	Menjalankan aktiviti berkaitan pendidikan alam sekitar dan pemuliharaan hutan bersama-sama institusi pendidikan <i>Conduct nature and forest conservation activities with educational institutions</i>	65	92
19	Melahirkan saintis yang memperoleh sarjana atau doktor falsafah dalam bidang kepakaran FRIM <i>Produce scientists with MScs and PhDs in FRIM expertise</i>	2	4
20	Menghantar dokumen cadangan penyelidikan (DCP) kepada penaja luar bagi memastikan kelestarian penyelidikan dan pembangunan <i>Submit research proposals to external funders to ensure R&D sustainability</i>	41	46

PENYELIDIKAN & PEMBANGUNAN

RESEARCH & DEVELOPMENT



Crateva religiosa

SOROTAN PENYELIDIKAN DAN PEMBANGUNAN

HIGHLIGHTS OF RESEARCH AND DEVELOPMENT

Penilaian Kawasan Hutan Bandar dan Hutan Rekreasi untuk Pengurusan Hutan Bersepadu ke arah Kesejahteraan Rakyat **Assessment of Urban and Recreational Forest for Integrated Management towards Community Well-being**

Kawasan hutan bandar khususnya taman awam bandaran mempunyai faedah dan fungsi daripada aspek ekologi, rekreasi dan nilai estetika. Taman awam bandaran juga merupakan tempat untuk masyarakat beristirehat, beriadah bersama keluarga serta melakukan aktiviti sosial dan kemasyarakatan. Selain menawarkan peluang untuk rekreasi, taman awam bandaran juga penting untuk tujuan pendidikan alam sekitar dan pemuliharaan biodiversiti. Satu projek kajian di bawah Rancangan Malaysia Kedua Belas (RMK-12) yang bertajuk Penilaian Kawasan Hutan Bandar dan Hutan Rekreasi untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat telah dijalankan pada tahun 2023 di tiga taman awam bandaran terpilih di negeri Kelantan dengan kerjasama Majlis Perbandaran Kota Bharu Bandar Raya Islam (MPKB-BRI) dan Majlis Daerah Kuala Krai (MDKK).

Urban forest areas especially urban public parks provide benefits and functions in terms of ecology, recreation and aesthetic value. The urban public park is also a place for leisure for the community and to carry out recreational and social activities. In addition to recreation, public parks are also important for environmental education and biodiversity conservation purposes. A study under the Twelfth Malaysia Plan (12MP) titled Assessment of Urban and Recreational Forest for Integrated Management towards Community Well-being was carried out in 2023 at three selected public parks in the state of Kelantan in collaboration with the Kota Bharu Municipal Council - Islamic City (MPKB-BRI) and Kuala Krai District Council (MDKK).



Hasil kajian inventori

maklumat flora
mendapati
Indeks

Kepelbagaian
Spesies (SDI)

di ketiga-tiga
taman kajian

mencatatkan
bacaan yang

**tinggi iaitu
antara 0.88
hingga 0.96.**

**The results of the
flora inventory
found that the
Species Diversity
Index (SDI)
in all 3 study
areas recorded
high readings
ranging from
0.88 to 0.96.**

Objektif kajian ini adalah untuk menilai faedah hutan bandar dan kawasan rekreasi terhadap pemuliharaan ekologi, iklim mikro dan juga kebajikan populasi setempat. Terdapat 3 komponen di bawah projek ini iaitu kajian inventori flora dan fauna, kajian penilaian faedah kawasan hijau terhadap iklim mikro dan kajian faedah kawasan hijau kepada populasi setempat. Lokasi kajian ialah di Taman Perbandaran Tengku Anis (TPTA), di daerah Kota Bharu, serta Taman Tasik Krai (TTK) dan Taman Chintawangsa (TC) di daerah Kuala Krai.

Hasil kajian inventori maklumat flora mendapati Indeks Kepelbagaian Spesies (SDI) di ketiga-tiga taman kajian mencatatkan bacaan yang tinggi iaitu antara 0.88 hingga 0.96. Komposisi spesies pokok di ketiga-tiga taman awam terdiri daripada spesies tempatan dan eksotik yang ditanam sebagai pokok landskap dan teduhan. Pemerhatian kepelbagaian avifauna pula mencatatkan 29 spesies di TPTA, 28 spesies di TTK dan 24 spesies di TC yang terdiri daripada burung tempatan dan burung hijrah. Selain itu, terdapat 4 spesies amfibia, 3 spesies reptilia dan 3 spesies mamalia diperhatikan di TPTA, manakala TTK dan TC masing-masing mencatatkan 6 & 4 spesies amfibia, 2 & 3 spesies reptilia dan 3 & 2 spesies mamalia. Pemerhatian ini menunjukkan bahawa kawasan taman awam amat sesuai menjadi habitat kepada pelbagai jenis fauna dan penting untuk pemeliharaan biodiversiti bandar.

The objective of this study was to assess the benefits of urban forests and recreational areas on ecological conservation, microclimate and also the welfare of local populations. There are 3 components under this project, namely inventory study of flora and fauna, study on the benefits of green areas on microclimate and study of the benefits of green areas to the local population. The study locations were at Tengku Anis Municipal Park (TPTA), in Kota Bharu district, Krai Lake Park (TTK) and Chintawangsa Park (TC), both in Kuala Krai district.

The results of the flora inventory found that the Species Diversity Index (SDI) in all 3 study areas recorded high readings ranging from 0.88 to 0.96. The tree species composition in all 3 public parks consisted of local and exotic species planted as landscape and shade trees. The observation on diversity of avifauna recorded 29 species in TPTA, 28 species in TTK and 24 species in TC consisting of local as well as migratory birds. In addition, there were 4 species of amphibians, 3 species of reptiles and 3 species of mammals observed in TPTA, while TTK and TC recorded 6 and 4 species of amphibians, 2 and 3 species of reptiles and 3 and 2 species of mammals, respectively. These observations indicate that urban public park is suitable as a habitat for a wide variety of fauna and is important for the protection of urban biodiversity.

Kajian juga menunjukkan pokok yang mempunyai silara yang padat dan leaf area index (LAI) yang tinggi memberikan lebih teduhan, menurunkan suhu, mengurangkan silau matahari serta meningkatkan kelembapan bandingan. Faktor-faktor ini mempengaruhi keselesaan pengunjung di taman awam. Antara pokok-pokok yang mempunyai LAI tinggi ialah *Sandoricum koetjape* (TPTA), *Mimusops elengi* (TTK) dan *Garcinia mangostana* (TC). Kajian persepsi pengunjung menunjukkan bahawa majoriti daripada responden bersetuju bahawa kunjungan ke taman awam adalah satu aktiviti pengisian masa lapang yang berkualiti selain memberi faedah daripada aspek kesihatan dan nilai sosial. Untuk faedah ekonomi, anggaran nilai tingkat kesanggupan membayar (Willingness to Pay - WTP) pengunjung untuk pemuliharaan taman di TPTA adalah daripada RM3,349,715 hingga RM3,970,032 setahun, manakala di TTK dan TC ianya adalah di antara RM2,110,480 hingga RM2,131,681 setahun. Penilaian ekonomi pokok menggunakan kaedah Thyer oleh ahli arboris pula menunjukkan purata nilai beberapa spesies pokok teduhan bersaiz besar di TPTA mencapai RM42,742.12.

Melalui projek ini, Sistem Maklumat Inventori Flora & Fauna (SMIFF) telah dibangunkan bagi mewujudkan satu pangkalan data yang sistematik untuk merekod dan menyimpan maklumat hasil kajian. Sistem ini akan membantu pihak MPKB-BRI dan MDKK dalam pengurusan taman dan penyelenggaraan aset hidup tumbuhan. Dua bengkel telah dilaksanakan pada 14-15 November 2023 dan 21-22 November 2023 masing-masing di Kota Bharu dan Kuala Krai. Bengkel ini bertujuan untuk menyebarkan hasil kajian dan mendapatkan maklum balas daripada pelbagai agensi di kedua-dua daerah. Aktiviti penanaman pokok bersama peserta bengkel telah dijalankan sebagai tanda sokongan terhadap Kempen Penanaman 100 Juta Pokok di bawah Program Penghijauan Malaysia.

Studies have also shown that trees with dense canopy and high leaf area index (LAI) provide more shade, lower temperatures, reduce sun glare and increase comparative humidity. These are some of the factors that affect the comfort of visitors while visiting a public park. Among the examples of trees with high LAI are *Sandoricum koetjape* (TPTA), *Mimusops elengi* (TTK) and *Garcinia mangostana* (TC). The survey from the third component showed that the majority of respondents agreed that a visit to a public park is a quality leisure activity as well as providing health and social benefits. In terms of economic benefits of the parks, the estimated value of visitors' Willingness to Pay (WTP) for park conservation at TPTA was between RM3,349.715 to RM3,970,032 per year, while in TTK and TC, it was between RM2,110,480 to RM2,131,681 per year. The economic valuation of trees using Thyer method by arborist showed that the average value of some large-sized shade tree species in TPTA reached RM42,742.12.

Through this project, a Flora & Fauna Inventory Information System (SMIFF) was developed to create a database to systematically record and store information of the studies. This system will assist MPKB-BRI and MDKK in the management of the park as well as the maintenance of plant living assets. Two workshops were held on 14-15 November 2023 and 21-22 November 2023 in Kota Bharu and Kuala Krai, respectively. These workshops aimed to disseminate the findings of this study and obtain feedback from various agencies in both districts. Tree planting activity was also held during the workshops to support the 100 Million Tree-Planting Campaign under the Greening Malaysia Programme.



Antara pokok-pokok yang ditanam untuk tujuan teduhan dan estetik iaitu *Lophanthera lactescens* (Golden chain) dan *Pterocarpus indicus* (Angsana)
Among the trees grown for shade and aesthetic purposes are *Lophanthera lactescens* (Golden chain) and *Pterocarpus indicus* (Angsana)



Pengukuran LAI menggunakan alat Ceptometer (AccuPAR LP-80)
Measurement of LAI using Ceptometer (AccuPAR LP-80)



Antara spesies amfibia (*Polypedates discanthus*) dan avifauna (*Phaenicophaeus diardi*) yang dikenal pasti
Among the species of amphibians (*Polypedates discanthus*) and avifauna (*Phaenicophaeus diardi*) identified



Soal selidik persepsi pengunjung terhadap faedah taman dan penilaian ekonomi pokok oleh ahli arboris
Questionnaire of visitors' perception on the benefits of park and tree economic valuation by arborist



Paparan sistem pangkalan data dan peta taburan pokok yang dijana daripada SMIFF
Screenshot of the database system and tree distribution map generated from SMIFF



Sesi perbincangan dalam kumpulan semasa bengkel
Group discussion session during the workshop

Tindak Balas Kandungan Air Tanah dan Sejatpeluhan Terhadap Keadaan Sangat Kering di Hutan Tanah Pamah Tropika, Hutan Simpan Pasoh, Negeri Sembilan

Hutan dipterokarpa tanah pamah tropika menerima jumlah hujan yang tinggi sepanjang tahun. Walau bagaimanapun, dinamik iklim seperti perubahan iklim, fenomena El Nino dan perubahan monsun menyebabkan hutan ini mengalami tekanan air yang membawa kesan ketara ke atas ekosistemnya. Hutan terpaksa mengeluarkan air walaupun kandungan air tanah berkurangan kerana ia perlu melakukan proses fisiologi penting seperti fotosintesis dan transpirasi. Proses ini membantu hutan menyerap karbon dioksida daripada udara dan membebaskan wap air ke atmosfera, yang menyejukkan alam sekitar dan menyumbang kepada pembentukan hujan.

Kajian ini menggunakan menara fluks untuk memantau perubahan ciri-ciri meteorologi tempatan. Ini merupakan kaedah pemantauan pertama di hutan dipterokarpa tanah pamah tropika di zon kering Semenanjung Malaysia. Penemuan kajian ini adalah penting untuk pembangunan model perubahan iklim yang akan memberikan ramalan yang lebih tepat pada masa hadapan. Pemantauan harus diteruskan dalam jangka panjang untuk meningkatkan ketepatan ramalan.

“Menurut kajian ini, jika hutan tidak menerima hujan selama sepuluh hari berturut-turut, maka simpanan air bawah tanahnya akan berkurangan sebanyak 0.5%.”

Keadaan ini dijangka bertambah buruk semasa fenomena El Nino yang kuat, yang boleh menyebabkan suhu lebih tinggi dan udara kering. Kesan fenomena ini terhadap alam sekitar dan ekosistem hutan sukar dikesan dengan mata kasar. Oleh itu, pemantauan hutan melalui menara fluks adalah penting untuk mendapatkan data penting yang boleh membantu kita memahami tindak balas ekosistem hutan terhadap sebarang fenomena perubahan iklim dengan lebih baik.

Perubahan kandungan air tanah yang didorong oleh keadaan kering yang berpanjangan akan memberi kesan kepada kesihatan hutan. Ini seterusnya akan menjejaskan komposisi biodiversiti hutan dan perkhidmatan ekosistem. Dalam jangka masa panjang, sesetengah spesies mungkin tidak

The Responses of Soil Water Content and Evapotranspiration to an Extremely Dry Condition in Lowland Tropical Forest at Pasoh Forest Reserve, Negeri Sembilan

Tropical lowland dipterocarp forests receive high amount of rainfall throughout the year. However, climate dynamics such as climate change, the El Niño Phenomenon and monsoon changes cause these forests to experience water stress, which has a significant impact on their ecosystems. The forest is forced to release water even if the soil water content decreases because it needs to perform essential physiological processes such as photosynthesis and transpiration. This process helps the forest absorb carbon dioxide from the air and releases water vapour into the atmosphere, which cools the environment and contributes to the formation of rain.

This study used the flux tower to monitor changes in local meteorological characteristics. This is the first monitoring method in tropical lowland dipterocarp forests in the dry zone of Peninsular Malaysia. The findings of this study are crucial for climate change models, which will provide more accurate predictions in the future. Long term monitoring will improve the accuracy of forecast.

“According to this study, if the forest does not receive rain for 10 consecutive days, then its soil water storage will decrease by 0.5%.”

This situation is expected to worsen during a strong El Niño Phenomenon, which can cause hotter temperatures and dry air. It is difficult to detect the impact of this phenomenon on the environment and forest ecosystem with the naked eye. Therefore, monitoring the forest through flux towers is essential to obtain important data that can help us better understand the forest ecosystem's response to any climate change phenomenon.

Changes in soil water content driven by prolonged dry conditions will have an impact on forest health. This, in turn, will affect the composition of forest biodiversity and ecosystem services. In the long term, some species may not be able to survive the hot and dry conditions,

dapat bertahan dalam keadaan panas dan kering, yang membawa kepada kepupusan. Bagi mengatasi masalah ini, amalan pengurusan hutan harus memberi tumpuan kepada pemilihan spesies yang sesuai iaitu mempunyai daya tahan terhadap suhu yang tinggi dan kandungan air tanah yang rendah di sesuatu kawasan bagi meningkatkan kejayaan usaha penghutan semula.

Maklumat mengenai dinamik ciri iklim tempatan juga adalah penting untuk pengurusan kawasan tadahan air di dalam hutan. Ini akan memastikan ketersediaan sumber air di kawasan tadahan air dan untuk meramal sumber air masa hadapan, bukan sahaja untuk kegunaan manusia tetapi juga untuk menjamin kelestarian ekosistem hutan. Penyelidikan jangka panjang mengenai air dan iklim dalam landskap hutan adalah penting untuk memahami potensi impak dan daya tahan hutan. Penemuan baharu dalam kajian ini juga merupakan tambahan ilmu kepada sains perhutanan dan alam sekitar untuk dijadikan rujukan kepada orang awam, penyelidik dan khususnya kepada penggubal dasar.

leading to their extinction. To address this problem, forest management practices should focus on selection of species that are tolerant to high temperature and low soil water content to increase the success of reforestation efforts.

Information on the dynamics of local climate characteristics is also important for management of watersheds in the forest. This will ensure the availability of water resources in a watershed area and predict future water resources, not only for human consumption but also to guarantee the sustainability of the forest ecosystem. Long term research on water and climate in forest landscape is crucial to understand the potential impact and resilience of a forest. The findings in this study provides new knowledge to forestry and environmental science as reference for the general public, researchers and policymakers in particular.



Pengukuran tanah untuk profil kandungan air tanah
Ground measurement for profile soil water content



Pemasangan sensor pada menara Flux 52 m untuk
mencerap data meteorologi
Sensors installed at the 52-m Flux tower to capture
meteorological data



Kejadian sungai berjeda semasa musim hujan dan
disebabkan larian permukaan
Intermittent stream occurred during rainy period and the
result of surface runoff

Protokol Pemantauan Biodiversiti, Perkhidmatan Ekosistem dan Stok Karbon

Satu output yang telah ditetapkan di bawah projek Improving Connectivity in the Central Forest Spine Landscape (IC-CFS) ialah pembangunan protokol berkaitan biodiversiti, perkhidmatan ekosistem dan stok karbon. Maka, Protokol Pemantauan Biodiversiti di Landskap Central Forest Spine (PPBioD) telah diterbitkan pada tahun 2021 dalam versi Bahasa Inggeris, Bahasa Malaysia pada tahun 2022 dan diikuti dengan Manual Pemantauan Biodiversiti pada tahun 2023. Objektif utama pembangunan protokol ini adalah untuk memantau lapan kumpulan berfungsi yang sensitif terhadap sebarang perubahan kepada satu-satu ekosistem khususnya di koridor ekologi CFS. Lapan kumpulan berfungsi ini adalah pokok, tumbuhan herba, semut, kumbang najis, kupu-kupu, herpetofauna (amfibia dan reptilia), mamalia kecil dan mamalia besar.

Pada tahun 2023, pelaksanaan protokol ini telah dicadangkan khususnya dalam menyokong usaha pengurusan sumber hutan secara mampan. Oleh itu, cadangan ini telah melalui tiga peringkat pembentangan yang dimulai dengan Jawatankuasa Penyelarasan Penyelidikan Perhutanan (JPPP) 1/2023 pada 15 Mei 2023, diikuti dengan Majlis Urusan Hutan dan Silvikultur (MAJURUS) yang ke-59 pada 20 Jun 2023 dan Persidangan Pengarah-Pengarah Perhutanan Negeri Semenanjung Malaysia ke-43 pada 23–27 September 2023. Tambahan lagi, pembentangan juga telah diberikan berkaitan pemantauan dua kumpulan berfungsi (mamalia kecil dan herpetofauna) semasa Persidangan Serantau berkaitan Jaringan Hutan dan Pemuliharaan Biodiversiti di Pusat Konvensyen Setia Alam pada 21–22 November 2023 bertajuk Pemantauan Vertebrata Terpilih di Landskap Central Forest Spine (CFS).

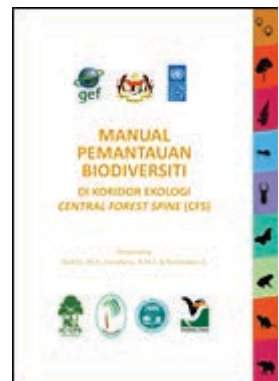
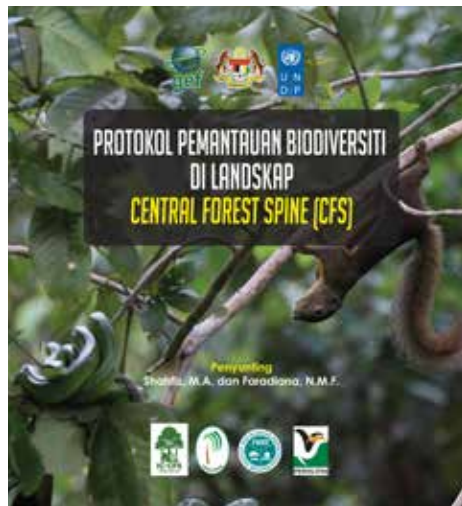
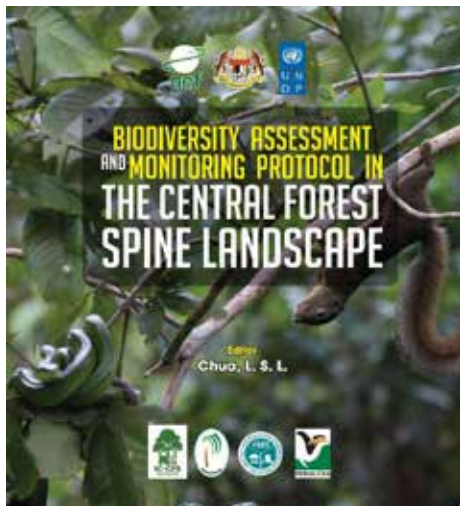
Selain itu, protokol berkaitan Perkhidmatan Ekosistem dan Stok Karbon telah diterbitkan pada tahun 2023. Aplikasi InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) telah digunakan dalam memberikan penilaian perkhidmatan ekosistem seperti kualiti habitat, risiko habitat untuk hidupan liar, potensi rekreasi dan stok karbon. Maka, ia diharap dapat memberikan panduan dan rujukan kepada pihak-pihak berkepentingan dalam membuat keputusan berkaitan perkhidmatan ekosistem yang ingin dicadangkan khususnya di peringkat negeri. Kedua-dua protokol ini telah diperkenalkan semasa Showcase CFS Negeri Johor pada 16 Oktober 2023.

Biodiversity Monitoring, Ecosystem Services and Carbon Stock Protocols

One of the outputs that has been set under the Improving Connectivity in the Central Forest Spine Landscape (IC-CFS) project is the development of biodiversity-related protocols, ecosystem services and carbon stocks. Thus, the Biodiversity Monitoring Protocol in the Central Forest Spine Landscape (PPBioD) was published in 2021 in English and in Bahasa Malaysia in 2022 followed by the publication of Biodiversity Monitoring Manual in 2023. The main objective of this protocol is to monitor eight functional groups that are sensitive to any changes to one ecosystem, particularly in the CFS ecological corridor. These eight functional groups are trees, herbaceous plants, ants, dung beetles, butterflies, herpetofauna (amphibians and reptiles), small mammals and large mammals.

In 2023, this protocol was proposed to be implemented specifically in support of sustainable forest resource management efforts. Therefore, this Proposal has gone through three stages of presentation beginning with the Forestry Research Coordination Committee (JPPP) 1/2023 on 15 May 2023, followed by the 59th Forest and Silvicultural Affairs Council (MAJURUS) on 20 June 2023 and the 43rd State Forestry Directors Conference of Peninsular Malaysia on 23–27 September 2023. In addition, the monitoring of two functional groups (small mammals and herpetofauna) was presented during the Regional Conference on Forest Connectivity and Biodiversity Conservation at the Setia Alam Convention Centre on 21–22 November 2023 with the title Monitoring Selected Vertebrates in The Central Forest Spine (CFS) Landscape.

Besides these, a protocol related to Ecosystem Services and Carbon Stocks was published in 2023. The Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) has been used in providing valuation of ecosystem services such as habitat quality, habitat risk for wildlife, recreational potential and carbon stocks. Therefore, it is hoped that it will provide guidance and reference to stakeholders in making decisions on ecosystem services that are intended to be proposed especially at the state level. Both protocols were introduced during the Johor State CFS Showcase on 16 October 2023.



PPBioD yang telah diterbitkan dalam Bahasa Inggeris (kiri), Bahasa Malaysia (Tengah) dan Manual Pemantauan Biodiversiti (kanan)
Published PPBioD in English (left), Malay (middle) and Biodiversity Monitoring Manual (right)



Pembentangan semasa persidangan serantau pada 21–22 November 2023
Presentation at the regional conference on 21–22 November 2023

Penghasilan Bahan Tanaman Berkualiti Meranti Sarang Punai (*Shorea parvifolia*) Melalui Kajian Progeni dan Penubuhan Bank Germplasma

Shorea parvifolia Dyer atau dikenali sebagai meranti sarang punai tergolong dalam keluarga Dipterocarpaceae. Spesies ini berasal dari Semenanjung Malaysia, Sabah, Sarawak, Sumatera dan Thailand. Spesies ini kebanyakannya ditemui di tanah pamah sehingga ke hutan bukit dan hutan hujan tropika. Di Semenanjung Malaysia, spesies ini biasanya ditemui pada ketinggian 800 m dan dianggap antara spesies dipterocarpaceae yang biasa dijumpai di Malaysia. Senarai Merah IUCN (2018) dan Senarai Merah Tumbuhan Malaysia (2021) mengklasifikasikan meranti sarang punai sebagai kurang membimbangkan (LC). Memandangkan spesies ini merupakan antara spesies dagangan yang berharga, ia berada di bawah ancaman pembalakan terpilih. Justeru itu, peneakan spesies ini tanpa perancangan strategik untuk mengekalkan sumber genetik boleh mengakibatkan pengurangan kepelbagaian genetik populasi. Oleh itu, usaha membaiki dan pemuliharaan bagi meranti sarang punai dilaksanakan melalui kajian percubaan progeni dan penubuhan bank germplasma. Kajian yang dilaksanakan ini adalah penting untuk memastikan bekalan bahan tanaman berkualiti yang mampan, terutamanya dalam usaha penanaman semula dan pemulihan kawasan hutan yang terosot.

“**Penanaman menggunakan bahan tanaman yang diperbaiki secara genetik telah terbukti dapat meningkatkan hasil sekurang-kurangnya 15%.**”

Kajian percubaan progeni adalah fasa awal yang penting dalam program membaiki spesies kayu keras. Kajian percubaan progeni dijalankan dengan memilih pokok terbaik, mendapatkan benih yang dihasilkan daripada pokok terbaik dan menanam semula dalam percubaan lapangan yang direplikasi. Dalam bidang membaiki baka, pokok terbaik merujuk kepada pokok terpilih yang telah digredkan (ciri kuantitatif dan kualitatif) untuk sumber pengeluaran bagi kajian lanjutan. Pengumpulan benih daripada pokok terbaik sahaja adalah untuk menggalakkan perolehan pokok progeni yang baik seperti pokok plus. Benih dikumpul daripada 17 pokok terbaik terpilih yang berasal dari 11 kawasan hutan simpan di negeri Pahang, Negeri Sembilan, Kelantan, Perak, Kedah, Johor, Terengganu dan Selangor. Dalam kajian ini, dua plot percubaan progeni telah ditubuhkan. Di

Establishment of the Multilocal Progeny Trial of *Shorea parvifolia* (Meranti Sarang Punai) For the Production of Genetically Improved Planting Materials

Shorea parvifolia Dyer, locally known as meranti sarang punai or light red meranti as a trade name, belongs to the family of Dipterocarpaceae. This species is native to Peninsular Malaysia, Sabah, Sarawak, Sumatra and Thailand. It is mainly found in lowland to hill forests and seasonally dry tropical rainforests. In Peninsular Malaysia, this species is usually found at 800 m altitude and is considered among the most common dipterocarp in Malaysia. IUCN Red List (2018) and Malaysia Plant Red List (2021) classified *S. parvifolia* as Least Concern (LC). As *S. parvifolia* is a species of interest for timber among light red meranti group, it is under threat due to selective logging. Harvesting without strategic planning to sustain the genetic resources might reduce the population's genetic diversity. Therefore, an improvement program via progeny trial for *S. parvifolia* has been initiated to ensure a sustainable supply of quality planting materials especially for reforestation and rehabilitation of degraded forest areas.

“**Using genetically improved planting materials has been proven to increase yield by at least 15%.**”

Progeny trial is the first important step in any improvement programme of hardwood species. Progeny trial is conducted by selecting plus trees, obtaining seeds produced from the plus trees and planting in replicated field trials. In tree breeding, plus tree refers to the selected tree that has been graded (quantitative and qualitative traits) as a source of production for further breeding study. Seeds were collected from 17 selected plus trees originating from 11 forest reserves in Pahang, Negeri Sembilan, Kelantan, Perak, Kedah, Johor, Terengganu and Selangor. In this study, two progeny trial plots have been established at FRIM Research Station in Segamat, Johor (December 2022) with a total of 280 saplings planted across 0.6 ha and at FRIM Research Station in Mata Ayer, Perlis (October 2022), a total of 260 saplings were planted over 0.31

Stesen Penyelidikan FRIM (SPF) di Segamat, Johor (Disember 2022), sejumlah 280 anak pokok telah ditanam dalam kawasan seluas 0.6 ha manakala di SPF Mata Ayer, Perlis (Oktober 2022) pula, sejumlah 260 anak pokok telah ditanam di kawasan seluas 0.31 ha. Selain itu, bank germplasma berkonsepkan common garden telah ditubuhkan di SPF Jeli, Kelantan pada Disember 2022 dengan sejumlah 350 anak pokok ditanam di kawasan seluas 0.42 ha. Buat masa ini, pengumpulan data prestasi pertumbuhan sedang dilaksanakan. Program membaiki pokok mengambil masa yang panjang untuk mendapatkan data yang konklusif kerana tempoh kematangan pokok adalah lama. Kini, koleksi gen meranti sarang punai daripada 17 pokok terbaik telah pun diperolehi dari lapan negeri di Semenanjung Malaysia. Data prestasi pertumbuhan yang dikumpul daripada kajian ini dapat memberikan maklumat penting bagi membolehkan pemilihan baka pokok yang baik. Di samping itu, penubuhan plot-plot ini juga menyumbang kepada pemerkasaan bank germplasma negara.

ha. Additionally, a germplasm with a common garden concept has been established at FRIM Research Station in Jeli, Kelantan (December 2022) with a total of 350 saplings planted over 0.42 ha. Currently, the collection of growth data is ongoing and growth performances of the different families at different locations are still at the infancy level. Tree breeding programmes will take a significant amount of time to obtain reliable results as the period of maturity is long. There is now a collection of gene pool for *S. parvifolia* from 17 selected plus trees collected from eight different states in Peninsular Malaysia. The growth performance data collected from this study will be able to provide important information for future research. In addition, the establishment of these plots also contributed to the empowerment of the nation's germplasm bank.



Pokok meranti sarang punai, biji benihnya yang bersayap dan daun pokok
The whole tree, its winged seeds and leaves of *Shorea parvifolia*

Pemilihan pokok terbaik Selection of plus tree



Pusat Edutourism Sungai Menyala,
Negeri Sembilan (N-MSP2)



Jalan Jeram Papan - Kuala Pilah,
Negeri Sembilan (N-MSP3)



Hutan Lipur Bukit Bakar,
Machang, Pahang (D-MSP4)



Hutan Simpan Ulu Muda,
Baling, Kedah (N-MSP5)



Rimba Rekreasi Lata
Mengkuang, Kedah (K-MSP6)



Rimba Rekreasi Lata
Mengkuang, Kedah (K-MSP7)



Hutan Simpan Ulu Muda,
Baling, Kedah (K-MSP8)



Taman Negara (Hutan Simpan
Tekai), Pahang (C-MSP19)

Antara pokok terbaik yang menjadi sumber biji benih kepada penubuhan plot kajian percubaan progeni dan bank germplasma
Some of the selected plus trees where seeds were collected for the establishment of progeny trial plots and germplasm bank



Penubuhan plot kajian progeni di SPF Mata Ayer, Perlis
Establishment of the progeny trial plot at FRIM Research Station in Mata Ayer, Perlis



Plot kajian progeni di SPF Segamat, Johor
Progeny trial plot at FRIM Research Station in Segamat, Johor



Bank germplasma di SPF Jeli, Kelantan
Germplasm bank at FRIM Research Station in Jeli, Kelantan

Pelan Penyelamatan Kelip-kelip Sungai Selangor

Populasi kelip-kelip daripada spesies *Pteroptyx tener* yang hidup di sepanjang tebing Sungai Selangor di daerah Kuala Selangor terkenal dengan kerlipan cahaya yang dihasilkan oleh kelip-kelip jantan spesies ini sepanjang tahun. Kehadiran spesies ini merupakan tarikan pelancong ke daerah Kuala Selangor serta membantu meningkatkan sumber pendapatan komuniti setempat melalui aktiviti ekopelancongan di mana pelancong dibawa melihat kelip-kelip yang hinggap di pokok *Sonneratia caseolaris* (berembang) di sepanjang Sg. Selangor. Populasi kelip-kelip di Sg. Selangor ini yang bilangannya mencecah sehingga beribu-ribu individu bergantung kepada pokok *S. caseolaris* serta habitat hutan bakau untuk kemandiriannya. Selain daripada daerah Kuala Selangor, populasi *P. tener* juga boleh didapati di Sg. Kerian, Sg. Sepetang dan Sg. Linggi di pantai barat, dan Sg. Chukai, Sg. Kemaman dan Sg. Cherating di pantai timur Semenanjung Malaysia.

Namun, populasi kelip-kelip di Kuala Selangor merupakan populasi yang terbesar di Malaysia. Disebabkan statusnya yang ikonik dan fungsinya sebagai indikator kesihatan ekosistem sungai, Lembaga Urus Air Selangor (LUAS) telah melantik FRIM untuk membangunkan kaedah dan teknik baharu untuk memulihara populasi kelip-kelip dan habitatnya di Sg. Selangor. Dengan bantuan daripada penyelidik Institut Genom dan Vaksin Malaysia serta Universiti Malaysia, FRIM telah menganalisa kepelbagaian genetik serta aliran gen antara populasi *P. tener* di sepanjang persisiran Sungai Selangor untuk mengenalpasti sama ada populasi ini telah menjadi semakin terpisah antara satu sama lain. Selain memahami proses genetik populasi yang telah memberi impak kepada *P. tener*, FRIM juga menggunakan teknik penderiaan jauh dengan satelit dan dron untuk menilai kualiti dan integriti ekosistem yang didiami oleh kelip-kelip ini.

Genetic Rescue Plan for Selangor River Fireflies

Populations of the estuarine firefly, *Pteroptyx tener*, which inhabit the banks of the Selangor River near Kampung Kuantan, Kuala Selangor, are famed for the spectacular displays of synchronised flashing by males of the species all-year round. They are an important tourist attraction in Selangor providing enterprising locals with the opportunity to provide guided tours so that tourists can view them up close from the river. The populations here, which number in thousands of individuals, depend on both *Sonneratia caseolaris* and the mangrove habitat lining the Selangor River for their survival. Apart from Kuala Selangor, populations of *P. tener* can also be found in Kerian, Sepetang and Linggi Rivers on the west coast; and Chukai, Kemaman and Cherating Rivers on the east coast of Peninsular Malaysia.

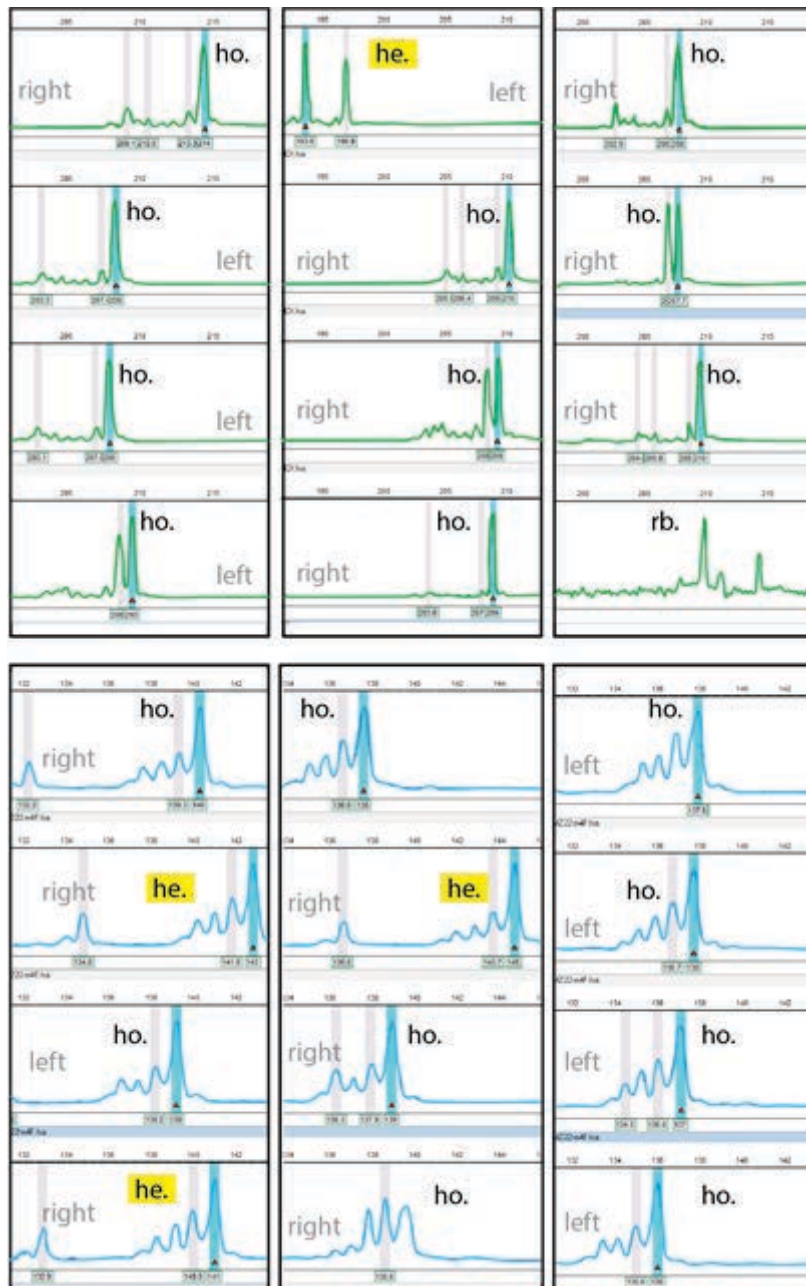
Kuala Selangor is, however, home to the largest firefly population in the country. Because of its iconic status and realisation of its role as an indicator of ecosystem health, Lembaga Urus Air Selangor (LUAS) commissioned FRIM to embark on a year-long study to develop new methods and techniques to conserve and rehabilitate this species and its habitat. With the assistance of researchers from Malaysia Genome and Vaccine Institute and University of Malaya, FRIM undertook the task of assessing genetic diversity and gene flow in- and between- populations of *P. tener* inhabiting different sections of the Selangor River in order to characterise their diversity and determine if populations inhabiting the different sections of the Selangor River were slowly becoming isolated from one another. Apart from population genetic processes impacting *P. tener*, researcher of this project employed remote sensing tools such as satellite imaging and drone imaging to assess the quality and integrity of the fireflies ecosystem.

Dapatan kajian FRIM menunjukkan kebanyakan individu kelip-kelip di Sg. Selangor mempunyai konstitusi genetik yang agak sama antara satu sama lain, manakala analisa gen mitokondria pula menunjukkan kehadiran varian-varian genetik nadir di beberapa lokasi di persisiran Sg. Selangor yang dikaji. Walaupun masih di peringkat awal, projek perintis ini telah menyumbang kepada peningkatan pemahaman kita mengenai proses yang telah memberi kesan kepada populasi *P. tener* di Sg. Selangor dan kepentingannya untuk membangunkan kaedah baharu untuk mengurangkan atau mengelakkan kehilangan kepelbagaian genetik kelip-kelip, serta meningkatkan kepelbagaian genetik kelip-kelip melalui kaedah pembiakan dengan bantuan penanda genetik. Selain itu, FRIM menunjukkan kebolegunaan teknik penderiaan jauh untuk memantau dan menilai kesihatan habitat atau ekosistem bakau yang didiami oleh *P. tener*. FRIM berhasrat untuk terus membantu LUAS serta pemegang taruhnya untuk meningkatkan kesihatan habitat kelip-kelip serta membangunkan kaedah baharu untuk memulihara populasi kelip-kelip di Sg. Selangor.

Results from FRIM's molecular genetics analyses showed that populations of firefly in Kuala Selangor appear to be genetically similar to one another. Separately, mitochondrial DNA gene sequencing results showed many rare genetic variants among firefly individuals inhabiting some sections of the Selangor River. Although still at an early stage, this pioneering research has provided a better understanding of population genetic processes affecting *P. tener* and the need to develop solutions to help minimise and prevent loss of genetic diversity, and strategies to enhance diversity such as marker-assisted breeding. Separately, through the use of remote sensing technology, the researchers were able to evaluate and demonstrate the use of this method to monitor land use change and habitat encroachment, as well as to determine the quality of the mangrove vegetation inhabited by *P. tener*. FRIM's ultimate aim is to assist LUAS and its stakeholders improve the health of the firefly habitat and to co-develop.



Pteroptyx tener jantan pada pokok *Sonneratia caseolaris*
Male *Pteroptyx tener* on *Sonneratia caseolaris*



Pengenotipan populasi menggunakan penanda DNA mikrosatelit menunjukkan kebanyakan individu kelip-kelip di Sg. Selangor mempunyai konstitusi genetik yang agak sama antara satu sama lain

Population genotyping using DNA microsatellite markers showed that a majority of the *P. tener* individuals genotyped appeared to be genetically similar to one another/homozygous



Pembentangan draf laporan akhir kepada LUAS dan pemegang taruh di Institut Genom dan Vaksin Malaysia pada 11 April 2023
Presentation of draft final report to LUAS and its stakeholders at Malaysia Genome and Vaccine Institute on 11 April 2023

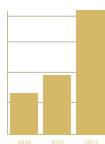


Peserta dan pemegang taruh Bengkel Kajian Pengurusan Kelip-kelip Sungai Selangor Bersama Pihak Berkepentingan di MGVI Bangi, Selangor pada 11 April 2023
Stakeholders and participants of the Bengkel Kajian Pengurusan Kelip-kelip Sungai Selangor Bersama Pihak Berkepentingan at the MGVI Bangi, Selangor on 11 April 2023



Di Malaysia, kadar jangkitan **MRSA** di hospital kerajaan telah menurun secara mendadak buat pertama kalinya sejak 2012, dari **14.9%** pada tahun 2020 kepada **6.0%** pada tahun 2022.

In Malaysia, the overall **MRSA** infection rate in the Ministry of Health (MOH) hospitals has decreased dramatically for the first time since 2012, from **14.9%** in 2020 to **6.0%** in 2022.



Kematian akibat daripada jangkitan darah oleh **MRSA** di hospital kerajaan telah **melonjak** daripada **8.4/100** kes pada tahun 2020 kepada **14.9/100** kes pada tahun 2022.

Death due to **MRSA** blood infection in MOH hospitals has **soar** from **8.4/100** cases in 2020 to **14.9/100** cases in 2022.

Pembangunan Sebatian Baharu Pyrrolidone Berdasarkan Tumbuhan yang Berpotensi Sebagai Agen Anti-MRSA

Staphylococcus aureus rintang-meticilin (MRSA) adalah bakteria yang biasa dijumpai di hospital dan terkenal dengan sifat rintang terhadap pelbagai antibiotik dan agen antimikrob yang berlainan struktur. Baru-baru ini, *S. aureus* telah dikenal pasti sebagai punca utama kematian yang disebabkan oleh bakteria di 135 negara yang mana bakteria MRSA merupakan punca untuk lebih daripada 100,000 kematian pada tahun 2019.

Di Malaysia, kadar jangkitan MRSA di hospital kerajaan telah menurun secara mendadak buat pertama kalinya sejak 2012, dari 14.9% pada tahun 2020 kepada 6.0% pada tahun 2022. Walau bagaimanapun, gabungan bakteria *S. aureus* dan MRSA telah menjadikan patogen ini sebagai bakteria yang paling banyak dipencilkan dari hospital kerajaan berbanding dengan mikroorganisma Gram-negatif yang lain. Selain itu, kematian akibat daripada jangkitan darah oleh MRSA di hospital kerajaan telah melonjak daripada 8.4/100 kes pada tahun 2020 kepada 14.9/100 kes pada tahun 2022.

Dari segi ekonomi, kos penggunaan antibiotik sistemik di hospital-hospital di Malaysia terus meningkat daripada RM381 juta pada tahun 2011 kepada RM408 juta pada tahun 2016. Ironinya, pembangunan antibiotik baharu telah hampir terhenti apabila hanya dua kelas antibiotik baharu (oxazolidinone dan lipopeptide) terhadap MRSA telah diluluskan oleh FDA dalam tempoh 60 tahun yang lalu. Jelas sekali, terdapat keperluan

Development of a Novel Plant-Based Pyrrolidone Compound as a Potential Anti-MRSA Agent

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a nosocomial-related bacteria that have been known to display multidrug-resistance properties towards a wide range of structurally-unrelated antibiotics and antimicrobial agents. Recently, *S. aureus* has been identified as the leading cause of bacterial death in 135 countries in which MRSA alone are directly responsible for more than 100,000 deaths in 2019.

In Malaysia, the overall MRSA infection rate in the Ministry of Health (MOH) hospitals has decreased dramatically for the first time since 2012, from 14.9% in 2020 to 6.0% in 2022. However, the combined might of *S. aureus* and MRSA has made this opportunistic pathogen as the highest bacteria isolated from MOH hospitals as compared to other medically important Gram-negative microorganisms. Additionally, death due to MRSA blood infection in MOH hospitals has soar from 8.4/100 cases in 2020 to 14.9/100 cases in 2022.

Economically, the cost of systemic antibiotics usage in Malaysian Hospitals has steadily risen from RM381 million in 2011 to RM408 million in 2016. Ironically, development of novel antibiotics has been dwindling almost to a halt as only two new classes of anti-MRSA drugs (oxazolidinone and lipopeptide) have been approved by the FDA in the last 60 years. Clearly, there is a dire need for a



Kos penggunaan **antibiotik sistemik** di hospital-hospital di Malaysia terus meningkat daripada **RM381 juta** pada tahun 2011 kepada **RM408 juta** pada tahun 2016.

Cost of **systemic antibiotics** usage in Malaysian Hospitals has steadily risen from **RM381 million** in 2011 to **RM408 million** in 2016.

yang mendesak untuk penghasilan kelas antimikrob baharu dan alternatif bagi mencegah atau sekurang-kurangnya mengurangkan jangkitan MRSA di seluruh dunia.

Alkaloid polihidroksi pyrrolidone semula jadi telah dikenali mempunyai sifat antimikrob yang sangat baik. Sehubungan itu, sekumpulan saintis dari Pusat Sintesis dan Biologi Kimia, Institut Sains, Universiti Teknologi MARA (UiTM) dan Makmal Antimikrob di Institut Penyelidikan Perhutanan Malaysia (FRIM) telah berjaya menghasilkan satu sebatian terbitan pyrrolidone berhalogen baharu iaitu HCD1 yang mempamerkan aktiviti perencatan yang baik dengan nilai kepekatan perencatan minimum (MIC) kurang daripada 8 µg/ml terhadap satu panel pencilan MRSA. Dalam kajian ini, HCD1 telah di uji melalui penilaian ketoksikan, keberkesanan perlindungan anti-MRSA dan integriti sel MRSA.

Di dalam ujian ketoksikan akut, tiada kematian atau perubahan tingkah laku diperhatikan pada tikus yang dirawat dengan dos tunggal HCD1 pada 300 mg/kg dan 2000 mg/kg. Keputusan ujian ini menunjukkan bahawa dos yang boleh membawa maut untuk HCD1 adalah lebih tinggi daripada 2000 mg/kg. Ketoksikan sub-akut untuk HCD1 dengan dos berulang pada 125 mg/kg/hari selama 28 hari juga tidak menunjukkan tanda-tanda ketoksikan pada haiwan yang dirawat. Ujian perlindungan terhadap mencit yang dijangkiti MRSA menunjukkan HCD1 berjaya memberikan kadar kelangsungan hidup sehingga 83% pada kepekatan 62.5 mg/kg. Analisis mikroskopi elektron pengimbasan (SEM) mendedahkan bahawa terdapat kerosakkan terhadap struktur membran dan struktur sitoplasmik pada sel MRSA yang dirawat dengan HCD1 berbanding sel MRSA yang tidak dirawat.

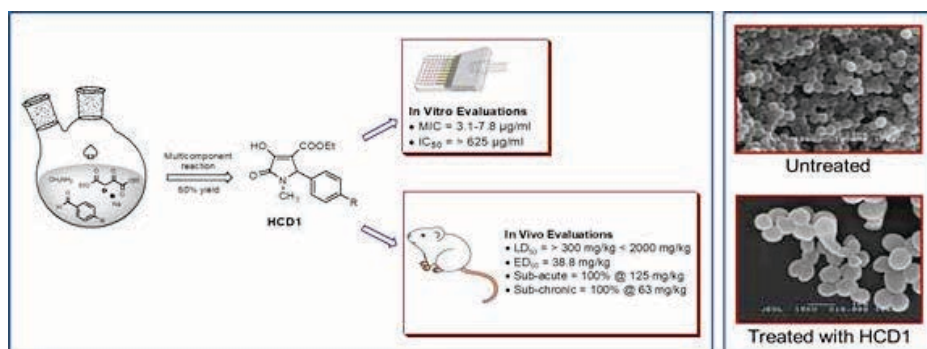
Kesimpulannya, HCD1 sangat disyorkan untuk dibangunkan sebagai agen antibakteria baharu yang selamat dan berkesan terhadap MRSA. Diharapkan HCD1 akan menjadi komponen penting kepada persenjataan antibiotik yang semakin berkurangan terhadap 'superbug' yang berbahaya ini.

novel and alternative class of antimicrobials to prevent or at least reduces MRSA infections worldwide.

Natural polyhydroxy pyrrolidone alkaloids are known to display remarkable antimicrobial properties. However, pyrrolidone alkaloids carrying an aromatic substituent on the ring are of a rare class found in nature. Previously, a group of scientists from the Centre of Synthesis and Chemical Biology, Institute of Science, Universiti Teknologi MARA (UiTM) and the Antimicrobial Laboratory at Forest Research Institute Malaysia (FRIM) have successfully synthesized a novel halogenated codonopsinine derivative, HCD1, that exhibited a good inhibitory action with minimum inhibitory concentrations (MIC) value of less than 8 µg/ml against a panel of MRSA isolates. In this study, HCD1 were subjected to various toxicity, anti-MRSA protection efficacy and MRSA cell integrity evaluations.

In the acute toxicity study, no mortality or behavioural changes were observed in rats treated with a single dose of 300 mg/kg and 2000 mg/kg of HCD1. This result indicates that the lethal dose of HCD1 is higher than 2000 mg/kg. Sub-acute toxicity at of HCD1 in a repeated dose of 125 mg/kg/day for 28 days also showed no signs of toxicity in the treated animals. The mice protection assay revealed that HCD1 provided an 83% survival rate against MRSA infection at 62.5 mg/kg. Scanning electron microscopy (SEM) analysis revealed structural and cytoplasmic membrane disruptions on MRSA cells treated with HCD1 as compared to the untreated bacterial cells.

In conclusion, HCD1 is highly recommended to be developed as a new, safe and efficacious antibacterial agent against MRSA. It is hoped that HCD1 will serve as an important addition to the depleting armament against this dangerous 'superbug'.



Gambar rajah skematik hasil kajian
A schematic diagram of the results of the study

Pembangunan Ekstrak Piawai daripada *Azadirachta excelsa* (Sentang) untuk Pembangunan Biopestisid

Racun serangga berasaskan bahan kimia digunakan secara meluas di seluruh dunia. Namun, penggunaannya berpotensi menimbulkan masalah kesihatan dan alam sekitar. Untuk mengatasi masalah ini, pendekatan harus diubah kepada sumber semula jadi demi kesihatan dan keselamatan pengguna dan alam sekitar.

Pokok *Azadirachta excelsa* atau dikenali dengan nama tempatan sebagai sentang adalah sejenis pokok besar berkayu yang terdapat di Semenanjung Malaysia. Spesies ini lebih dikenali dalam industri perkayuan berbanding ciri bioaktivitinya. *Azadirachta excelsa* berkongsi genus yang sama dengan *Azadirachta indica* atau neem yang lebih popular kerana kepelbagaian kegunaannya. Beberapa kajian tentang *A. excelsa* untuk sifat biopestisidnya telah dilaporkan. Disebabkan penemuan yang menarik ini, kajian menyeluruh tentang spesies ini telah dijalankan untuk mendalami keistimewaannya yang boleh dikembangkan lagi.

Terpenoid telah dikaji secara intensif untuk bioaktiviti seperti antikanser, antimikrob dan ciri pestisid kerana tindak balas mekanisme dan strukturnya yang pelbagai. Kajian di FRIM menunjukkan *A. excelsa* mengandungi sebatian terpenoid sebagai komponen aktif larvasid untuk anai-anai dan nyamuk *Aedes*. Ia berdasarkan penemuan daripada pengenalpastian sebatian yang terdapat dalam tumbuhan ini melalui analisis kromatografi dan spektroskopi. Kaedah pengekstrakan dioptimumkan untuk menghasilkan ekstrak yang tinggi kandungan bahan aktif terpenoid berdasarkan tiga faktor penting dalam pengekstrakan, iaitu tempoh masa pengekstrakan, suhu yang digunakan, dan nisbah kombinasi antara bahan pelarut dan berat sampel daun sentang. Faktor-faktor yang dipilih ini mempengaruhi kuantiti ekstrak yang terhasil dan peratusan triterpenoid di dalam ekstrak. Proses reka bentuk eksperimen melibatkan suhu, masa dan kombinasi pelarut dan hasil yang dijangkakan adalah menggunakan kaedah statistik yang dikenali sebagai Central Composite Design (CCD) of Response Surface Methodology, yang mana kaedah optimum dan hasilnya dapat dikenal pasti. Kaedah yang dioptimumkan menghasilkan 10.63% (b/b) ekstrak manakala peratusan kandungan triterpenoid dalam ekstrak adalah 0.45%. Ekstrak ini dikenali sebagai ekstrak piawai.

Kajian keberkesanan ke atas serangga perosak anai anai *Captothermes curvignathus* dan serangga vector penyakit nyamuk denggi *Aedes aegypti* mendapati ekstrak piawai yang tinggi kandungan triterpenoid menunjukkan keputusan keberkesanan yang lebih tinggi dan konsisten berbanding ekstrak tidak diapiawakan. Nilai perencatan pemakanan (%) anai-anai untuk ekstrak piawai pada

Production of a Standardised Extract from *Azadirachta excelsa* (Sentang) for the Development of Biopesticides

Chemical-based pesticides are widely used around the world. However, the use of these types of pesticides can have detrimental impacts on health and the environment. To overcome these problems, people resort to natural approaches to address this problem.

Azadirachta excelsa or locally known as sentang is a woody plant that can be found in Malaysia. It is better for in the wood industry than for its bioactive properties. The species is grouped in the same genus with *Azadirachta indica* or neem, which is popularly known for a variety of therapeutic applications. A few studies on biopesticidal properties of *A. excelsa* have been reported. Due to the interesting findings, a comprehensive study of this species was carried out to search for potential activities that could be further developed into products.

The group terpenoid has been studied extensively for its bioactivities such as anticancer, antimicrobial and pesticidal due to its diverse mechanisms and structures. A study conducted in FRIM shows that *A. excelsa* contains terpenoid compounds that are active against termites and *Aedes* mosquitoes. The compounds were identified through chromatography and spectroscopy analyses. The extraction method was optimised to produce extract with high content of terpenoids as the active constituents, based on three factors, namely the extraction time, temperature and combination ratio between solvent and the weight of sentang leaves. These selected factors affect the quantity of extract produced and the percentage of terpenoid present in the extract. The experimental design process that involves temperature, time and combination of solvents and the expected results are using a statistical method known as Central Composite Design (CCD) of Response Surface Methodology where the optimal method and results can be identified. The optimised method produced 10.63% (w/w) extract yield while the percentage of terpenoids content in the extract was 0.45%. This extract is known as the standardised extract.

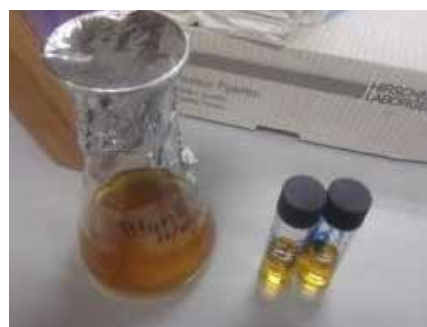
The standardised extract was more effective against *Captothermes curvignathus* termite and *Aedes aegypti* mosquito as compared to the non-standardised extract. The feeding inhibition (%) of termite for the standardised extract at 4% was 83.56% as compared to only 35% for the non-standardised extract. Meanwhile for larvicidal activity on *A. aegypti* larvae, the LC₅₀ value

kepekatan 4% adalah 83.56% bagi ekstrak piawai berbanding dengan 35% sahaja untuk ekstrak tidak piawai. Manakala aktiviti larvisid terhadap larva *A. Aegypti* (LC50) adalah 1,350 ppm bagi ekstrak piawai dan melebihi 2,000 ppm bagi ekstrak tidak piawai. Ini menunjukkan bahawa ekstrak piawai mampu menghalang pemakanan anai-anai *C. curvignathus* dan ia juga boleh membunuh larva nyamuk *A. aegypti* dengan jauh lebih berkesan berbanding ekstrak tidak piawai. Analisis HPLC juga menunjukkan terpen sebagai sebatian utama yang terdapat dalam ekstrak.

Ekstrak piawai daripada daun *A. excelsa* sangat berkesan dalam membunuh perosak dan larva vektor penyakit. Ia adalah bahan semula jadi berasaskan tumbuhan yang selamat untuk pengguna dan tidak mempunyai sebarang kesan negatif terhadap alam sekitar. Ekstrak piawai ini berpotensi untuk diformulasikan bagi tujuan komersialisasi.

was 1,350 ppm for the standardised extract whereas for non-standardised extract, more than 2,000 ppm was observed. This indicates that the standardised extract is able to inhibit or prevent termite *C. curvignathus* from feeding and it also could kill the larvae of mosquitoes *A. aegypti* more effectively as compared to the non-standardised extract. Analysis with HPLC also showed terpenes as the major compound present in the extract.

The standardized extract from the leaves of *A. excelsa* is very effective in killing pests and disease vector larvae. It is a natural plant-based material that is safe for users and does not have any negative effects on the environment. This standardized extract has the potential to be formulated for commercial purposes.



Pokok, daun dan ekstrak piawai *Azadirachta excelsa* (sentang)
Tree, leaves and standardised extract of *Azadirachta excelsa* (sentang)

Karbon Teraktif Buluh Sebagai Elektrod Superkapasitor

Bahan lignoselulosa contohnya kayu, tempurung kelapa, buluh dan sekam padi adalah antara sumber semula jadi yang berpotensi untuk dijadikan bahan yang boleh diperbaharui untuk keperluan masyarakat dan industri pada hari ini. Ketersediaan dan lambakan hasil sampingan pertanian seperti buluh dan tempurung kelapa menjadikan ianya sumber bahan mentah yang mudah didapati untuk pembuatan karbon teraktif (AC) di Malaysia. Penukaran biojisim daripada bahan lignoselulosa yang agak murah, mudah diproses dan didapati serta mesra alam sebagai produk nilai tambah telah dianggap sebagai alternatif untuk pengkomersialan AC. AC ialah sejenis karbon yang diproses untuk mempunyai liang kecil dan berisipadu rendah bagi meningkatkan luas permukaan untuk proses penyerapan. Ia biasanya digunakan untuk menapis bahan cemar daripada air dan udara dan juga boleh berfungsi dalam aplikasi termaju.

Aplikasi termaju untuk AC daripada biojisim hijau meliputi peranti storan tenaga mampan masa hadapan iaitu bateri dan superkapasitor. Bateri adalah lebih murah dan cekap, mempunyai ketumpatan tenaga yang lebih tinggi dengan reka bentuk dan bahan baharu manakala superkapasitor membekalkan kuasa lebih pantas dengan ketumpatan kuasa yang lebih tinggi. Superkapasitor mewakili kemajuan teknologi yang ketara dalam aplikasi penyimpanan tenaga yang memerlukan penghantaran kuasa yang cepat, ketumpatan kuasa, kapasitans tinggi dan jangka hayat yang lebih panjang. Ia mempunyai aplikasi yang berpotensi dalam tablet, telefon pintar, komputer riba dan alat lain yang berupaya mengecas dengan pantas dan mengekalkan kuasa untuk jangka masa yang panjang. Bateri pula sesuai untuk penyimpanan tenaga jangka panjang dan penghantaran kuasa yang mampan dalam tempoh yang lama dan biasanya digunakan dalam kenderaan elektrik dan aplikasi tenaga boleh diperbaharui.

Terdapat tiga jenis saiz liang dalam AC; liang mikro (kurang daripada 2 nm), liang meso (antara 2 nm hingga 50 nm), dan liang makro (lebih daripada 50 nm). Walau bagaimanapun, hanya liang mikro dan meso yang menyumbang dengan ketara kepada nilai kapasitans. Kawasan permukaan AC yang lebih tinggi antara 1100 hingga 2500 m²/g adalah berkadar langsung dengan peningkatan prestasi dan nilai kapasitans. Superkapasitor amat berpotensi dan boleh berkembang untuk menjadi salah satu daripada peranti penyimpanan tenaga. Luas permukaan AC yang tinggi dapat meningkatkan nilai kapasitans dalam bahan

Bamboo Activated Carbon as Supercapacitor Electrode

Lignocellulosic materials such as wood, coconut shell, bamboo and rice husk are among the most promising natural resources that are renewable and necessary for today's industrial society. The availability and abundance of agricultural by-products such as bamboo and coconut shell make them a readily available source of raw materials for the manufacturing of activated carbon (AC) in Malaysia. The conversion of inexpensive, easily processed, abundant and eco-friendly lignocellulosic biomass as value-added products has been considered as an alternative for the commercialization of AC. AC is a form of carbon that is processed to have small and low-volume pores, which increase the surface area available for adsorption. It is commonly used to filter contaminants from water and air and also for high end applications.

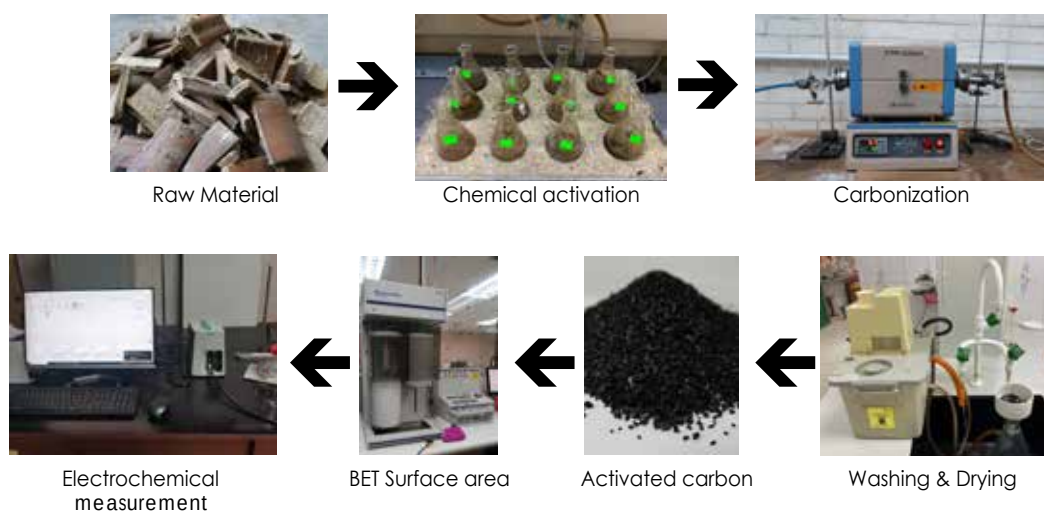
High end applications of AC from green biomass include future sustainable energy storage devices such as batteries and supercapacitors. Batteries are cheaper and more efficient, have higher energy density with new designs and materials while supercapacitors deliver power faster and get higher power density. Supercapacitors represent a significant technological advancement in energy storage applications requiring rapid power delivery, high power density, high capacitance and extended lifespan. It has potential applications in tablets, smartphones, laptops and other gadgets that need quick charging and retain power for an extended period of time. On the other hand, batteries are suitable for long-term energy storage and sustained power delivery over an extended period and commonly used in electric vehicles and renewable energy applications.

There are three types of pore sizes in AC; micropores (less than 2 nm), mesopores (between 2 nm to 50 nm), and macropores (greater than 50 nm). However, only micro and mesopores significantly contribute to capacitance for supercapacitor. Higher AC surface areas ranging from 1100 to 2500 m²/g are highly correlated with enhanced performance and capacitance yields. In order to create capacitances, it can make use of the large surface area of AC as an ingredient in electrode materials. The ideal capacitance results for the application utilizing electrolytes from lignocellulosic material should fall between 150 to 300 F/g (Farad/gram).

elektrod. Nilai kapasitans untuk aplikasi yang menggunakan elektrolit dari bahan lignoselulosa sepatutnya terletak di antara 150 hingga 300 F/g (Farad/gram).

Institut Penyelidikan Perhutanan Malaysia (FRIM) telah memulakan penyelidikan untuk menghasilkan AC daripada biojisim buluh melalui proses pengaktifan kimia dan stim. Kajian awal menunjukkan bahawa AC yang dihasilkan oleh pengaktifan stim dan kaedah pengaktifan zink klorida (ZnCl_2) hanya boleh mencapai luas permukaan yang lebih rendah, masing-masing kurang daripada $1000 \text{ m}^2/\text{g}$. Rawatan pencemaran udara dan pembersihan air adalah satu-satunya aplikasi sederhana dan rendah yang sesuai untuk AC jenis ini. Selepas itu, penyelidikan tertumpu kepada pembangunan dan peningkatan luas permukaan AC yang lebih tinggi melalui proses pengubahsuaian bagi aplikasi elektronik. Luas permukaan AC yang lebih tinggi kemudiannya berjaya diperoleh daripada $1000\text{--}1500 \text{ m}^2/\text{g}$ menggunakan pelbagai kaedah pengkarbonan dan pengaktifan serta pelbagai jenis agen pengaktifan kimia seperti potassium hidroksida (KOH) dan asid fosforik (H_3PO_4). Hasilnya, AC buluh ini dapat menghasilkan nilai kapasitans spesifik yang optimum iaitu $120\text{--}230 \text{ F/g}$ yang mana nilai ini berada dalam nilai ideal untuk superkapasitor daripada bahan lignoselulosa. AC buluh ini menunjukkan prestasi elektrokimia yang baik dan berpotensi dalam aplikasi superkapasitor. Untuk itu, lebih banyak kajian perlu dilakukan dari segi ketahanan dan kitaran hayat bahan elektrod bagi meningkatkan prestasi AC untuk digunakan sebagai komponen dalam elektrod superkapasitor. Proses penghasilan AC dengan menggunakan biojisim buluh bagi aplikasi superkapasitor ditunjukkan dalam rajah.

Forest Research Institute Malaysia (FRIM) initiated research in the production of AC from bamboo biomass using chemical and steam activation process. Preliminary studies demonstrated that AC produced by the steam activation and zinc chloride (ZnCl_2) activation methods could only achieve lower surface areas of less than $1000 \text{ m}^2/\text{g}$, respectively. This type of AC is only suitable for air pollution treatment and water purification, which are medium- and low-end applications. Research was then focused on creating high surface area AC through modification process for high-end electronic application. Higher surface area AC was successfully obtained from $1000\text{--}1500 \text{ m}^2/\text{g}$ using various methods of carbonization and activation and different types of chemical activating agents such as potassium hydroxide (KOH) and phosphoric acid (H_3PO_4). As a result, this higher surface area of bamboo AC could produce good specific capacitance value from $120\text{--}230 \text{ F/g}$, which is within the ideal value for supercapacitor from lignocellulosic material. These bamboo ACs demonstrated good electrochemical performances for supercapacitor application but more study needs to be conducted to test its durability and life cycle of electrode material to improve AC performance to be utilized as a component in the supercapacitor electrode. A flow diagram on the synthesis of AC production using bamboo biomass for supercapacitor application is shown.



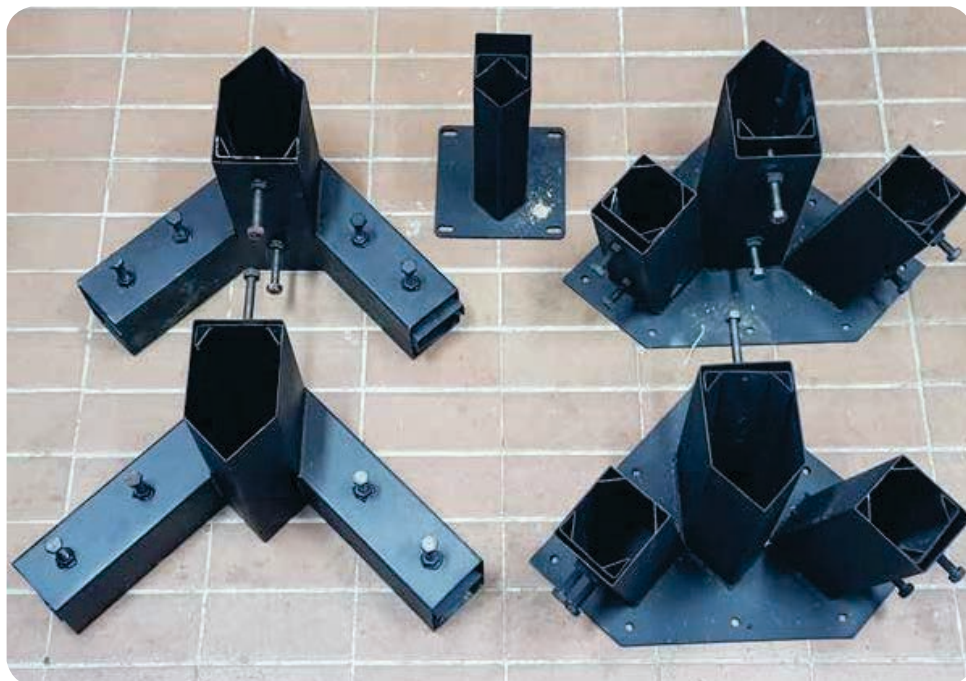
Rajah skema sintesis karbon teraktif daripada biojisim buluh untuk aplikasi superkapasitor
Schematic of the synthesis of activated carbon derived from bamboo biomass for supercapacitor application

BambooNxtor – Penyambung Buluh Serbaguna

Penyambungan batang-batang buluh dalam pembinaan sentiasa menjadi cabaran kerana saiz dan bentuk diameter batang buluh yang secara semula jadi tidak seragam. Biasanya, dalam usaha untuk menghasilkan sambungan yang sempurna dan selamat, bahagian di hujung batang buluh perlu diketam, dipotong atau digerudi, dan kadang-kadang diisi dengan tuangan konkrit yang akan dibiarkan mengeras. Proses ini memakan masa dan biasanya akan melemahkan bahagian batang buluh tersebut. Pada tahun 2020, FRIM mencipta sejenis alat penyambung, iaitu BambooNxtor yang dapat menyelesaikan isu di atas. Justeru, menjadikan sambungan batang-batang buluh lebih mudah berbanding sebelum ini. Hujung batang-batang buluh yang hendak disambung dimasukkan ke dalam BambooNxtor dan diketatkan menggunakan sepasang pengepit berbentuk V. Konsep 'kepit dan ketat' ini membolehkan bebanan disebar secara seragam di bahagian hujung batang buluh tersebut, sekaligus mengelakkan risiko buluh akan pecah, terkoyak, patah dan sebagainya. Proses mengaplikasi BambooNxtor dalam binaan buluh telah dijalankan sepanjang tahun 2021 dan 2022 yang melibatkan pembinaan 3 buah gazebo di pusat peranginan Tadom Hill, Banting dan di Taman Botani Kepong (KBG), FRIM. Menurut pekerja-pekerja binaan yang diupah untuk membina gazebo-gazebo tersebut, BambooNxtor jenis asas tapak sangat berkesan

BambooNxtor – A Versatile Bamboo Connector

Bamboo poles connection in building construction has always been a challenge due to the inconsistency of natural bamboo diametrical sizes and shapes. In the efforts to produce a perfect and secured connection, a portion at the pole ends are usually shaved, cut or drilled, and sometimes filled with concrete that will be left to harden. These processes are time consuming and will usually weaken the bamboo. In 2020, FRIM invented a connector named BambooNxtor to solve the above issues by eliminating the needs to further process the bamboo. Hence, making bamboo poles connection easier than ever. The ends of the bamboo poles to be connected are inserted into the BambooNxtor and tightened using a pair of V-shaped clamps. This 'clamp and tighten' concept allows the load to be distributed uniformly at the ends of the bamboo poles, thus avoiding the risk of the bamboo breaking, tearing, shearing and etc. The application of BambooNxtor in bamboo construction was carried out throughout 2021 and 2022, involving the building of 3 gazebos at the Tadom Hill resort, Banting and at the Kepong Botanic Garden (KBG), FRIM. According to the construction workers who were hired to build the gazebos, BambooNxtor footing connector is very effective in facilitating and speeding up



Prototaip BambooNxtor
BambooNxtor prototypes

di dalam memudahkan dan mempercepat proses menetapkan lokasi dan mendirikan tiang-tiang buluh pada permukaan lantai. Tiang-tiang buluh yang berdiri tegak dan tegap memudahkan pemasangan dan penyambungan lain-lain komponen gazebo seperti rasuk, penyangga, kekuda bumbung dan tunjuk langit. Lazimnya, sekiranya kaedah tuangan konkrit digunakan untuk mendirikan tiang, pekerja perlu menunggu sehingga 3 hari untuk memastikan konkrit kering sepenuhnya sebelum lain-lain komponen dapat dipasang. BambooNxtor telah ditambahbaik dari semasa ke semasa supaya ia dapat digunakan untuk lain-lain produk seperti kubah geodesik, tempat perlindungan bantuan bencana, kiosk jualan dan panel pameran. Ciptaan ini telah didaftarkan bagi tujuan pengiktirafan paten (MyIPO PI 2021002142, PCT_MY2022_050026).

the process of setting the location and erecting the bamboo poles on the floor surface. The upright and sturdy bamboo poles made it easier to install and connect other components of the gazebo such as beams, bracers, roof trusses and finial. If the concrete pouring method was used to erect the columns, workers will have to wait up to 3 days to ensure the concrete is completely dry before other components can be installed. BambooNxtor has been improved over time so that it can be used for other products such as geodesic domes, disaster relief shelters, sales kiosks and display panels. This invention is pending patent recognition (MyIPO PI 2021002142, PCT_MY2022_050026).



Pembinaan gazebo buluh di KBG
Bamboo gazebo construction at KBG



Gazebo buluh pentagon di Tadam Hill
Pentagon shape bamboo gazebo at Tadam Hill Resort



Lukisan konsep kubah geodesik yang menampilkan aplikasi BambooNxtor
Conceptual illustration of a geodesic dome featuring BambooNxtor application

Kajian Penilaian Ekonomi Berasaskan Pendekatan Kos di Hutan Simpanan Kekal (HSK) Negeri Kedah

Institut Penyelidikan Perhutanan Malaysia (FRIM) dengan kerjasama Bahagian Perancangan dan Ekonomi Hutan, Jabatan Perhutanan Semenanjung Malaysia dan Universiti Utara Malaysia (UUM) di bawah peruntukan pembangunan, Rancangan Malaysia Keduabelas (RMK12) telah menjalankan kajian Penilaian Ekonomi Berasaskan Kos di Hutan Simpanan Kekal (HSK) Negeri Kedah. Antara objektif kajian adalah untuk mengenal pasti kepentingan atau justifikasi keperluan hutan sebagai penyedia perkhidmatan pembekalan dan kawal selia di samping mengganggu nilai kos yang dikeluarkan agensi dan penyedia perkhidmatan akibat perubahan guna tanah di kawasan HSK Negeri Kedah.

Penilaian ekonomi berasaskan pendekatan kos ini merupakan salah satu kaedah penilaian yang mengambil kira kos-kos alam sekitar yang terlibat, disebabkan kerosakan atau kehilangan perkhidmatan ekosistem hutan. Keperluan untuk mendapatkan kos-kos ini adalah untuk mengkaji sebanyak mana kos yang perlu ditanggung oleh kerajaan untuk membaiki pulih kerosakan atau mengganti perkhidmatan ekosistem sedia ada bagi kestabilan dan kelestarian alam sekitar untuk kesejahteraan masyarakat.

An Economic Evaluation Study of Cost-Based Approach in the Permanent Reserved Forest (PRF) State of Kedah

Forest Research Institute Malaysia (FRIM) in collaboration with the Department of Forestry in Peninsular Malaysia and Universiti Utara Malaysia (UUM), under the development allocation of the Twelfth Malaysian Plan (RMK12), conducted a cost-based economic evaluation study in the Permanent Reserved Forest (PRF) in Kedah. Among the objectives of the study are to identify the importance or justification of the need for forest as a provider of supply and regulatory services, and to estimate the value of costs incurred by agencies and service providers due to land use changes in the PRF area of the State of Kedah.

Economic evaluation based on cost approach is one of the evaluation methods that takes into account the environmental costs involved, due to the damage or loss of forest ecosystem services. The need to obtain these costs is to study how much cost the government has to bear to repair damage or replace existing ecosystem services for the stability and sustainability of the environment for the well-being of the community.

Terdapat 4 skop yang dijalankan dalam kajian ini iaitu

- i. Nilai faedah ekonomi pemuliharaan HSK sebagai fungsi kawasan tadahan untuk sumber bekalan air pertanian dan industri.
- ii. Penilaian faedah ekonomi HSK untuk sumber bekalan air domestik.
- iii. Penilaian regim pengurusan kawasan usahahasil dengan mengambil kira kuantiti dan kualiti air sebagai indikator pengukur.
- iv. Nilai faedah ekonomi pemuliharaan HSK terpilih sebagai fungsi menghalang hakisan dan banjir (Penilaian Ekonomi Impak Kejadian Kepala Air di HS Gunung Jerai, Negeri Kedah).

Keputusan menunjukkan beberapa implimentasi dasar boleh disyorkan. Nilai yang diperoleh boleh dijadikan panduan kepada pihak pengurusan untuk membuat pilihan atau alternatif baharu bagi penggunaan perkhidmatan ekosistem alam sekitar HSK selaras dengan aspirasi negara iaitu 'Forest beyond Timbers'.

- i. Pelaksanaan untuk 'Pembayaran untuk Perkhidmatan Ekosistem Hutan (PFES)'.
- ii. Cadangan 1: Pihak pengurusan boleh menggunakan penemuan untuk pembiayaan pemuliharaan melalui faedah tadahan air HSK untuk pertanian dan domestik; RM 50.8 juta/tahun untuk kerajaan Negeri.
- iii. Cadangan 2: Pihak pengurusan boleh menambah baik pemantauan, penyelenggaraan pembinaan jalan di kawasan pengeluaran bagi memastikan sedimen minimum akan dipindahkan dan mengekalkan jarak penampakan berhampiran tebing curam. Pemantauan kualiti air boleh dilakukan dengan lebih sistematik dengan kajian tentang hubungan antara FCD dan kualiti air hasil daripada kajian ini.
- iv. Cadangan 3: Pihak berkenaan perlu mempercepatkan pemasangan EWS di Baling dan menambah lebih banyak sistem amaran di Jerai. Pihak berkenaan juga boleh menggunakan nilai min RM 33.54–37.35 sebagai panduan sekiranya mereka bercadang untuk mengenakan bayaran tertentu untuk pemasangan sistem EWS di kedua-dua kawasan.

“Kesimpulannya, HSK Kedah memainkan peranan penting untuk tadahan air untuk domestik, pengairan pertanian dan berfungsi sebagai pencegah hakisan dan banjir.”

There are 4 scopes carried out in this study, namely

- i. Economic benefit value of PRF conservation as a function of catchment area for agricultural and industrial water supply source.
- ii. Evaluation of the economic benefits of PRF for domestic water supply source.
- iii. Evaluation of the management regime of the business area by taking into account the quantity and quality of water as a measuring indicator.
- iv. The value of the economic benefits of selected PRF conservation as a function of preventing erosion and flooding (economic assessment of the impact of debris flow events at Gunung Jerai Forest Reserve, Kedah).

Results show that some policy implementation can be recommended. The values obtained can be used as a guide for the management to make new choices or alternatives for the use of PRF environmental ecosystem services in line with the national aspirations of 'Forest beyond Timbers'.

- i. Implementation of 'Payment for Forest Ecosystem Services (PFES)'.
- ii. Recommendation 1: The management can use the findings for conservation financing through the benefits of water catchments of PRF for agriculture and domestic; RM 50.8 million/year for the State government
- iii. Recommendation 2: The management can improve the monitoring, maintenance of the road constructions in the production area to ensure that minimal sediment will be transferred and maintain buffer distance near the steep bank. Water quality monitoring can be done more systematically with a study of the relationship between FCD and water quality resulting from this study.
- iv. Recommendation 3: The concerned party should speed up the installation of EWS in the Baling area and add more warning systems in the Jerai area. The concerned party can also use the mean value RM33.54 –37.35 as a guide if they intend to charge a certain amount for the installation of the EWS system in both areas.

“As a conclusion, the Kedah PRF plays an important role for water catchment for domestic, agriculture irrigation and function to prevent erosion and flood.”

Kajian ini juga secara saintifik telah mengukur status dan hubungan penutupan kanopi hutan oleh hutan yang dibalak dengan kualiti air. Perkaitan perubahan kualiti air semasa musim hujan diperlukan untuk melihat kesan rejim kualiti air dengan lebih mendalam. Konsep penilaian ekonomi yang dijalankan adalah untuk menyediakan anggaran kos kerosakan alam sekitar di HSK Kedah. Walaupun terdapat had dalam menetapkan kos sebenar dalam bentuk kewangan atau 'monetary' untuk kemerosotan alam sekitar, namun anggaran tersebut diharap dapat dijadikan panduan kepada pihak pengurusan untuk membuat pilihan atau alternatif baharu bagi penggunaan HSK.

This project also scientifically measured the status and relationship of forest canopy density by forest logged to water quality. Correlating changes in water quality during raining seasons is necessary to see the effects of water quality regime in more depth. The concept of the economic assessment that was carried out is to provide an estimate of the cost of environmental damage in the Kedah PRF. Although there are limitations in setting of the actual cost in financial form or 'monetary' for environmental degradation, it is hoped that the estimate can be used as a guide for the management to make new choices or alternatives for the use of PRF.



Lawatan pemantauan ke Hutan Simpan Gunung Jerai selepas fenomena kepala air, 11–13 Oktober 2021
Monitoring visit to Gunung Jerai Forest Reserve after water surge phenomenon, 11–13 October 2021



Lawatan ke kawasan pembinaan empangan SABO, Gunung Jerai, 21 Jun 2022
Visit to SABO dam construction area, Gunung Jerai, 21 June 2022



Lawatan pemantauan dan pengumpulan data hidrologi di Hutan Simpan Ulu Muda, 4–8 Julai 2022
Monitoring visit and hydrological data collection at Ulu Muda Forest Reserve, 4–8 July 2022



Survei komuniti dan awam/pelancong, 19–26 Julai 2022
Community survey and public/tourist survey, 19–26 September 2022

Penilaian Ekonomi Aset Semula Jadi ke Arah Perakaunan Hijau

Malaysia menduduki ranking ke 12 dunia sebagai negara yang mempunyai kepelbagaian mega biodiversiti dunia. Hutan hujan tropika Malaysia merupakan salah satu aset semula jadi yang menawarkan 22 perkhidmatan ekosistem yang diklasifikasikan kepada empat kategori utama iaitu pembekalan (makanan, air, bahan mentah, sumber genetik, sumber ubatan dan sumber bahan hiasan); pengawalan (rawatan sisa, kawalan hakisan, kawalan kualiti udara, kesuburan tanah kawalan iklim, kawalan aliran air, kawalan biologi, kawalan bencana alam dan pendebungaan); sokongan (habitat kepelbagaian spesies dan perlindungan kepelbagaian genetik); dan budaya (maklumat estetik, rekreasi/eko pelancongan, sumber inspirasi budaya, seni dan reka bentuk, maklumat pembangunan kognitif dan pengalaman kerohanian). Namun, peranan hutan ini sering diabaikan dalam pembuatan keputusan akibat daripada maklumat berkaitan nilai perkhidmatan ekosistem hutan yang sangat terhad dan tidak diselaraskan.

Sehubungan itu, Unit Perancang Ekonomi telah meluluskan satu kajian bagi menilai peranan hutan dari aspek ekonomi, sosial dan alam sekitar bagi menyokong hasrat membangunkan sistem perakaunan hijau negara. Kajian ini bertujuan untuk menilai hutan melangkaui balak (forest beyond timber) dengan mengambil kira penilaian stok hutan, kebergantungan komuniti dan aktiviti ekonomi hiliran yang terlibat di Hutan Simpan Kekal Ulu Muda, Kedah. Nilai ekonomi perkhidmatan ekosistem hutan yang diperoleh ini digabungkan dengan nilai-nilai ekonomi perkhidmatan ekosistem hutan yang telah dijalankan di hutan-hutan lain di Malaysia di dalam satu pangkalan data yang dinamakan MyTEV. MyTEV akan dipaparkan di laman sesawang sebagai sumber rujukan berpusat mengenai nilai ekonomi perkhidmatan ekosistem hutan di Malaysia. Maklumat ini boleh diakses dan digunakan oleh pihak pembuat keputusan dalam menilai kepentingan hutan terhadap ekonomi, sosial dan alam sekitar. Maklumat ini juga boleh digunakan sebagai asas integrasi sistem perakaunan hijau negara.

Bagi memastikan pandangan semua pihak diambil kira, sebanyak enam (6) sesi perbincangan kumpulan fokus (FGD) telah dilaksanakan bersama pemegang taruh termasuk jabatan perhutanan, agensi-agensi yang berkaitan, wakil industri, wakil komuniti dan pertubuhan bukan kerajaan (NGO). Pelbagai pendekatan kajian telah dilaksanakan merangkumi penilaian inventori bagi 17 perkhidmatan ekosistem hutan; survei eksploratori yang dijalankan mengenal

Economic Valuation of Natural Capital towards Green Accounting

Malaysia is ranked 12th of the megadiverse countries in the world. Malaysias tropical rainforests are one of the natural assets that offer 22 ecosystem services that are classified into four main categories which are supply (food, water, raw materials, genetic resources, medicinal resources and decorative material resources); control (waste treatment, erosion control, air quality control, soil fertility, climate control, water flow control, biological control, natural disaster control and pollination); support (species diversity habitat and protection of genetic diversity); and culture (aesthetic information, recreation/ecotourism, cultural inspiration, art and design, cognitive development information and spiritual experiences). However, the roles of these forests are often neglected in decision-making due to very limited and uncoordinated information related to the value of these forest ecosystem services.

Therefore, the Economic Planning Unit has approved a study to assess the roles of forests from economic, social and environmental aspects to support the country's inspiration to develop green accounting system. This study aims to assess forest beyond timber by taking into account forest stock assessment, community dependency and downstream economic activities which involved Ulu Muda Permanent Forest Reserve, Kedah. The economic value of forest ecosystem services obtained is combined with the economic values of forest ecosystem services that have been carried out in other forests in Malaysia, in a database called MyTEV. MyTEV will be displayed on a website as a centralised reference source for the economic value of forest ecosystem services in Malaysia. This information can be accessed and used by decision makers in assessing the importance of forests to the economy, society and the environment. This information can also be used as a basis for the integration of the country's green accounting system.

To ensure that the views of all parties are taken into account, a total of six (6) focus group discussion (FGD) sessions were held with stakeholders including the forestry department, relevant agencies, industry representatives, community representatives and non-governmental organisations (NGOs). Various research approaches were implemented including inventory assessment of 17 forest ecosystem services; an exploratory survey carried out identified 2,810 economic entities within a radius of 15 km from the forest; and a face-to-

pasti 2,810 entiti ekonomi yang berada di dalam radius jarak 15 km dari hutan; dan survei bersemuka melibatkan 1,697 ketua isi rumah di 32 kampung berhampiran hutan.

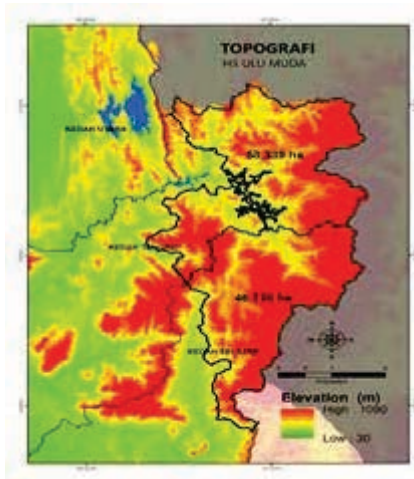
Antara aktiviti berkaitan HSUM adalah pertanian iaitu penanaman padi dan getah, perikanan, produk hutan bukan kayu seperti rotan, buluh, madu, kraftangan dan tumbuhan ubatan. Masyarakat sekitar juga berminat untuk melibatkan diri dalam pengurusan hutan seperti ekopelancongan dan penggunaan sumber hutan. Nilai pendapatan keseluruhan daripada sumber hutan dan aktiviti ekopelancongan HSUM adalah 9% (RM188) daripada keseluruhan purata pendapatan isi rumah yang berjumlah RM2,392. Sebanyak 2,810 aktiviti ekonomi di sekitar HSUM telah berjaya dikenal pasti dan 203 daripadanya terlibat secara langsung dalam menggunakan perkhidmatan ekosistem daripada HSUM seperti air, balak, produk hutan bukan kayu, ikan dan ekopelancongan yang menghasilkan RM17 juta nilai rantai industri hiliran daripada HSUM.

Di samping itu, hasil semasa ialah jemputan daripada Jabatan Perakaunan Negara untuk berkongsi tatacara pelaksanaan dan berkongsi elemen perkhidmatan ekosistem hutan yang boleh dinilai untuk dimasukkan ke dalam sistem perakaunan negara. Hubungan dan kerjasama strategik dengan sembilan agensi/jabatan termasuk satu agensi antarabangsa (The French Agricultural Research Centre for International Development - CIRAD) dapat diperkukuhkan melalui kajian ini. Selain itu, sebanyak 34 orang graduan yang baru tamat pengajian telah dilatih dan terlibat dengan kajian ini. Kajian ini menunjukkan keperluan menghargai sumbangan perkhidmatan ekosistem agar dapat diambil kira dalam perancangan dasar dan pembuatan keputusan dengan menunjukkan nilai dan kepentingannya kepada kesejahteraan masyarakat dan perkembangan ekonomi negara.

face survey involving 1,697 heads of households in 32 villages near the forest.

The main socio-economic activities for adjacent populations in the protected areas were agriculture (paddy fields and rubber plantations) and other related activities such as fishing, non-timber forest products such as collecting rattan, bamboo, honey, handcrafting, and medicinal plant collection. The households responded positively on conservation purposes, and there was an increasing demand for locals to participate in forest management including ecotourism and utilization of forest resources. The total income derived from the forest resources and ecotourism activities related to the UMFR complex is about 9% (RM188) out of an average of RM2,392 monthly household income. A total of 2,810 economic activities were identified in the vicinity of UMFR; 203 of these activities rely on the forest ecosystem services, which include fish, timber, water, and non-timber forest products. These activities provide approximately RM17 million in value chain revenue for UMFR.

Among the current outcomes of this study are the invitation by the National Accounting Department to share the implementation procedures and elements of forest ecosystem services that can be assessed to be included in the national accounting system. Relationships and strategic collaboration with nine agencies/departments including one international agency (The French Agricultural Research Center for International Development - CIRAD) was forged and strengthened through this study. In addition, a total of 34 new graduates were trained and involved in this study. This study shows the need to appreciate the contribution of ecosystem services so that they can be taken into account in policy planning and decision-making by showing their value and importance to the well-being of the community and the economic development of the country.



Peta topologi kawasan kajian
Topology map of the study site



Perbincangan kumpulan fokus bersama komuniti setempat
Focus group discussion with the local communities



Penganjuran seminar secara hybrid bagi berkongsi dapatan kajian
Conference organized via hybrid for sharing the research findings

FRIM Rancakkan Kempen Kitar Semula

Walaupun masyarakat dunia sedang mengalami kemajuan pesat, penjagaan kelestarian alam sekitar adalah penting demi keseimbangan dan kesejahteraan bersama. Oleh itu, FRIM telah mengambil tanggungjawab dengan mengurangkan penggunaan plastik sekali guna di peringkat institut bagi menjamin persekitaran yang lebih mampan dan lestari. Dalam usaha meningkatkan kesedaran, pelbagai aktiviti sejajar dengan prinsip 3R – kurangkan, guna semula, kitar semula – telah dilaksanakan dalam kempen ini. FRIM membuat agihan bekas makanan (bekas bento) kepada warga kerja FRIM, Bahagian Latihan Perhutanan (BLP), SK Kepong dan Kelas Al-Quran dan Fardu Ain (KAFA) untuk kemudahan membawa bekal makanan tanpa menggunakan pembungkusan plastik sekali guna di kafe atau kedai makan.

Meskipun terdapat cabaran dalam mewujudkan kesedaran tentang penggunaan plastik sekali guna, FRIM turut berusaha untuk memupuk budaya membawa beg sendiri untuk membeli-belah di kalangan komuniti FRIM. Sehubungan itu, Perkumpulan Wanita FRIM (PWFRIM) telah mengambil inisiatif untuk mengedarkan beg non-woven kepada lebih 400 orang ahli PWFRIM yang disumbangkan oleh Norazian Adam, Pengerusi PWFRIM. Harapannya ialah cenderahati tersebut dapat menyemai kesedaran alam sekitar kepada penggunanya. Dengan langkah-langkah ini, diharap para pengguna dapat mengubah sikap dan memilih kaedah pembungkusan yang boleh diguna semula serta menolak penggunaan plastik sekali guna.

FRIM turut melaksanakan kempen kitar semula e-waste dengan menempatkan tong kitar semula di bangunan Kelab FRIM dan bangunan Pentadbiran FRIM. Barangan yang dikumpulkan kemudiannya dikutip oleh agensi/syarikat yang bertanggungjawab dalam pengurusan kitar semula iaitu syarikat T-Pot Electrical dan Electronic pada Ogos 2022 dan Majlis Perbandaran Selayang (MPS) pada Februari 2023. Pertandingan Pengumpulan Barangan Terpakai dengan kerjasama SWCorp Malaysia sempena sambutan bulan kebangsaan peringkat FRIM tahun 2022 berjaya mengumpulkan sebanyak 4,000 kg barangan terpakai dan lusuh selain daripada kotak, kertas, botol plastik, perkakasan elektrik dan lain-lain.

Pada Jun 2023, FRIM telah mengadakan Pertandingan Kitar Semula Fabrik dengan kerjasama Syarikat Kloth Circularity dan Life Line

FRIM Boosts the Recycling Campaign

In the midst of global development, it is important to maintain environmental balance and sustainability for collective well-being. Therefore, FRIM has taken the responsibility to reduce single-use plastic consumption at institution level to ensure a more sustainable environment. In an effort to raise awareness, various activities aligned with the 3R principles (reduce, reuse, recycle) have been implemented in this campaign. FRIM distributed food containers (bento boxes) to FRIM staff, Forestry Training Division (BLP), SK Kepong, and Kelas Al-Quran dan Fardu Ain (KAFA), to promote the convenience of take-away food without using single-use plastic packaging in cafes or eateries.

Despite challenges in creating awareness about single-use plastic, FRIM continues to strive in cultivating a culture of bringing reusable bags for shopping within the FRIM community. In line with this, FRIM Women's Association (PWFRIM) has also taken the initiative to distribute non-woven bags to over 400 PWFRIM members, donated by Norazian Adam, the Chairperson of PWFRIM. It is hoped that these gifts will sow environmental awareness among users, encouraging them to choose reusable food packaging while rejecting single-use plastic.

FRIM also conducted an e-waste recycling campaign by placing recycling bins in the FRIM's Club building and the FRIM Administration building. The collected items are then picked up by responsible recycling management agencies/companies, T-Pot Electrical and Electronic in August 2022 and Selayang Municipal Council in February 2023. In conjunction with FRIM's celebration of the national month in 2022 and with collaboration from SWCorp Malaysia, the Used Goods Collection Competition had successfully collected 4,000 kg of used and worn-out items besides boxes, paper, plastic bottles, electrical appliances and others.

In June 2023, FRIM organised a Fabric Recycling Competition in collaboration with Kloth Circularity Company and Life Line Clothing Malaysia. The encouraging response from FRIM's staff resulted in the collection of 3,000 kg of fabric. Recycling used clothing and textiles is the most effective way to prevent pollution and the production of new clothing. As a recognition of this initiative, FRIM was awarded with the Certificate of Environmental Impact by Kloth Circularity Company and Life Line Clothing Malaysia.

Clothing Malaysia. Sambutan yang baik daripada warga kerja FRIM berjaya mengumpul sebanyak 3,000 kg fabrik. Langkah mengitar semula pakaian dan tekstil adalah cara paling berkesan untuk mengelakkan pencemaran serta pengeluaran pakaian baharu. Atas inisiatif pengumpulan fabrik terpakai ini, FRIM telah dianugerahkan Certificate of Environmental Impact daripada syarikat Kloth Circularity dan Life Line Clothing Malaysia.

Kempen kitar semula dan pengurangan penggunaan plastik sekali guna di FRIM ini merupakan sebahagian daripada aktiviti Projek Kajian Kesedaran dan Amalan Pemegang Taruh Kampus FRIM, Kepong Terhadap Penggunaan Plastik dan Kitar Semula sepanjang tempoh 2022–2023. Projek ini merupakan cetusan idea Ketua Pengarah FRIM untuk menerapkan nilai dan budaya kitar semula serta mengurangkan penggunaan plastik sekali guna dalam kampus FRIM. Ketua Pengarah menegaskan bahawa perancangan dan pelaksanaan ke arah sifar plastik sekali guna harus dilaksanakan dengan lebih cekap dan berkesan agar dapat meningkatkan kesedaran di kalangan warga FRIM dengan efektif. Kerjasama daripada semua warga kerja, komuniti dalaman, pelawat dan orang awam penting untuk menambahbaik pengurusan sisa dan mencapai objektif kitar semula. Usaha ini adalah selaras dengan hasrat Menteri Sumber Asli dan Kelestarian Alam yang berikut:

The recycling and reduction of single-use plastic initiatives at FRIM are part of the project on Study on Awareness and Practices by FRIM Campus Stakeholders, Kepong Towards the Use of Plastic and Recycling throughout the period of 2022–2023. This project was inspired by Director General of FRIM to instil recycling values and culture while reducing single-use plastic in FRIM campus. The Director General emphasises that planning towards zero single-use plastic and implementation of related activities must be carried out more efficiently and effectively to enhance awareness in FRIM. Cooperation from all FRIM staff, communities within FRIM, visitors and the public are essential to improve waste management and achieve recycling goals. This effort is in line with the aspiration of the Minister of Natural Resources and Environmental Sustainability, as follows:



Aktiviti kitar semula oleh warga FRIM
Recycling activities by FRIM staff



Pelajar sekolah dibekalkan dengan bekas makanan semasa kempen
Food container was distributed to school pupil during the campaign

“Penggunaan plastik sekali guna akan dihapus cara berperingkat” - Nik Nazmi

Bernama
6 Oktober 2023

“The use of single-use plastic will be phased out gradually” - Nik Nazmi

Bernama
6 October 2023

PENGURUSAN R&D

Laporan pengurusan penyelidikan dan pembangunan (R&D) untuk tahun 2023 memperlihatkan perolehan peruntukan dana dengan jumlah keseluruhan RM RM21,116,306.00 untuk pelbagai projek yang disokong oleh agensi pemberi dana yang berbeza. Majoriti pendanaan projek penyelidikan FRIM disokong oleh Kerajaan Malaysia melalui pembiayaan RMK-12 (Kementerian Ekonomi), dengan jumlah keseluruhan 12 projek berjumlah RM 19,259,900. Selain itu, kerjasama dengan organisasi antarabangsa, entiti swasta, dan agensi negeri menunjukkan pendekatan yang berbeza dalam inisiatif pendanaan penyelidikan kepada FRIM. Impak daripada penerimaan dana ini membolehkan saintis-saintis FRIM menjalankan usaha yang menyeluruh dalam meningkatkan pengetahuan saintifik sejagat dan menangani cabaran sosioekonomi melalui penyelidikan dan inovasi yang bermutu agar memberi kesan kepada landskap R&D Malaysia terutama yang berkaitan Sains Perhutanan Tropika.

MANAGEMENT OF R&D

The research and development (R&D) management report for the year 2023 illustrates the acquisition of funding amounting to a total of RM21,116,306.00 for various projects supported by different funding agencies. Most of the funding for FRIM research projects is provided by the Malaysian government through RMK-12 financing (Ministry of Economy), with a total of 12 projects amounting to RM19,259,900. Additionally, collaborations with international organizations, private entities, and state agencies indicate diverse approaches in funding initiatives for FRIM research. The impact of this funding acquisition enables FRIM scientists to undertake comprehensive efforts in advancing global scientific knowledge and addressing socio-economic challenges through high-quality research and innovation, thus influencing the landscape of R&D in Malaysia, particularly in the field of Tropical Forestry Science.

BILANGAN PROJEK LULUS MENGIKUT DANA NUMBER OF APPROVED PROJECTS BY FUNDING AGENCIES		
Penaja/Funding agency	Bil/No	Jumlah/Total (RM)
Antarabangsa/International	1	150,000.00
RMK-12 (EPU)	12	19,259,900.00
MyIS (MOSTI)	1	300,000.00
HRGS (MAFS)	2	420,000.00
Persekutuan/Federal	2	260,406.00
Swasta/Private	2	370,000.00
Negeri/State	1	15,000.00
JTRD (KeTSA)	2	50,000.00
RPP (FRIM)	6	234,500.00
JUMLAH BESAR/GRAND TOTAL	29	21,059,806.00

Nota/Notes:

RMK-12/Twelfth Malaysia Plan

PIKM: Tabung Pembangunan Industri Kayu-Kayan Malaysia/Malaysia Timber Industry Development Fund

A-PHSB: Amanah Projek Pengurusan Hutan Secara Berkekalan/Trust Account sustainable Forest Management Project Forestry Department Malaysia

HRGS: Skim Geran Penyelidikan Herba Bernilai Tinggi/High-Value Herbal Research Grant Scheme

PPRN2.0: Public-Private Research Network 2.0

RPP: Geran Penyelidikan, Pra-Komersialisasi dan Penerbitan (Geran Dalaman)/ Research, Pre-Commercialisation & Publication Grant (Internal Fund)

MyIS: Inisiatif Inovasi Malaysia (MyIS Komuniti)/ Malaysia Innovation Fund (MyIS Community)

Senarai projek yang diluluskan/List of approved project

Bil No	Geran Grant	Tajuk projek Project Title	Tarikh Lulus Date Approved	Jumlah peruntukan diluluskan Total fund approved (RM)
1	RMK-12	Pengukuhan Sistem Pengurusan Hutan Melalui Peningkatan Integriti Ekosistem Hutan	7/12/2021	1,370,200.00
2	RMK-12	Pemeriksaan Bank Germplasma Ke Arah Penghasilan Bahan Tanaman Berkualiti Dan Berakreditasi Untuk Menyokong Industri Perhutanan Dan Herba Negara (Fasa 2)	7/12/2021	2,187,000.00
3	RMK-12	Dokumentasi Dan Konservasi Biodiversiti Demi Kesejahteraan Hutan Dan Kemampunan Sumber Semulajadi (Fasa 2)	7/12/2021	2,187,000.00
4	RMK-12	Pemantapan Teknologi Dan Peningkatan Nilai Kebolehpasaran Produk Yang Menyokong Komersialisasi Ke Arah Peningkatan Ekonomi.	7/12/2021	1,934,200.00
5	RMK-12	Memacu Lonjakan Pertumbuhan Industri Perabot Hijau Negara Untuk Pasaran Domestik Dan Antarabangsa Melalui Penyelidikan, Teknologi Dan Pensijilan Produk	7/12/2021	3,431,100.00
6	RMK-12	Pemanfaatan Inovasi Melalui Pemeriksaan R&D Dan Teknologi Lestari Terkini Ke Arah Memenuhi Keperluan Pasaran Industri Perakayuan Negara Bagi Melonjakkan Impak Rd&C Kepada Ekonomi Kitaran	7/12/2021	2,624,400.00
7	RMK-12	Penerokaan Potensi Dan Pembangunan Entiti Bernilai Ekonomi Daripada Hasil Semula Jadi Ke Arah Memakmur Sektor Bioekonomi Dan Kemampunan Produktiviti Biodiversiti Negara	7/12/2021	1,603,800.00
8	RMK-12	Pemeriksaan Pemuliharaan Dan Perlindungan FRIM Selangor Forest Park Unesco World Heritage Site Serta Pengukuhan Jaringan Kerjasama Antarabangsa (Fasa 2)	7/12/2021	1,263,600.00
9	RMK-12	Penilaian Kawasan Hutan Bandar Dan Hutan Rekreasi Untuk Pengurusan Bersepadu Ke Arah Kesejahteraan Masyarakat	7/12/2021	1,247,000.00
10	RMK-12	Pemeriksaan Industri Ekopelancongan Daerah Hulu Perak Menerusi Pembangunan Pusat Pemuliharaan Dan Interpretif Rafflesia (Ppir) Bagi Merencanakan Pertumbuhan Bioekonomi Ncer (Fasa 2)	7/12/2021	437,400.00

Bil No	Geran Grant	Tajuk projek Project Title	Tarikh Lulus Date Approved	Jumlah peruntukan diluluskan Total fund approved (RM)
11	RMK-12	Kajian Keberkesanan Penyebaran Maklumat Mengenai Biodiversiti	7/12/2021	818,400.00
12	RMK-12	Pembangunan Direktori Kawasan Penting Biodiversiti (Key Biodiversity Area-KBA) Di Negeri Perak (Fasa 1)	7/12/2021	388,800.00
13	RPP	Soil and Vegetation Assesement in FRIM Pasoh Research Station for East Asia Acid Deposition Network (EANET) Report	01/01/2023	32,200.00
14	Antarabangsa/ International (University of Sunshine Coast)	Building an Effective Forest Health and Biosecurity Network on Southeast Asia	01/01/2023	150,000.00
15	Swasta/ Private (Yayasan Kemanusiaan Muslim Aid Malaysia)	Water for Life Phase 4 di Hutan Paya Gambut, Hutan simpan Ayer Hitam Utara, Muar Johor.	01/04/2023	145,000.00
16	HRGS	Pembangunan Satu Monograf Farmakopia (MHP)	01/08/2023	60,000.00
17	Swasta/ Private (Senheng Electrical KL Sdn Bhd)	Genetic Conservation Of Peninsular Malaysia Fireflies	01/09/2023	225,000.00
18	MyIS	Pengeluaran Bahan Tanaman Kacip Fatimah Elit FaFa01 Bagi Kelestarian Bahan Mentah Industri Herba Negara	01/09/2023	300,000.00
19	HRGS	Memperkasa Industri Herba Berasaskan Tongkat Ali Ke Arah Peningkatan Kualiti Melalui RD&I Di HICD Chegar Perah, Pahang	01/11/2023	360,000.00
20	JTRD	Status of Mangrove in Malaysia	01/09/2023	20,000.00
21	JTRD	Kajian Pemantauan dan Penyelenggaraan Penanaman Spesies Bakau di Kawasan Berisiko Menggunakan Struktur Pemecah Ombak Kos Efektif	01/09/2023	30,000.00
22	RPP	Experimental 10-year-old Eucalyptus Hybrid Timber with Various Diameter Classes for Kiln Drying Process Optimisation	1/11/2023	30,000.00
23	RPP	Improvement Program of Batai (Paraserianthes falcataria) Through Selection Of Plus Trees And The Establishment Of Seed Production Area (SPA)	1/11/2023	30,000.00

Bil No	Geran Grant	Tajuk projek Project Title	Tarikh Lulus Date Approved	Jumlah peruntukan diluluskan Total fund approved (RM)
24	RPP	Quality Assessment of <i>Labisia pumila</i> (Blume) Derived Products in the Malaysian Herbal Market	1/11/2023	27,300.00
25	RPP	Economic Value of FRIM's R&D	1/11/2023	100,000.00
26	RPP	Enhancing 3D Printing Filament Performance: Investigating the Potential of Nanocellulose	1/11/2023	15,000.00
27	Negeri/ State	Kajian Penilaian Kawasan Berisiko di Lubuk Yu, Maran Melalui Analisis Imej Satelit dan Tinjauan Lapangan	1/01/2024	15,000.00
28	Persekutuan/ Federal	Program Penanaman Pokok Makanan Gajah & Restorasi Hutan Di Koridor CFS:PL2 Hutan Simpan Panti-Hutan Simpan Ulu Sedili, Johor	1/10/2023	220,000.00
29	Persekutuan/ Federal	Malaysian Priority Herbs: LCMS Profiles and Establishment of Validated HPLC Methods of Chemical Markers of <i>Ficus deltoidea</i> and <i>Andrographis paniculata</i>	1/11/2023	40,406.00
Jumlah besar/ Grand total				21,059,806.00

KERJASAMA PENYELIDIKAN

RESEARCH COLLABORATIONS



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RESEARCH REPORT

KERJASAMA PENYELIDIKAN RESEARCH COLLABORATIONS

Pada tahun 2023, terdapat 27 projek kerjasama penyelidikan yang aktif dengan pecahan sebanyak 23 memorandum persefahaman (MoU) dan empat adalah perjanjian. Bilangan projek aktif ini merangkumi 9 agensi atau rakan kerjasama dari luar negara manakala selebihnya (18) merupakan agensi atau rakan kerjasama tempatan.

In year 2023, there are 27 active research collaboration projects which included 23 memorandums of understanding (MoUs) and four agreements. The active projects represented 9 international agencies or collaborators, while the remaining 18 are from local agencies or collaborators.



Mesyuarat Anggota Institut juga telah meluluskan satu kerjasama penyelidikan baharu untuk dimeterai bersama agensi luar iaitu MoU antara FRIM dengan Lembaga Perbadanan Labuan. Selain itu, terdapat juga dua memorandum persefahaman (MoU) termasuklah dengan Japan International Research Center for Agricultural Sciences (JIRCAS) dan Universiti Kebangsaan Malaysia (UKM) serta satu perjanjian iaitu dengan East Coast Economic Region Development Council (ECERDC) telah diperbaharui, termasuklah. Penyambungan ini bagi meneruskan aktiviti-aktiviti yang telah dirancang dan disambut baik oleh FRIM kerana dapat memberikan kesan positif dan impak jangka panjang bagi kedua-dua pihak.

Members of the Institute have approved one research collaboration (MoU) between FRIM with external agencies i.e. Board of Labuan Corporation. In addition, FRIM also extended two MoUs with Japan International Research Center for Agricultural Sciences (JIRCAS) and Universiti Kebangsaan Malaysia (UKM) as well as one agreement with East Coast Economic Region Development Council (ECERDC). The continuation of the collaboration is most accepted by FRIM in order to conduct the planned activities, which were shown to give positive and long-term impacts to both parties.

Senarai kerjasama penyelidikan baharu/ List of new research collaboration:

Bil No	Rakan Kerjasama Collaborators	Bidang Kerjasama Field of Collaboration	Jenis Kerjasama Type of Collaboration	Pegawai Bertanggungjawab Officer In-Charge	Tarikh Meterai Signing Date
1	Perbadanan Labuan	Pengurusan Hutan Bandar Dan Hutan Paya Laut Di Wilayah Persekutuan Labuan Urban and Peat Swamp Forest Management Program at Federal Territory of Labuan	MoU	Ahmad Azaruddin Mohd Noor	26/9/2023

Senarai projek kerjasama penyelidikan yang disambung/ List of extended research collaborations:

Bil No	Rakan Kerjasama Collaborators	Bidang Kerjasama Field of Collaboration	Jenis Kerjasama Type of Collaboration	Pegawai Bertanggungjawab Officer In-Charge	Tarikh Meterai Signing Date
1	Japan International Research Center for Agricultural Sciences (JIRCAS)	Penyelidikan Pengurusan Hutan Mampan Menggunakan Teknologi Bernilai Tambah Research Related to Sustainable Forest Management Using Value-Added Technologies	MoU	Dr Wan Mohd Shukri Wan Ahmad	1/4/2021 – 31/3/2026
2	Universiti Kebangsaan Malaysia (UKM)	Kajian Perundangan UKM-FRIM sebagai Tapak Warisan Dunia UNESCO UKM-FRIM Legal Research as a UNESCO World Heritage Site	MoU	Universiti Kebangsaan Malaysia (UKM)	1/10/2022 – 30/9/2025
3	East Coast Economic Region Development (ECERDC)	Projek Konservasi Tumbuhan Teratai Secara Lestari di Tasik Chini bagi Kesenambungan Rizab Bisfera Alam di Malaysia Lotus Plant Conservation Project in Tasik Chini for the Continuity of Natural Biosphere Reserves in Malaysia	Perjanjian/ Agreement	Dr Marryanna Lion	3/3/2023 – 2/3/2024

MoU dengan Lembaga Perbadanan Labuan

FRIM telah memeterai memorandum persefahaman (MoU) bersama Lembaga Perbadanan Labuan pada 26 September 2023 bagi melaksanakan kerjasama dalam pengurusan hutan bandar serta hutan paya laut di Wilayah Persekutuan Labuan dengan FRIM memberikan khidmat kepakaran teknikal dalam aspek pengurusan hutan bandar dan arborikultur.

Lembaga Perbadanan Labuan juga akan dapat mendapat manfaat dalam kerjasama ini untuk aspek pemuliharaan kawasan hutan paya lau yang berpotensi untuk dijadikan kawasan ekopelancongan. Selain itu, Lembaga Perbadanan Labuan berupaya untuk menambah baik aspek pengurusan dan penyelenggaraan Taman Botani yang tertua di Malaysia yang terdapat di Labuan iaitu Taman Botani Labuan.

MoU with Board of Labuan Corporation

FRIM has signed a memorandum of understanding (MoU) with Board of Labuan Corporation on 26 September 2023 to implement cooperation in the management of urban forests and peat swamp forests in the Federal Territory of Labuan with FRIM providing technical expertise in aspects of urban forest management and arboriculture.

Board of Labuan Corporation will get benefit from this collaboration for the conservation aspect of the swamp forest area that has the potential to be used as an ecotourism area. Beside, Board of Labuan Corporation also strives to increase the management and maintenance aspects of the oldest Botanical Garden in Malaysia which located in Labuan.



Majlis Menandatangani MoU antara FRIM dan Lembaga Perbadanan Labuan
MoU signing ceremony between FRIM and Board of Labuan Corporation

Pada tahun 2023 juga, sebanyak empat projek kerjasama penyelidikan (MoU) telah tamat tempoh pelaksanaannya. Beberapa projek kerjasama penyelidikan ini menunjukkan prestasi baik sepanjang pelaksanaan dan memberikan impak tinggi terhadap FRIM.

A total of four research collaboration projects (MoU) were completed in 2023. Few research collaboration projects showed a very good performance and contributed a high impact on FRIM.

Projek kerjasama yang tamat pada 2023 ialah:

1. Penang Botanic Garden
2. Guangxi University of Chinese Medicine (GXUCM)/ Guangxi Hebabiz Pharmaceutical Technology Co. Ltd (HBB)
3. Malaysian Nature Society (MNS)
4. Jabatan Hutan Sarawak (JHS)

MoU dengan Penang Botanic Garden (PBG)

Kerjasama MoU dengan Penang Botanic Garden (PBG) telah dimeterai pada 21 Julai 2020 bagi tempoh selama tiga tahun bertujuan untuk memperkasa, mempromosi dan mengembangkan kerjasama dalam bidang penyelidikan pemuliharaan tumbuhan secara ex-situ, pengurusan taman dan hortikultur bagi faedah bersama.

Sepanjang tempoh kerjasama ini, FRIM telah menerima 406 spesimen tumbuhan daripada PBG untuk simpanan dan rujukan di Herbarium KEP, FRIM.

Collaboration projects completed in 2023 were:

1. Penang Botanic Garden
2. Guangxi University of Chinese Medicine (GXUCM)/Guangxi Hebabiz Pharmaceutical Technology Co. Ltd (HBB)
3. Malaysian Nature Society (MNS)
4. Jabatan Hutan Sarawak (JHS)

MoU with Penang Botanic Garden (PBG)

MoU with Penang Botanic Garden was signed on 21 July 2020 for three years to empower, promote, and develop cooperation in the field of ex-situ plant conservation research, garden management and horticulture for mutual benefit.

During this collaboration period, FRIM has received 406 plant specimens from PBG for collection and reference at the HEP Herbarium, FRIM.



INOVASI, KOMERSIALISASI DAN PEMINDAHAN TEKNOLOGI

INNOVATION, COMMERCIALISATION AND
TECHNOLOGY TRANSFER

Costus woodsonii

AROBAN NADHAN

A B M B A S A R P

AKTIVITI INOVASI, KOMERSIALISASI DAN PEMINDAHAN TEKNOLOGI

INNOVATION, COMMERCIALISATION AND TECHNOLOGY TRANSFER ACTIVITIES

Selaras dengan Akta FRIM yang telah berkuatkuasa pada 2016, FRIM telah menambahbaik konsep strategi dan struktur komersialisasi yang digunakan. Bahagian Inovasi dan Komersialisasi kini lebih bersifat Technology Transfer Office (TTO) untuk membantu aspek komersialisasi dengan lebih terperinci dan mengadaptasi struktur tersebut mengikut model yang bersesuaian.

“Tidak hanya tertumpu kepada kajian saintifik, FRIM juga menawarkan perkhidmatan teknikal, khidmat kepakaran dan pensijilan produk.”

FRIM terus mengenal pasti teknologi baharu dan boleh diperbaharui yang boleh diaplikasi serta dikomersialkan bagi memenuhi permintaan pasaran sekaligus meningkatkan jumlah pendapatan, mencipta kemahiran baharu serta menawarkan penyampaian perkhidmatan awam yang lebih cekap dan berkesan. Fokus penyelidikan FRIM menjurus kepada pembangunan dan pengaplikasian teknologi dalam pelbagai bidang akan diutamakan bagi lonjakan kemajuan negara seterusnya. Bagi melaksanakan tujuan ini, penekanan kepada kaedah teknologi mapping dan penentuan maklumat ketersediaan rantaian proses dan nilai pakej teknologi yang dirujuk sebagai S.I.P.O.C (Source, Input, Process, Output and Customer) telah dilaksanakan bagi mewujudkan produk berinovasi yang menyokong industri dan pembangunan setempat.

In line with the FRIM Act that came into effect in 2016, FRIM has improved the strategic concept and commercialization structure being utilized. The Innovation and Commercialization Division now operates more like a Technology Transfer Office (TTO) to provide detailed assistance in commercialization aspects and adjust its structure to a suitable model.

“FRIM not only focuses on scientific research but also provides technical services, expertise, and product certification.”

FRIM continues to identify new and renewable technologies that can be applied and commercialized to meet market demand while increasing revenue, creating new skills and offering more efficient and effective public service delivery. FRIM's research focus is on the development and use of technology in various fields to prioritize the advancement of the country. To achieve this goal, emphasis has been placed on utilizing technology mapping methods and determining information availability of the process chain and value package technology referred to as S.I.P.O.C (Source, Input, Process, Output, and Customer) to create innovative products that support local industry and development.

HARI INOVASI FRIM 2023

Majlis Perasmian dan Penyampaian Anugerah Hari Inovasi FRIM 2023 (HIF 2023) telah diadakan di bangunan FRIM-MTDC Technology Centre (FMTC). Lebih 400 pengunjung yang terdiri daripada warga FRIM, syarikat swasta dan pegawai MTDC telah menghadiri HIF23. HIF edisi tahun 2023 dijalankan dengan kolaborasi bersama Malaysian Technology Development Corporation (MTDC) selaku rakan kerjasama strategik FRIM. Majlis telah dirasmikan oleh YBrs Dr Ismail Haji Parlan, Ketua Pengarah Institut Penyelidikan Perhutanan Malaysia (FRIM). HIF23 mengiktiraf serta memberi penghargaan kepada kejayaan warga FRIM memartabatkan penyelidikan dalam bidang perhutanan tropika ke peringkat kebangsaan mahupun antarabangsa. Pengiktirafan ini memberi galakan dan sokongan berterusan agar keberhasilan penyelidikan dapat diaplikasi dan dimanfaatkan oleh seluruh rakyat Malaysia amnya.

FRIM INNOVATION DAY 2023

The Opening Ceremony and Award Presentation of the FRIM Innovation Day 2023 (HIF 2023) took place in the FRIM-MTDC Technology Centre (FMTC) building. More than 400 attendees, including FRIM residents, private company representatives, and MTDC officials, participated in HIF23. The 2023 HIF edition is being carried out in collaboration with the Malaysian Technology Development Corporation (MTDC) as a strategic partner of FRIM. The event was inaugurated by YBrs Dr Ismail Haji Parlan, Director General of the Forest Research Institute Malaysia (FRIM). HIF23 recognizes and appreciates the achievements of FRIM members in advancing research in the field of tropical forestry at both national and international levels. Recognition provides encouragement and continuous support to ensure the success of research can be applied and utilized by all Malaysian citizens.



Dr Ismail merasmikan Hari Inovasi FRIM 2023
Dr Ismail officiating the FRIM Innovation Day 2023



Peserta menerangkan inovasi yang dipertandingkan kepada KP FRIM
Participant explains the innovation to FRIM's DG

AKTIVITI PEMINDAHAN TEKNOLOGI

FRIM telah berjaya menarik minat pihak berkepentingan dengan penghasilan produk prototaip berdasarkan kajian saintifik yang dijalankan untuk terus memeterai perjanjian menerusi usaha bersepadu bersama pelbagai pemegang taruh bagi menghasilkan teknologi yang memenuhi keperluan pasaran. Ini membolehkan teknologi FRIM yang dipindahkan kepada industri mematuhi peraturan perundangan negara serta mesra pengguna. Menerusi kajian yang dijalankan, produk yang telah berjaya dilesenkan pada tahun 2023 adalah bahan tanaman berkualiti, sistem inventori pokok dan ekstrak premium berkualiti dan patuh kepada piawaian negara dan antarabangsa.

Perjanjian Pelesenan bagi penghasilan Ekstrak Piawai daripada Cucur Atap

FRIM menerusi Stesen Penyelidikan FRIM (SPF) Setiu, telah menjalankan aktiviti penyelidikan dan mengenal pasti spesies pokok hutan bernilai komersial yang sesuai ditanam di tanah BRIS. Spesies cucur atap yang tumbuh secara meliar berpotensi untuk dijadikan sebagai produk kesihatan, produk hiasan, produk landskap dan produk minyak pati. Produk Cucur atap mengandungi ekstrak

TECHNOLOGY TRANSFER ACTIVITIES

FRIM has successfully attracted stakeholders' interest by producing prototype products based on scientific research to solidify agreements through collaborative efforts with various stakeholders to develop technology that meets market demands. This allows FRIM's technology transferred to the industry to comply with the country's legislation and be user-friendly. Based on the research done, the products that have been licensed in 2023 are quality plant materials, tree inventory systems, and premium extracts that comply with national and international standards.

Licensing Agreement for the production of Standardized Extract from Cucur Atap

FRIM has conducted research activities at the FRIM Research Station (SPF) Setiu to identify commercially valuable forest tree species suitable for planting in BRIS soil. Wild-growing roof pumpkin species have the potential to be utilized for health products, decorative products, landscaping products, and essential oil products. The Cucur atap product contains standardized extracts and bioactive compounds that effectively inhibit enzymes and prevent

piawai dan sebatian bioaktif yang berkesan dalam merencat enzim dan berkesan dalam mencegah serangan radang di sendi anggota badan. Teknologi ini berjaya dilesenkan kepada pihak syarikat. Produk 'CURATAP', iaitu suplemen makanan tambahan yang diformulasikan daripada ekstrak cucur atap (*Baeckea frutescens*) berjaya dikomersialkan dan dipasarkan.

inflammatory attacks in the joints of the body. This technology was successfully licensed to the company. The product 'CURATAP', a dietary supplement formulated from the extract of the *Baeckea frutescens* plant, has been successfully commercialized and marketed.



Ekstrak Premium Tongkat Ali (SEEL 30) dan formulasi produk minuman kesihatan SEEL30 bersama coklat/ kopi

'Standardised extract *Eurycoma longifolia* (SEEL30) adalah ekstrak akueus piawai daripada bahan mentah tongkat ali yang mengandungi bahan aktif EL30. Teknologi ini telah dilindungi dengan paten dan terbukti secara saintifik mempunyai sifat anti kanser terhadap sel ovari secara in vitro dan dalam haiwan eksperimen (in-vivo). SEEL30 juga didapati mempunyai sifat ergogenik yang menyumbang kepada peningkatan dalam pengeluaran ATP.

Produk prototaip dalam bentuk tradisional (kapsul) dan F&B dalam bentuk produk minuman kesihatan pra campur perisa coklat serta kopi yang mengandungi ekstrak premium tongkat ali (SEEL30). Segmen pasaran produk ini adalah untuk semua peringkat umur, yang mengamalkan gaya hidup aktif dan sihat serta pesakit kanser yang telah menamatkan sesi kemoterapi dan menjalani rawatan paliatif.

Tongkat Ali Premium Extract (SEEL 30) and SEEL30 health drink product formulation with chocolate/ coffee

The standardized extract *Eurycoma longifolia* (SEEL30) is a standardized aqueous extract derived from raw tongkat ali material containing the active ingredient EL30. This technology is patented and scientifically proven to have anti-cancer properties against ovarian cells in both in vitro and in vivo animal experiments. SEEL30 was found to possess ergogenic properties that contribute to an increase in ATP production.

A prototype product in traditional capsule form and a health drink product in the form of pre-mixed chocolate and coffee flavors with premium tongkat ali extract (SEEL30). The target market segment for this product includes individuals of all age groups who lead an active and healthy lifestyle, as well as cancer patients who have completed chemotherapy and are undergoing palliative care.

PROMOSI KEPAKARAN FRIM

Pembangunan modal insan merupakan faktor kritikal bagi menjana dan mengekalkan pertumbuhan ekonomi negara. Ketersediaan tenaga kerja berkemahiran tinggi adalah penting untuk menyokong peralihan semua sektor ekonomi ke arah aktiviti berintensifkan pengetahuan, teknologi dan inovasi. Menerusi pelbagai program peningkatan pembangunan modal insan, FRIM telah berjaya melahirkan pakar-pakar bidang yang menyumbang kepada keberhasilan pendapatan negara. FRIM mempunyai 35 bidang kepakaran bermula dari aktiviti upstream dan downstream. Sumbangan kepakaran FRIM dapat dilihat menerusi pelaksanaan projek berbentuk konsultasi bersama pihak berkepentingan. Antara bidang kepakaran FRIM yang mendapat perhatian pada tahun 2023 adalah flora, fauna perubahan iklim, geoinformasi, ekologi hutan, kajian bersepadu, ekonomi dan sosial, landskap dan pengurusan perhutanan bandar. Kepakaran FRIM dalam membantu membangunkan serta menambahbaik sesuatu projek diiktiraf di peringkat kebangsaan mahupun antarabangsa.

FRIM'S EXPERTISE PROMOTION

Human capital development is a critical factor in generating and sustaining the economic growth of a country. The availability of highly skilled workforce is crucial to support the transition of all economic sectors towards knowledge-intensive, technology-driven, and innovative activities. Through various human capital development programs, FRIM has successfully produced experts in several fields who contribute to the country's economic success. FRIM has 35 areas of expertise ranging from upstream to downstream activities. The expertise contribution of FRIM can be observed through the implementation of consultation projects with stakeholders. FRIM's areas of expertise receiving attention in 2023 include flora, fauna, climate change, geoinformation, forest ecology, integrated studies, economics and social aspects, landscape, and urban forestry management. FRIM's expertise in developing and improving projects is recognized at both national and international levels.



Bidang kepakaran yang mendapat perhatian pada tahun 2023
Areas of expertise receiving attention in 2023

FASILITI PEMROSESAN HERBA BERTARAF GMP KE ARAH MENYOKONG KELESTARIAN INDUSTRI BERASASKAN HERBA YANG BERDAYA SAING

Permintaan global untuk produk herba yang semakin bertambah telah mewujudkan potensi yang amat besar kepada hasrat kerajaan untuk meningkatkan sumbangan sektor ini kepada Pendapatan Negara Kasar (PNK) daripada produk bernilai tinggi berasaskan herba. FRIM telah merencanakan pelbagai aktiviti bagi merealisasikan hasrat negara ke arah membantu pengusaha herba dari Industri Mikro, Kecil dan Sederhana terutamanya membangunkan produk herba bernilai tinggi melalui perkhidmatan pemprosesan herba yang dijalankan di Pusat Teknologi Herba (HTC).

Sehingga kini HTC telah menerima pengiktirafan diperingkat dalam dan luar negara seperti:

1. Pensijilan Good Manufacturing Practice (GMP) for Food (GMP MS 1514:2019), pengiktirafan oleh Jabatan Standard Malaysia (JSM)
2. Pensijilan GMP (Traditional Medicines), pengiktirafan oleh Bahagian Regulatori Farmasi Negara (NPRA)
3. Pensijilan Hazard Analysis Critical Control Points (HACCP MS 1490:2019), pengiktirafan oleh JSM
4. Pensijilan Hazard Analysis Critical Control Points (TQCSI HACCP Code 2020), pengiktirafan oleh Joint Accreditation System of Australia & New Zealand (JAS-ANZ)
5. Sijil Pengesahan Halal Malaysia (SPHM) Skim Pengilangan Kontrak/ OEM, pengiktirafan oleh Jabatan Kemajuan Islam Malaysia (JAKIM)
6. SPHM Skim Makanan, pengiktirafan oleh Jabatan Agama Islam Selangor (JAIS)
7. MS ISO 9001:2015, pengiktirafan Intertek
8. Bionexus Partner (BNP) Laboratory Status, pengiktirafan oleh Malaysian Bioeconomy Development Corporation Sdn. Bhd.

Produk ubat herba berdaftar wajib dikilangkan di dalam premis yang berstatus GMP serta memiliki lesen pengilang dari NPRA. HTC berupaya menyediakan perkhidmatan pengilangan kontrak kepada pengusaha Industri Mikro, Kecil dan Sederhana (PMKS) terutama dari kawasan luar bandar yang tidak mampu membangunkan fasiliti berstatus GMP. Pengeluaran produk berdaftar berupaya menyumbang kepada pengembangan perniagaan PMKS yang terlibat melalui peningkatan pendapatan syarikat dan pengambilan tenaga kerja bagi menjalankan

GMP STANDARD HERBAL PROCESSING FACILITIES TOWARDS SUPPORTING THE SUSTAINABILITY OF A COMPETITIVE HERBAL INDUSTRY

The increasing global demand for herbal products has created significant potential for the government to enhance the contribution of this sector to Gross National Income (GNI) from high-value herbal-based products. FRIM has planned many activities to support the country's goal of assisting herbal entrepreneurs from the Micro, Small, and Medium Enterprises industry, particularly in developing high-value herbal products through processing services conducted at the Herbal Technology Center (HTC).

HTC has received recognition at both national and international levels, such as the Good Manufacturing Practice (GMP) certification for Food (GMP MS 1514:2019) awarded by the Department of Standards Malaysia (JSM).

1. Pensijilan Good Manufacturing Practice (GMP) for Food (GMP MS 1514:2019), pengiktirafan oleh Jabatan Standard Malaysia (JSM)
2. Pensijilan GMP (Traditional Medicines), pengiktirafan oleh Bahagian Regulatori Farmasi Negara (NPRA)
3. Pensijilan Hazard Analysis Critical Control Points (HACCP MS 1490:2019), pengiktirafan oleh JSM
4. Pensijilan Hazard Analysis Critical Control Points (TQCSI HACCP Code 2020), pengiktirafan oleh Joint Accreditation System of Australia & New Zealand (JAS-ANZ)
5. Sijil Pengesahan Halal Malaysia (SPHM) Skim Pengilangan Kontrak/ OEM, pengiktirafan oleh Jabatan Kemajuan Islam Malaysia (JAKIM)
6. SPHM Skim Makanan, pengiktirafan oleh Jabatan Agama Islam Selangor (JAIS)
7. MS ISO 9001:2015, pengiktirafan Intertek
8. Bionexus Partner (BNP) Laboratory Status, pengiktirafan oleh Malaysian Bioeconomy Development Corporation Sdn. Bhd.

Registered herbal medicine products must be manufactured in premises that are GMP-certified and hold a manufacturing license from NPRA. HTC aims to provide contract manufacturing services to Micro, Small, and Medium Enterprises (MSMEs), especially those from rural areas who are unable to develop GMP-certified facilities. Registered product expenditures contribute to the development of PMKS businesses by increasing company revenue and hiring employees to carry out business operations.



Secara kumulatif dari tahun 2016 hingga 2023, HTC telah melaksanakan sejumlah 1,846 perkhidmatan kepada 337 pelanggan yang menjana pendapatan sebanyak RM1.63 juta kepada FRIM.

From 2016 to 2023, HTC has carried out a total of 1,846 services for 337 clients, generating revenue of RM1.63 million for FRIM.

operasi perniagaan. Pemasaran produk secara berterusan mampu menyumbang kepada peningkatan Keluaran Dalam Negara Kasar (KDNK) dan pertumbuhan ekonomi negara.

Secara kumulatif dari tahun 2016 hingga 2023, HTC telah melaksanakan sejumlah 1,846 perkhidmatan kepada 337 pelanggan yang menjana pendapatan sebanyak RM1.63 juta kepada FRIM. Dalam tempoh yang sama HTC telah membantu PMKS mendaftarkan 30 produk ke NPRA dan mengeluarkan sejumlah 203,073 unit produk berdaftar untuk dikomersialkan. Berdasarkan harga di pasaran, nilai produk tersebut dianggarkan bernilai RM17.33 juta yang memberi kesan impak positif kepada peningkatan ekonomi pelanggan-pelanggan HTC.

Continuously marketing products can contribute to the increase in Gross Domestic Product (GDP) and the economic growth of the country.

From 2016 to 2023, HTC has carried out a total of 1,846 services for 337 clients, generating revenue of RM1.63 million for FRIM. During the same period, HTC assisted PMKS in registering 30 products with NPRA and producing a total of 203,073 registered products for commercialization. Based on market prices, the estimated value of the product is RM17.33 million, which has a positive impact on the economic growth of HTC's customers.



Pelesenan Teknologi Technology Licensing

Bil No	Produk Product	Pegawai Bertanggungjawab Person-In-Charge
1	Perjanjian pelesenan bagi klon elit kacip fatimah FaFaF01	Dr Farah Fazwa Md Arif
2	Perjanjian pengurusan penjualan anak pokok FRIM dan sistem inventori	Dr Siti Salwana Hashim
3	Ekstrak piawai daripada cucur atap	Dr Fadzureena Jamaludin
4	Ekstrak premium tongkat ali (SEEL 30) dan formulasi produk minuman kesihatan SEEL30 bersama coklat/kopi	Dr Nurhanan Murni Yunos

Teknologi yang berpotensi untuk ditingkat skala, dikomersial atau diterima pakai oleh pemegang taruh

Potential technology for upscaling, commercialise or applicable to stakeholders

Bil No	Keberhasilan/Output Outcome/output	Pegawai Bertanggungjawab Person-In-Charge
1	Nano-HabD4:D18	Abd. Rashid Li
2	Floating lotus	Mohd Rizuwan Mamat
3	Optimal drying temperature of Beackea frutescens raw material using HPLC for quality control	Hada Masayu Ismail @ Dahlan
4	Anti-folate inhibitor potentials of selected quassinoids from Eurycoma longifolia	Dr Nurhanan Murni Yunos
5	Furniture from scavenged wood: circular economy friendly products (Perabot dari kayu di lupus: produk mesra ekonomi kitaran)	Dr Khairul Awang
6	Karas Resin Malaysia (KARESMA) - Premium Agarwood Fragrance	Sahrim Lias
7	Rapid colorimetric assay for qualitative and quantitative determination of pyrethroid compound type II in wood preservative and treated wood using carminic acid reagent	Dr Tumirah Khadiran
8	MEIN-REKA: Memento Informatif Resin + Kayu Berautoriti	Dr Wan Tarmeze Wan Ariffin
9	NambiSin® Antibacterial Hydrogel	Dr Getha R. Krishnasamy
10	Active Ingredient EL50: Toward Development as Anti-Cancer Agent for Various Cancers	Dr Nurhanan Murni Yunos
11	Dossier "Forus Authentic Standardized Hempedu Bumi Extract"	Muhammad Yatimi Othman
12	Dossier "Forus Authentic Standardized Gelenggang Extract"	
13	Dossier "Forus Authentic Standardized Asam Gelugur Extract"	

Bil No	Keberhasilan/Output Outcome/output	Pegawai Bertanggungjawab Person-In-Charge
14	Dossier "Forus Authentic Standardized Tongkat Ali Extract"	Muhammad Yatimi Othman
15	Dossier "Forus Authentic Standardized Roselle Extract"	
16	Dossier "Forus Authentic Standardized Misai Kucing Extract"	

Reka cipta yang didaftarkan di MyIPO Invention registered with MyIPO

Bil No	Reka cipta Inventon	Pereka cipta Inventor	No. Pemfailan Filing No.
1	Transgenic <i>Centella asiatica</i> Hairy Root Expressing Codon-Optimized Proinsulin Sci-57-Kedl and Method of Production There Of	Dr Norlia Basherudin	PI 2023008041

Paten yang diiktiraf Granted patent

Bil No	Reka cipta Inventon	Pereka cipta Inventor	No. Pemfailan Filing No.
1	An Antihypertrophic Compound for Cardiomyocyte Cells	Dr Nurhanan Murni Yunos	MY-195447-A
2	An Anti-Ovarian Cancer Composition		MY-196709-A
3	Combination Of Therapeutic Agents for Treating Ovarian Cancer		MY-198135-A
4	Atteva sciodoxa Mycoinsecticide	Dr Mohd Farid Ahmad	MY-198935-A

PROGRAM PENGEMBANGAN DAN PENYELIDIKAN TRANSLASI

OUTREACH PROGRAMMES AND
TRANSLATIONAL RESEARCH

Rosa sp.

PROGRAM PENGEMBANGAN

OUTREACH PROGRAMME

Seminar/persidangan/bengkel/dialog/pemindahan teknologi/program latihan yang dianjurkan oleh FRIM atau dengan kerjasama pihak lain, antaranya ialah:

Seminar/conference/workshop/dialogue/technology transfer/training organised by FRIM or jointly organised with other parties:

Bil No	Tajuk Title	Lokasi Location	Tarikh Date
1	Bengkel Pengaturcaraan Pembangunan Kanvas Model Perniagaan (Business Model Canvas, BMC) Dan Pelan Strategik Pelaksanaan Perniagaan (Business Strategic Implementation Plan, BSIP)	Riviera Suites @ Pulau Melaka, Melaka	7 – 9/3/2023
2	Webinar Sains Masyarakat siri 1 Peringkat Negeri Kelantan	Dalam talian	12/4/2023
3	Kursus penilaian jawatankuasa penilaian kerja, bekalan dan perkhidmatan bagi sebut harga/ tender FRIM	Villea Morib, Banting, Selangor	22 – 24/2/2023
4	Technology Transfer Coldfusion with Framework	FRIM	10 – 14/7/2023
5	Kursus Life Cycle Cost (LCC)	FRIM	27 – 28/6/2023
6	GCMS training model GC 7890 + 5977 B on Mass Hunter Software on Quantitation	FRIM	9-10/5/2023
7	Latihan Sesi Awareness & Refresher Course ISO/IEC 17065	FRIM	30/5/2023
8	Taklimat Kesedaran Pensijilan Hijau kepada Pengusaha Perabot	FRIM	19/5/2023
9	Bengkel Pemindahan Teknologi 2023 : Penyulingan Minyak Pati dan Penyediaan Sabun Mandi daripada ABP016	RPS Banun, Gerik, Perak	30 – 31/5/2023
10	Kursus secara teori dan pratikal pengambilan data di kilang untuk pengiraan carbon footprint (pembelahan balak-sawmill, pegeringan kayu & pembuatan perabot)	Kilang Impressive Transform Sdn. Bhd, Melaka	31/5, 1 – 2 /6/2023
11	Bengkel Green Community Model (GCM-2023) Siri-1: Pembangunan Model Program Komuniti-3F (Food Forest Farming)	FRIM & FELDA Sungai Panching Selatan, Kuantan	5 – 9/6/2023
12	Latihan teknikal analisis ORAC di bawah SKOP ISO 1702	FRIM	7/6/2023
13	Bengkel Kesedaran Pemeliharaan Pengetahuan Tradisi (TK) Suku Kaum Semai	Cameron Highlands, Pahang	20-22/6/2023

Bil No	Tajuk Title	Lokasi Location	Tarikh Date
14	Bengkel konsultasi stakeholders-peringkat komuniti “Penglibatan komuniti setempat terhadap program pemulihan dan pemuliharaan persekitaraan hutan bakau dalam HS Kuala Linggi”	HS Kuala Linggi	24/6/2023
15	Bengkel kesan perubahan iklim terhadap serangan penyakit dan perosak tanaman ladang hutan di Malaysia	Le'Venue Hotel, Bangi, Selangor	25 – 26/7/2023
16	Bengkel Kajian Penerimaan Pasaran bagi Menilai Potensi Pembangunan dan Komersialisasi Produk Cucur Atap Fasa II dan Kajian Ketersediaan Bahan Mentah bagi Produk Cucur Atap	Sutera Beach Resort, Marang, Terengganu	15 – 16/7/2023
17	Training on Introduction to Deflection Mechanics	FRIM	3/7/2023
18	Program Kesedaran Masyarakat (Sains Masyarakat)	FRIM	6/7/2023
19	Program Kesedaran Penyebaran Spesies Terancam, Langka dan Endemik kepada Pelajar Sekolah Menengah di Taman Botani Kepong (KBG)	FRIM	6/7/2023
20	Bengkel konsultasi pemegang taruh/stakeholders bagi “Penganjuran bengkel interpretasi persekitaran”	Hutan Simpan Gunung Tebu, Besut, Terengganu	7 – 9/7/2023
21	Training on Integrated Valuation of Ecosystem Services and Tradeoff (InVEST): Carbon & Habitat Quality Module	Hutan Simpan Panti & Desaru, Johor	10-14/7/2023
22	Kursus Pengenalan Paludarium Begonia	FRIM	17/7/2023
23	Course on Economic Valuation (EV) and Economic Costing (EC) of Forest and Forest Products and Their Role In Sustainable Development (SD)	FRIM	25-27/7/2023
24	Program Sains Masyarakat Siri 2.0 Peringkat Negeri Kedah	Darulaman Sanctuary Langkawi & Pusat Penyelidikan Langkawi (UKM)	28 – 29/7/2023
25	Bengkel konsultasi pemegang taruh peringkat komuniti Sahabat Gunung Tebu: “Pemuliharaan persekitaran hutan menerusi penggunaan sumber asli secara mapan Semenanjung Malaysia”	Besut, Terengganu & Gunung Jerai & Jerai Geopark, Kedah	26 – 29/7/2023
26	Bengkel Inisiatif Pembangunan Kaedah Pengredan Gaharu Melalui Pendekatan Saintifik Secara Bersepadu	Avillion Cameron Highlands, Pahang	2-4/8/2023
27	Bengkel Pra-Pengenalan Teknik Asas Kultur Tisu Tumbuhan	FRIM	22/8/2023
28	Bengkel Pemprosesan Pembuatan Perabot di Kilang Impressive Transform Sdn. Bhd (ITSB) dan Kilang Homestead Wood Industries Sdn. Bhd (HWISB) dan Bengkel Penanaman Pokok di SPF Selandar, Melaka	ITSB, Melaka HWISB, Negeri Sembilan & SPF Selandar, Melaka	25-26/8/2023

Bil No	Tajuk Title	Lokasi Location	Tarikh Date
29	Kursus Microsoft Excel: Analisis Data	FRIM	28/8/2023
30	Bengkel Pelaksanaan Modul Toksinologi bersama Pusat Racun Negara	FRIM	5-6/9/2023
31	Bengkel Pemerkasaan Aktiviti Komersialisasi Produk/Teknologi Berasaskan Herba/Tumbuhan	Avillion Hotel, Cameron Highland	12-15/9/2023
32	Bengkel Kesedaran Pemeliharaan Pengetahuan Tradisi (TK) Suku Kaum Semoq Beri	Kg Embus, Maran, Pahang	19-21/9/2023
33	Kem Biodiversiti Peringkat Negeri Kelantan Siri 2/2023 (untuk murid sekolah menengah di Negeri Kelantan)	Taman Etnobotani Gua Musang Taman Negara Kuala Koh	19-21/9/2023
34	Bengkel Pemudahcara Program Pendidikan Biodiversiti	Alor Setar, Kedah	26 – 28/9/2023
35	Latihan Faktor-faktor Kegagalan bagi Pensijilan Pintu Rintangan Api	FRIM	25/9/2023
36	Latihan Penggunaan Stiker bagi Pensijilan Pintu Rintangan Api	FRIM	26/9/2023
37	Program Kesedaran Biodiversiti dan Konservasi bersama Pelajar Sekolah Menengah di Taman Botani Kepong (KBG)	FRIM	20/9/2023
38	Kursus Pendigitalan Spesimen	IMR	14-15/9/2023
39	Bengkel Transliterasi Kitab Tib Siri satu (1) hingga tiga (3)	FRIM	2/11/2023
40	Bengkel Rejim Silvikultur Hutan Terosot siri 2	Klana Resort, Seremban	09-11/10/2023
41	MS 1514:2022 Good Manufacturing Practices Awareness and Internal Audit Training	FRIM	10-11/10/2023
42	Kem Biodiversiti Peringkat Negeri Kedah siri 4.0	Alor Setar, Kedah	24-26/10/2023
43	Kursus ujian katil besi 2 tingkat (standard baharu), pembuatan prototaip katil dan latihan ujian in-situ perabot fabrik	Malpro Industries (M) Sdn. Bhd, Rawang, Selangor	Oktober 2023
44	Bengkel pembangunan framework/blueprint 3R circular economy (CE) untuk produk perabot bersama syarikat & persatuan serta agensi kerajaan	Hotel Concorde Shah Alam,	Oktober 2023
45	Bicara Teknologi FRIM 2023	Kuala Terengganu, Terengganu	8/11/2023
46	Bengkel Kajian Penilaian Kawasan Hutan Bandar dan Hutan Rekreasi untuk pengurusan bersepadu ke arah kesejahteraan masyarakat di Kuala Krai & Kota Bharu dengan kerjasama Majlis Daerah Kuala Krai (MDKK) & Majlis Perbandaran Kota Bharu Bandar Raya Islam (MPKB-BRI)	Kelantan	14-15/11 & 21-22/11/2023
47	Kursus "Analisis Statistik Data Morfometerik"	FRIM	17/11/2023
48	Agilent 5977 GC/MS Techniques and Operations with Data Analysis	FRIM	20-22/11/2023

Bil No	Tajuk Title	Lokasi Location	Tarikh Date
49	Seminar Hasil Kajian Pemeliharaan & Pemuliharaan Begonia herveyana dan Begonia tampinica di Melaka dan Negeri Sembilan	FRIM	24/11/2023
50	Latihan Pembangunan Aplikasi Mudah Alih HerbaXpress 3.0 Menggunakan Flutter Versi Baharu-Berdasarkan kod sedia ada (Flutter dan Figma)	FRIM	27/11 – 1/12/2023
51	Bengkel Pendidikan Alam Sekitar (BEE@FRIM 2023)	FRIM	5-7/12/2023
52	Simposium Gel Based Proteomics and Biochemical Pathway Mapping via Ingenuity Pathway Analysis Pasca-Persidangan ICDDTM23	FRIM	8/12/2023
53	Bengkel TOT Pembangunan & Pemarkasan Produk Ekopelancongan Sumber Asli	FRIM	22-26/2/2023
54	Kursus Penyelenggaraan Pokok Teduhan Siri 1/2023	Majlis Daerah Batu Gajah	15-16/3/2023
55	Termites Associated with structures and trees workshop (posponed bulan 10)	Universiti Putra Malaysia	4-5/10/2023
56	Technical Training on Termite Biology, Ecology and Management for Syngenta Malaysia	Syngenta Crop Protection Sdn. Bhd.	11/5/2023
57	Kursus Asas Landskap Untuk Perbadanan Labuan	Perbadanan Labuan	13-15/6/2023
58	Kursus Asas Arborikultur Untuk Perbadanan Labuan	Perbadanan Labuan	3-6/7/2023
59	Kursus Asas Penyediaan Slaid Mikroskopik Kayu	Jabatan Hutan Sarawak	21-23/6/2023
60	Bengkel Teknik Asas Kultur Tisu Tumbuhan	Pusat Biosahawan Bioteknologi	5-6/9/2023
61	Kursus Pengurusan Orkid dan Pengurusan Spesimen	Jabatan Taman Botani Pulau Pinang	5-7/9/2023
62	Kursus Kepentingan Tanah dalam Perladangan Hutan	Lembaga Perindustrian Kayu Malaysia (MTIB)	21/11/2023
63	Tissue Culture - An Advance Technology in Plant Production	Malaysian Bioeconomy Development Corporation Sdn Bhd	24-25/10/2023
64	Kursus Asas Landskap dan Penyelenggaraan Pokok untuk kakitangan Majlis Daerah Tangkak, Muar Johor	Majlis Daerah Tangkak	30-31/10/2023
65	Technical Training on Wood and Wood-Based Products for Industrial Application	MZEC Corporation Sdn Bhd	14-16/11/2023
66	One-day training package under programme 'Opportunities for carbon offset and achieving net-zero targets through nature-based solution approach'	Malaysia Forest Fund	23/11/2023

Bil No	Tajuk Title	Lokasi Location	Tarikh Date
67	Bengkel Pengurusan Rekod di FRIM - Program Pemprosesan dan Sifat-sifat Kayu	FRIM	10/8/2023
68	Kursus Pengecaman Kayu Siri I	FRIM	14-16/2/2023
69	Kursus Pengecaman Kayu Siri II	FRIM	3-5/10/2023
70	Kursus Tatacara Penggunaan DDMS dan Pengurusan Rekod (Rasmi dan Terperingkat di Bahagian Keluaran Hutan	FRIM	23/10/2023
71	Technical Training on Wood and Wood-Based Products for Industrial Application (Module 1: Basic Wood Properties)	FRIM	14-16/11/2023
72	Seminar and Exhibition Herbs for Health and Healing	UPM, Serdang	11/7/2023
73	Webinar FRIM-USM 2023 "Medicinal Plants and Their Applications"	Aplikasi zoom-webinar	25/7/2023
74	Kursus Forensik Perhutanan di Negeri Kelantan (20 peserta)	Hotel H Elite, Kota Bharu, Kelantan	28/2 – 2/3/2023
75	Bengkel Kajian Pengurusan Kelip-Kelip Sungai Selangor Bersama Pihak Berkepentingan (21 peserta)	MGVI, Bangi, Selangor	11/4/2023
76	Program Merakytakan Hasil R&D FRIM Melalui Pemindahan Teknologi Bagi Projek Penanaman Herba Terpilih Secara Sistem Selingan Bagi Penghasilan Produk Berkualiti Tinggi	Koperasi Peserta Rancangan FELCRA Seberang Perak Berhad	30/1 – 2/2/2023
77	Kursus Forensik Perhutanan di Negeri Kedah (25 peserta)	Hotel Park Avenue, Sg. Petani, Kedah	11-16/6/2023
78	APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources (3 peserta)	FRIM	3-6/7/2023
79	Sambutan Hari Bumi (Earth Day) peringkat FRIM - sharing session dengan orang ramai berkaitan penghasilan bahan tanaman menggunakan tanah dan tanpa tanah.	FRIM	15/4/2023
80	Bengkel Pemindahan Teknologi Projek Keusahawanan Komuniti Peserta Berasaskan Herba Bersama Koperasi Peserta-Peserta Rancangan FELCRA Lubuk Sireh, Perlis Berhad	Lubuk Sireh, Perlis	19-23/6/2023
81	Bengkel Pemindahan Teknologi Projek Keusahawanan Komuniti Peserta Berasaskan Herba Bersama Koperasi Peserta-Peserta Rancangan FELCRA Nasaruddin (Belia) Berhad, Perak.	Seri Iskandar, Perak	9-10/8/2023
82	Pra-pengenalan bengkel teknik asas kultur tisu tumbuhan	Pusat Biousahawan Bioteknologi	21/8/2023
83	bengkel teknik asas kultur tisu tumbuhan	Pusat Biousahawan Bioteknologi	5-6/9/2023
84	kursus penghasilan anak pokok	Tapak Semaian Utama, FRIM	3/8/2023
85	Bengkel Inventori Data Spesimen bersama MARDI dan UKM	MARDI & UKM	18-19/12 & 20-21/12/2023

HARI BULUH SEDUNIA

YAB Dato' Sri Fadillah Yusof, Timbalan Perdana Menteri yang juga Menteri Perladangan dan Komoditi telah menyempurnakan perasmian sambutan 'World Bamboo Day (WBD)' Malaysia 2023 di FRIM, Kepong pada 21 September 2023.

Beliau turut melancarkan buku bertajuk 'Industri Arang Buluh di Malaysia' terbitan bersama FRIM dan Malaysian Timber Industry Board (MTIB). Penerbitan buku ilmiah tersebut bakal memberi manfaat kepada pemain industri buluh di Malaysia. Dr Norwati Muhammad, Timbalan Ketua Pengarah (KP) (Penyelidikan) mewakili KP FRIM menyampaikan ucapan alu-aluan pada majlis tersebut. Turut hadir, Abdul Hadi Omar, Timbalan Ketua Setiausaha (Perancangan Strategik dan Pengurusan) Kementerian Perladangan dan Komoditi (KPK); YB Datuk Larry Sng Wei Shien, Pengerusi MTIB; Wan Ahmad Asmady Wan Md Din, Setiausaha Bahagian Kanan Kemajuan Industri Kayu-kayan, Tembakau dan Kenaf KTK; Dr Mohd Zamri Mat Amin, KP MTIB; Pengerusi Malaysian Timber Council - MTC, Zainal Abidin Abdullah; wakil-wakil Malaysian Bamboo Society, KPK, agensi kerajaan dan industri.

Sempena sambutan WBD 2023, FRIM bersama MTIB menganjurkan 'National Seminar on Bamboo' pada 20-21 September untuk:

- meningkatkan kesedaran penggunaan buluh di peringkat global;
- melindungi sumber semula jadi dan alam sekitar;
- memastikan penggunaan buluh secara mampan; dan
- menggalakkan perladangan buluh sebagai satu industri baharu.

Seramai 159 peserta menghadiri seminar tersebut. Sebanyak 18 pembentangan lisan dan 21 poster oleh penyelidik dan pensyarah dari pelbagai institusi pengajian tinggi Malaysia disampaikan pada seminar tersebut.

WORLD BAMBOO DAY

YAB Dato' Sri Fadillah Yusof, Deputy Prime Minister and Minister of Plantation Industries and Commodities, officiated the celebration of Malaysia's World Bamboo Day (WBD) 2023 at FRIM, Kepong on 21 September 2023.

He also launched a book entitled 'Industri Arang Buluh di Malaya' published in collaboration with FRIM and the Malaysian Timber Industry Board (MTIB). The publication of this scientific book will benefit the bamboo industry players in Malaysia. Dr Norwati Muhammad, Deputy Director General (DG) (Research), represented FRIM's DG in delivering the welcoming address at the event. Also present were Abdul Hadi Omar, Deputy Chief Secretary (Strategic Planning and Management) of the Ministry of Plantation Industries and Commodities (KPK); YB Datuk Larry Sng Wei Shien, Chairman of MTIB; Wan Ahmad Asmady Wan Md Din, Senior Secretary of the Wood, Tobacco, and Kenaf Industry Development Division KTK; Dr. Mohd Zamri Mat Amin, KP of MTIB; Chairman of the Malaysian Timber Council - MTC, Zainal Abidin Abdullah; representatives from the Malaysian Bamboo Society, KPK, government agencies, and the industry.

In conjunction with WBD 2023, FRIM and MTIB organised the National Seminar on Bamboo on 20-21 September to:

- raise awareness of bamboo usage at the global level;
- conserve natural resources and the environment;
- ensure sustainable bamboo utilization; and
- promote bamboo cultivation as a new industry.

A total of 159 participants attended the seminar. There were 18 oral presentations and 21 posters presented by researchers and lecturers from various Malaysian higher education institutions at the seminar.



Dari kiri: Dr Mohd Zamri, Datuk Larry, Dato' Sri Fadillah, Dr Norwati dan Abdul Hadi semasa majlis perasmian
From left: Dr Mohd Zamri, Datuk Larry, Dato' Sri Fadillah, Dr Norwati dan Abdul Hadi during the official ceremony

TPM LANCAR SKIM PENSIJILAN PERABOT HIJAU FRIM

Dato' Sri Fadillah Yusof, Timbalan Perdana Menteri (TPM) merangkap Menteri Perladangan dan Komoditi telah melancarkan Skim Sijilan Perabot Hijau FRIM pada 21 November 2023 di Putrajaya sempena Majlis Makan Malam Simposium Perabot Hijau Kebangsaan 2023. Turut hadir pada majlis, YB Nik Nazmi Nik Ahmad, Menteri Sumber Asli, Alam Sekitar dan Perubahan Iklim (NRECC); serta Dr Ismail Parlan, Ketua Pengarah FRIM.

Skim pensijilan tersebut dapat membantu meningkatkan kredibiliti dan daya saing pihak syarikat seterusnya membantu pihak syarikat untuk memasarkan produk perabot di pasaran domestik dan antarabangsa.

Simposium yang bertemakan 'Melestari Industri ke Arah Ekonomi Kitaran' anjuran FRIM dengan kerjasama Malaysian Timber Industry Board (MTIB) ini telah dirasmikan semalam oleh Che Kodir Baharum, Pengarah Bahagian Ekonomi Alam Sekitar dan Sumber Asli, Kementerian Ekonomi yang juga merupakan Anggota Institut FRIM.

DPM LAUNCHES THE FRIM GREEN FURNITURE CERTIFICATION SCHEME

Dato' Sri Fadillah Yusof, Deputy Prime Minister (DPM) cum Minister of Agriculture and Commodities, launched the FRIM Green Furniture Certification Scheme on 21 November 2023, in Putrajaya during the Symposium Perabot Hijau Kebangsaan 2023 Dinner Event. Also present at the event were YB Nik Nazmi Nik Ahmad, Minister of Natural Resources, Environment, and Climate Change (NRECC), as well as Dr Ismail Parlan, FRIM Director-General.

The certification scheme aims to enhance the credibility and competitiveness of companies, thereby helping them market furniture products in both domestic and international markets.

The symposium themed 'Sustaining Industry Towards Circular Economy,' organized by FRIM in collaboration with the Malaysian Timber Industry Board (MTIB), was inaugurated yesterday by Che Kodir Baharum, Director of the Environmental Economics and Natural Resources Division, Ministry of Economy, who is also a FRIM Institute Member.

Lebih 200 peserta yang terdiri daripada wakil-wakil agensi kerajaan, pemain dan pengusaha bidang industri perabot serta pegawai-pegawai penyelidik telah menyertai simposium dua hari ini.

Pada Majlis Pengiktirafan Perabot Hijau, enam pemain industri telah menerima pengiktirafan sebagai syarikat perintis Skim Pensijilan Perabot Hijau FRIM, iaitu:

1. Coway Malaysia Sdn Bhd
2. Regal Bonus (M) Sdn Bhd
3. Ruffntuff Sdn Bhd
4. Apex Office Furniture Exporter Sdn Bhd
5. Meranti Marshal Sdn. Bhd. dan
6. Anggun Sofa & Interior Sdn Bhd.

Sijil Hijau FRIM PCS yang diperolehi dapat menjadi nilai tambah kepada produk yang dihasilkan dan usaha ini juga menyokong matlamat pembangunan mampan serta sasaran kerajaan bagi sifar bersih karbon 2050. Selain itu, pihak FRIM melancarkan dua dokumen penting bagi pembangunan perabot hijau; iaitu Skim Pensijilan Perabot Hijau FRIM PCS dan Dokumen Kriteria hijau.

Over 200 participants, comprising government agency representatives, players and entrepreneurs in the furniture industry, and researchers, attended the two-day symposium.

At the Green Furniture Recognition Ceremony, six industry players received recognition as pioneering companies under the FRIM Green Furniture Certification Scheme, namely:

1. Coway Malaysia Sdn Bhd
2. Regal Bonus (M) Sdn Bhd
3. Ruffntuff Sdn Bhd
4. Apex Office Furniture Exporter Sdn Bhd
5. Meranti Marshal Sdn. Bhd. and
6. Anggun Sofa & Interior Sdn Bhd.

The Green Certificate FRIM PCS obtained can add value to the products produced and this effort also supports the sustainable development goals as well as the government's target of zero net carbon by 2050. In addition, FRIM has launched two important documents for the development of green furniture; namely the FRIM PCS Green Furniture Certification Scheme and the Green Criteria Document.



Dari kiri: YB Nik Nazmi, Dato' Sri Fadillah dan Dr Ismail semasa perasmian majlis
From left: YB Nik Nazmi, Dato' Sri Fadillah and Dr Ismail during the official ceremony

FRIM ANJUR PERSIDANGAN PENEMUAN UBATAN DAN PERUBATAN TRANSLASIONAL

FRIM dengan kerjasama Persatuan Penyelidikan Kanser Malaysia (MACR), rakan kongsi pelbagai universiti telah menganjurkan Persidangan Penemuan Ubatan dan Perubatan Translasional 2023 (ICDDTM'23) di Seri Kembangan Selangor pada 5-6 Disember.

Bertemakan 'Penemuan Saintifik: Penjagaan Kesihatan Berimpak dan Pengerak Pertumbuhan Ekonomi', persidangan ini telah dirasmikan oleh Menteri Sains, Teknologi dan Inovasi Malaysia, YB Chang Lih Kang. Dengan penyertaan oleh lebih 110 peserta tempatan dan luar negara, fokus persidangan adalah mengenai penemuan ubatan dan perubatan translati terkini, antaranya dalam kanser, inflamasi, penyakit berjangkit dan metabolik serta neurodegeneratif. Dr Nurhanan, penyelidik dari Bahagian Hasil Semula Jadi yang merupakan salah seorang ahli jawatankuasa ICDDTM'23 telah dilantik sebagai ahli jawatankuasa MACR 2022-2025.

Bersempena dengan ICDDTM'23, FRIM telah menganjurkan simposium pasca persidangan bertajuk 'Gel-based Proteomics and Biochemical Pathway Mapping via Ingenuity Pathway Analysis (IPA)' di FRIM pada 8 Disember. Ketua Pengarah FRIM, Dr Ismail Parlan telah merasmikan simposium tersebut yang bermatlamat untuk berkongsi penyelidikan dan aplikasi proteomik yang dijalankan di FRIM sejak 2004 melalui sesi pembentangan dan latihan amali. Dr Chua Eng Wee, setiausaha ICDDTM'23 turut menghadiri majlis perasmian simposium tersebut.



Dr Ismail merasmikan simposium pasca ICDDTM'23
Dr Ismail officiating the post-conference symposium

FRIM CO-ORGANISED DRUG DISCOVERY AND TRANSLATIONAL MEDICINE CONFERENCE

FRIM, in collaboration with Malaysian Association of Cancer Research (MACR) and partners from various universities, had co-organised the International Conference on Drug Discovery and Translational Medicine 2023 (ICDDTM'23) in Seri Kembangan, Selangor on 5-6 December.

Themed 'Scientific Discoveries: Impacting Healthcare and Driving Economic Growth', ICDDTM'23 was officiated by the Minister of Science, Technology and Innovation Malaysia, YB Chang Lih Kang. With over 110 local and overseas participants, the conference focused on recent drug discovery and translational medicine findings in cancer, infectious diseases, inflammatory and metabolic diseases as well as neurodegenerative diseases, among others. FRIM Natural Products Division researcher Dr Nurhanan Murni Yunos served as one of the main committee members for ICDDTM'23 and was elected to the committee of MACR for 2022-2025.

In conjunction with ICDDTM'23, FRIM organised a post-conference symposium entitled, 'Gel-based Proteomics and Biochemical Pathway Mapping via Ingenuity Pathway Analysis (IPA)' at FRIM on 8 December. FRIM Director General Dr Ismail Parlan officiated the symposium, which aimed to share research and applications on proteomics research at FRIM since 2004 via oral presentation and hands-on training sessions. The secretary of ICDDTM'23 Dr Chua Eng Wee also attended this opening session.



Antara peserta yang menyertai simposium
Among participants attended the symposium



Sesi latihan amali mengenai proteomik
Hands-on training session on proteomics

FRIM ANJUR KEM BIODIVERSITI KEDAH 4.0

FRIM telah menganjurkan Kem Biodiversiti Kedah 4.0 bertempat di Kem Paya Pahlawan, Jitra, Kedah pada 5-7 Disember 2023. Kem anjuran Cawangan Pendidikan Alam Sekitar (EE), Program Ekopelancongan dan Hutan Bandar, FRIM ini diadakan dengan kerjasama Persatuan Pencinta Alam Malaysia (Malaysian Nature Society, MNS), Kelab Pencinta Alam Negeri Kedah (KPA Kedah), Jabatan Pendidikan Negeri Kedah (JPN Kedah), Jabatan Perhutanan Negeri Kedah (JPNK), Jabatan Perlindungan Hidupan Liar dan Taman Negara Semenanjung Malaysia (PERHILITAN) Negeri Kedah dan Majlis Bandaraya Alor Setar-MBAS.

Seramai 44 pelajar tingkatan 2 dan 10 guru pembimbing dari 11 sekolah menengah di Kedah telah menyertai kem tersebut. Sebahagian daripada mereka merupakan ahli MNS dan Kelab Pencinta Alam sekolah. Antara aktiviti yang dijalankan termasuklah ceramah dan taklimat mengenai biodiversiti, kepelbagaian flora dan fauna serta pemuliharaan dan kepentingan biodiversiti. Aktiviti interaktif turut diadakan seperti pecah bendungan, the guardian, perah otak dan future me.

FRIM ORGANISED KEDAH BIODIVERSITY CAMP 4.0

FRIM had organised a Kedah Biodiversity Camp 4.0 at the Kem Paya Pahlawan, Jitra, Kedah on 5-7 December 2023. The camp was organised by the Environmental Education Branch, Ecotourism and Urban Forestry Programme, FRIM in collaboration with Malaysian Nature Society (MNS), Malaysian Nature Society Kedah, Kedah State Education Department, Kedah State Forestry Department, Department of Wildlife and National Parks Peninsular Malaysia, Kedah State and Alor Setar City Council.

A total of 44 form two secondary students and 10 teachers from 11 secondary school in Kedah had attended the camp, in which some of them are MNS members and school nature society club. Among the activities that have been conducted were lectures and talks on biodiversity, flora and fauna diversity as well as conservation and its importance. The interactive activities such as dam break, the guardian, brainstorming and future me were also carried out.



Peserta Kem Biodiversiti Kedah 4.0 didedahkan dengan aktiviti ceramah dan interaktif
 Participants of the Kedah Biodiversity Camp 4.0 were introduced to the lectures and interactive activities



Program penanaman pokok CSR FRIM telah menanam sebanyak **717 pokok** antara Januari dan Disember 2023, melibatkan penyertaan **18 badan korporat**.

A total of 717 trees were planted between January and Disember 2023 through **FRIM CSR** tree planting programme, with the participation of **18 corporate bodies**.

PROGRAM TANGGUNGJAWAB SOSIAL KORPORAT (CSR) FRIM

FRIM terlibat aktif dalam aktiviti Tanggungjawab Korporat Sosial (CSR) dengan tujuan untuk meningkatkan imej korporat dan mempromosikan produk FRIM. Sebagai sebuah agensi kerajaan yang bertanggungjawab, FRIM berusaha memberikan pengalaman yang bermakna kepada pemegang taruhnya sambil menggalakkan menjaga kelestarian alam sekitar dan inisiatif hijau. Selain itu, FRIM memberikan peluang kepada entiti korporat untuk menjalankan aktiviti CSR mereka di kampus FRIM, yang telah mendapat sokongan dari syarikat tempatan dan antarabangsa serta institusi pengajian tinggi. Program penanaman pokok CSR FRIM telah menanam sebanyak 717 pokok antara Januari dan Disember 2023, melibatkan penyertaan 18 badan korporat. Program ini sejajar dengan Program Penghijauan Malaysia: Kempen Penanaman 100 Juta Pokok, yang mendapat sokongan aktif daripada FRIM.

FRIM CORPORATE SOCIAL RESPONSIBILITY PROGRAMME

FRIM actively engages in Corporate Social Responsibility (CSR) activities, with the aim of enhancing its brand reputation and promoting its products. As a responsible government agency, FRIM strives to provide exceptional experience to its stakeholders while promoting environmental sustainability and green initiatives. In addition to this, FRIM offers corporate entities the opportunity to conduct their own CSR activities on FRIM campus, which has garnered support from both local and international corporations and institutions of higher learning. A total of 717 trees were planted between January and Disember 2023 through FRIM CSR tree planting programme, with the participation of 18 corporate bodies. This programme aligns with the Malaysian Greening Programme's 100 Million Tree Planting Campaign, which FRIM actively supports.

Bil No	Organisasi Organisation
1	Kerjaya Property
2	RSPO (Rountable on Sustainable Palm Oil)
3	Pigeon Malaysia (Trading)
4	STM Lottery
5	Fibertex Personal Care
6	Mandarin Oriental KL
7	Azbil Malaysia
8	PETRONAS: Project Planning & Control (PP&C)
9	Hapag-Llyod Business Services (Malaysia)
10	Shearn-Delamore
11	OCBC Bank
12	Kum Hoi Engineering Industries
13	Universal Peak
14	RSPO (Rountable on Sustainable Palm Oil)
15	Coway (Malaysia)
16	Tokio Marine
17	Petronas (PD&T) & Jabatan Alam Sekitar, Putrajaya
18	Malaysian Technology Development Centre (MTDC)

PENYELIDIKAN TRANSLASI

TRANSLATIONAL RESEARCH

Kejayaan Pemindahan R&D Kacip Fatimah Kepada Komuniti FELCRA di Seberang Perak, Perak dan Lubuk Sireh, Perlis

Kajian biak baka kacip fatimah telah berjaya dikomersialkan kepada dua lagi koperasi FELCRA iaitu Koperasi Peserta Rancangan FELCRA Seberang Perak Berhad (KPRFSPB) dan Koperasi Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad (KPRFLSPB) melalui projek 'Keusahawanan Komuniti Peserta Berasaskan Herba' yang diketuai oleh Dr Farah Fazwa Md Ariff, Ketua Program Membaikbiak Tumbuhan FRIM. Projek ini merangkumi kerja-kerja mereka bentuk plot tanaman, menyelaras pembangunan rumah hijau bagi penubuhan ladang herba secara sistem selingan spesies kacip fatimah FAFAF01 dengan herba lain serta aktiviti komersialisasi teknologi penghasilan bahan tanaman dan produk akhir.

Pengembangan teknologi penanaman kacip fatimah ini mula diperkenalkan kepada komuniti pada tahun 2016 bersama Persatuan Peniaga Kecil Kampung Sagil melalui dana Program Pembangunan Komuniti Bioekonomi (BCDP) - Projek Penanaman Herba Kacip Fatimah yang ditaja oleh Malaysian Bioeconomy Development Corporation Sdn Bhd. Seterusnya, teknologi penanaman kacip fatimah FAFAF01 secara sistem selingan bersama herba lain seperti limau kasturi dan serai makan telah diperkenalkan kepada Koperasi Peserta Rancangan FELCRA Gugusan Bayai Berhad (KPRFGB) melalui Program Malaysia Social Innovation (MySI). Kejayaan projek-projek ini telah membawa kepada pengembangan teknologi kepada dua lagi koperasi peserta dibawah FELCRA Berhad iaitu KPRFSPB dan KPRFLSPB.

Projek keusahawanan komuniti peserta berasaskan herba yang bermula pada Mei 2022 hingga Disember 2023 ini melibatkan penyertaan lebih 100 orang peserta dari pelbagai peringkat umur dan latar belakang. Melalui projek ini, FRIM Incorporated Sdn Bhd telah berjaya memeterai dua perjanjian sub pelesenan bersama KPRFSPB dan KPRFLSPB untuk bekerjasama dalam pengkomersialan hasil projek penyelidikan dan pembangunan (R&D) kacip fatimah. Baka kacip fatimah FAFAF01 ini telah melalui beberapa siri R&D yang dijalankan lebih 10 tahun di makmal serta di ladang dan telah pun dipatenkan bawah Varieti Baharu Tumbuhan (PVBt) di bawah Jabatan Pertanian Malaysia dengan nombor pendaftaran PBR0323 pada bulan Mei 2023. Pemindahan R&D kacip fatimah ini akan diperluaskan lagi kepada individu dan syarikat yang berminat bagi memastikan kelestarian bekalan bahan mentah berkualiti tinggi kepada industri herba negara.

The Success of the Kacip Fatimah R&D Transfer to the FELCRA Communities in Seberang Perak, Perak and Lubuk Sireh, Perlis

The research on breeding of kacip fatimah has successfully been commercialized to two more FELCRA cooperatives, namely Koperasi Peserta Rancangan FELCRA Seberang Perak Berhad (KPRFSPB) and Koperasi Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad (KPRFLSPB) through a project entitled 'Community Entrepreneurship for Herbal-based Participants' lead by Dr Farah Fazwa Md Ariff, Head of FRIM Plant Improvement Programme. This project includes designing plant plots, coordinating the development of greenhouse facilities for the establishment of herb cultivation in an integrated system of kacip fatimah FAFAF01 with other herbs, as well as commercialization activities of the plant materials production and final product technologies.

The technology development on kacip fatimah cultivation was initially introduced in 2016 to the Kampung Sagil Small Traders Association through the Bioeconomy Community Development Programme (BCDP) funded by the Malaysian Bioeconomy Development Corporation Sdn Bhd for the project on cultivation of kacip fatimah. The cultivation technology of kacip fatimah FAFA01 intercropping with other herbs such as lime and lemongrass was then introduced to Koperasi Peserta Rancangan FELCRA Gugusan Bayai Berhad (KPRFGB) via Malaysia Social Innovation (MySI) Programme. The success of these projects has led to the development of technology for two more participating cooperatives under FELCRA Berhad, namely KPRFSPB and KPRFLSPB.

The Community Entrepreneurship for Herbal-based Participants project that began in May 2022 to December 2023 involved more than 100 participants from various ages and backgrounds. From this project, FRIM Incorporated Sdn Bhd has successfully signed 2 sub-licensed agreements with KPRFSPB and KPRFLSPB to collaborate in the commercialization of kacip fatimah research and development (R&D) results. The kacip fatimah breed (FAFAF01) has been developed through a series of R&D, and tested in the field and the laboratory for about 10 years. The breed was patented under the Plant Variety Protection (PVP), Department of Agriculture with a registration number PBR0323 in May 2023. This R&D transfer will be further extended to individuals or companies who are interested in ensuring the sustainable supply of high-quality raw materials for the national herbal industry.



Majlis pertukaran dokumen sub pelesenan antara FRIM Incorporated Sdn. Bhd. dan KPRFSPB pada 2 Februari 2023
Sub-licensing document exchange ceremony between FRIM Incorporated Sdn Bhd and KPRFSPB on 2 February 2023



Majlis pelancaran produk Teh Herba Warisan keluaran KPRFSPB yang dibimbing oleh penyelidik FRIM
The launching ceremony of the Teh Herba Warisan produced by KPRFSPB under the guidance of FRIM researcher



Peserta Bengkel Pemindahan Teknologi Projek Keusahawanan Komuniti Peserta Berasaskan Herba bersama KPRFSPB
The participants of technology transfer workshop of the Community Entrepreneurship for Herbal-based Participants project with KPRFSPB



Majlis menandatangani dokumen sub pelesenan antara FRIM Incorporated Sdn Bhd dan KPRFSPB pada 23 Jun 2023
The signing ceremony of sub-licensing document between FRIM Incorporated Sdn Bhd and KPRFSPB on 23 June 2023



KP FRIM merasmikan rumah hijau Projek Keusahwanan Komuniti Peserta Berasaskan Herba bersama KPRFLSPB
 FRIM DG officiated the green house of the Community Entrepreneurship for
 Herbal-based Participants Project with KPRFLSPB



Pelancaran LS Coffee sebagai simbolik pembangunan produk berasaskan pokok kacip fatimah
 The launching of LS Coffee a symbolic of product development based on kacip fatimah

PERKHIDMATAN PENSIJILAN PRODUK FRIM

FRIM PRODUCT
CERTIFICATION SERVICES



Clitoria ternatea

LAPORAN TAHUNAN

2023-2024

PELAKSANAAN PERKHIDMATAN PENSIJILAN PRODUK FRIM (FRIM PCS) 2022

IMPLEMENTATION OF FRIM PRODUCT CERTIFICATION SERVICES (FRIM PCS) 2022

SKIM PENSIJILAN PERABOT

Sehingga Disember 2023, sebanyak 87 syarikat masih aktif dengan Skim Pensijilan Perabot FRIM PCS dengan 230 sijil produk.

Tujuh syarikat telah digugurkan kerana tidak lagi berminat untuk meneruskan pensijilan produk atau telah tidak beroperasi. Pensijilan produk perabot ini adalah berdasarkan kepada kepatuhan produk terhadap kriteria yang telah ditetapkan oleh skim pensijilan dan juga melepasi ujian keselamatan, kekuatan, kestabilan dan ketahanan yang ditetapkan oleh standard BS EN. Selain daripada standard BS EN, FRIM PCS juga telah memperkenalkan pensijilan berdasarkan standard BIFMA bagi meluaskan lagi skop pensijilan produk perabot. Keperluan pensijilan produk perabot juga masih kekal menjadi syarat utama kepada syarikat untuk menyertai Kontrak Panel Berpusat Kementerian Kewangan Malaysia seperti mana yang termaktub di dalam PK 2.7 dan bagi pembekalan perabot sekolah di bawah Kementerian Pendidikan Malaysia.

FURNITURE CERTIFICATION SCHEME

Until December 2023, a total of 87 companies are still active with the FRIM PCS Furniture Certification Scheme with 230 product certificates.

Seven companies were dropped because they were no longer interested in pursuing product certification or had gone out of business. The certification of this furniture product is based on the product's compliance with the criteria set by the certification scheme and also passing the safety, strength, stability and durability tests set by the BS EN standard. Apart from the BS EN standard, FRIM PCS has also introduced certification based on the BIFMA standard to further expand the scope of furniture product certification. The furniture product certification requirement also remains the mandatory for companies to participate in the Malaysian Ministry of Finance's Centralized Panel Contract as stipulated in PK 2.7 and for the supply of school furniture under the Malaysian Ministry of Education.

Bil No	Zon Zone	Jumlah Syarikat Aktif Number of active companies	Jumlah Sijil Produk Aktif/ Number of active certificates
1	Utara/ Northern : Perlis, Kedah & Pulau Pinang	15	26
2	Tengah/ Central : Perak , Selangor & Kuala Lumpur	46	151
3	Selatan/ Southern : Negeri Sembilan, Melaka, Johor	8	20
4	Timur/ Eastern : Pahang, Kelantan & Terengganu	18	33
JUMLAH/ Total		87	230

Sebanyak 38 audit kilang telah dilaksanakan sepanjang 2023 bagi Skim Pensijilan Perabot. Maklumat jenis audit seperti di dalam jadual.

A total of 38 factory audits have been carried out throughout 2022 for the Furniture Certification Scheme. Details are as in the table.

Jenis Audit Type of Audit	Bilangan Syarikat Number of Companies
Audit Penilaian/ Evaluation Audit 1	2
Audit Pemantauan/ Surveillance Audit 1	8
Audit Pemantauan/ Surveillance Audit 2	4
Audit Penambahan Skop/ Extension of Scope Audit	6
Audit Pensijilan Semula/ Recertification Audit	18



Sepanjang 2023, sebanyak **empat sijil baharu** telah berjaya dikeluarkan dan pertambahan **satu syarikat baharu** yang menyertai **Skim Pensijilan Pintu Rintangan Api FRIM PCS**.

Throughout 2023, **four new certificates** have been successfully issued with the addition of **one new company** participating in the **FRIM PCS Fire Resistance Door Certification Scheme**.

SKIM PENSIJILAN PRODUK PINTU RINTANGAN API

Sepanjang 2023, sebanyak empat sijil baharu telah berjaya dikeluarkan dan pertambahan satu syarikat baharu yang menyertai Skim Pensijilan Pintu Rintangan Api FRIM PCS. Ini menjadikan, sebanyak 15 sijil produk rintangan api yang masih aktif sehingga Disember 2023 bagi enam buah syarikat.

FIRE DOOR RESISTANCE CERTIFICATION SCHEME

Throughout 2023, four new certificates have been successfully issued with the addition of one new company participating in the FRIM PCS Fire Resistance Door Certification Scheme. A total of 15 fire resistance product certificates for six companies are still active until December 2023.

Nama Syarikat Name of Company	Produk yang disijilkan Certified Products
1. Fitters Marketing Sdn Bhd	1. Composite Fire Resistant Doorsets (Single Leaf) –Model: PM F1H-SL
2. Gayador Sdn Bhd	1. Composite Fire Resistant Doorsets (Single Leaf)- Model: GD/MF/ONE/SL-01 2. Composite Fire Resistant Doorsets (Single Leaf)- Model:GD/MF/ONE/SL-02 3. Composite Fire Resistant Doorsets (Single Leaf)- Model:GD/MF/ONE/SL-03 4. Composite Fire Resistant Doorsets (Double Leaf)- Model:GD/MF/ONE/DL-02 5. Composite Fire Resistant Doorsets (Double Leaf)- Model:GD/MF/ONE/DL-03 6. Composite Fire Resistant Doorsets (Single Leaf/Metal Frame)- Model:GD/MF/ONE/SL/RW-R01) 7. Composite Fire Resistant Doorsets (Single Leaf/Timber Frame)- Model:GD/TF/ONE/SL/LW-01)
3. THI Hardware Trading Sdn Bhd	1. Composite Fire Resistant Doorsets (Single Leaf) – Model: TDR/MF/ONE/SL-01) 2. Composite Fire Resistant Doorsets (Double Leaf) – Model: TDR/MF/ONE/DL-01)
4. Superwood Industries Sdn. Bhd.	1. Composite fire resistant doorsets (double leaf with glass and timber frame) (PL/TF/ONE/DL-01) 2. Composite fire resistant doorsets (single leaf with glass and timber frame) – (PL/TF/ONE/SL-01)
5. Multisafedor (M) Sdn. Bhd.	1. Composite Fire Resistant Doorsets (Single-Leaf with Metal frame)- (DRT/MF/ONE/SL-1) 2. Composite Fire Resistant Doorsets (Double-Leaf with Glass and Metal Frame)- (DRT/MF/ONE/DL-01)
6. Jurusanwa Enterprise Sdn. Bhd.	1. Composite Fire Resistance Doorsets (Single-Leaf/ Metal Frame) (FD60SL-NS01)

Aktiviti Audit bagi Skim Pensijilan Pintu Rintangan Api
Audit Activities for Fire Door Certification Scheme

Jenis Audit Type of Audit	Bilangan Syarikat Number of Companies
Audit Penilaian/ Evaluation Audit	1
Audit Pemantauan/ Surveillance Audit	2
Audit Penambahan Skop/ Extension of Scope Audit	3
Audit Pensijilan Semula/ Recertification Audit	1

KAJIAN PEMBANGUNAN REKABENTUK, ERGONOMIK DAN KRITERIA PERABOT HIJAU

Sebanyak 40 prototaip perabot telah dihasilkan dan diuji pada 2023. Perabot yang gagal ujian ketahanan akan ditambahbaik bagi memastikan Kualiti perabot memenuhi keperluan standard yang ditetapkan. Beberapa sesi libat urus bersama pemegang taruh turut dilaksanakan bagi mendapatkan input berkenaan perabot hijau dan ekonomi kitaran negara.



Bengkel Pembangunan Framework/Blueprint Perabot Hijau ke Arah Ekonomi Kitaran pada 15-17 Ogos 2023 bersama pemegang taruh/industri
Green Furniture Framework/Blueprint Development Workshop towards a Circular Economy on 15-17 August 2023 with stakeholders/industry

DEVELOPMENT STUDY OF DESIGN, ERGONOMIC AND GREEN FURNITURE CRITERIA

A total of 40 furniture prototypes have been produced and tested in 2023. Furniture that fails the durability test will be improved to ensure the quality of the furniture meets the standard requirements. Several engagement sessions with stakeholders were also conducted to get input on green furniture and the country's cycle economy.



Bengkel Pembangunan dan Projek Rintis Reka Bentuk Perabot Makmal Hijau dalam Memacu Perolehan Hijau Kerajaan (GGP) bersama JKR, KPM dan pemegang taruh / industri di Putrajaya pada 20-23 Mac 2023
Green Laboratory Furniture Design Development Workshop and Pilot Project in Driving Government Green Procurement (GGP) with JKR, KPM, and stakeholders / industry in Putrajaya on 20-23 March 2023



Prototaip produk yang dihasilkan
Prototype products produced



Kegagalan ujian produk
Failure of product testing

DOKUMEN DAN PENERBITAN DOCUMENT AND PUBLICATION

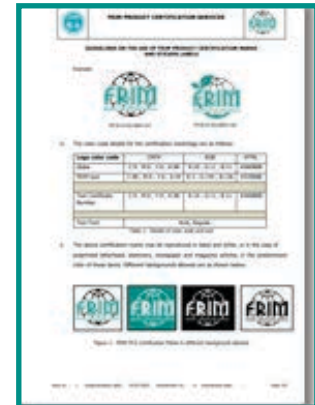
Antara dokumen dan penerbitan yang dikeluarkan pada 2023 adalah seperti berikut:
Among the documents and publications issued in 2023 were as follows:



Dokumen Skim Pensijilan
Perabot Hijau
Green Furniture Certification
Scheme Document



Dokumen Kriteria
Perabot Hijau
Green Furniture Criteria
Document



Panduan Penggunaan Tanda
Pensijilan dan Label Pelekat FRIM PCS
Guidelines On The Use Of FRIM PCS
Product Certification Marks And
Sticker Labels



Kertas kerja berkaitan pensijilan perabot bertajuk "Products Certification: Strategy And Enabling Factors Toward Competitiveness" telah dibentangkan pada tahun 2022 dan satu prosiding telah diterbitkan pada tahun 2023
A paper related to furniture certification entitled "Products Certification: Strategy And Enabling Factors Toward Competitiveness" was presented in 2022 and a proceeding was published in 2023



Buku Garis Panduan Pengujian
Perabot Di Kilang: Kerusi
Berasaskan Fabrik
In-Factory Furniture Testing
Guidebook: Fabric-Based Chairs

PROMOSI DAN KEMPEN KESEDARAN

FRIM PCS sentiasa mempromosikan perkhidmatan pensijilan produk yang ditawarkan kepada orang ramai melalui media sosial seperti Facebook (FRIM PCS), Instagram (FRIM_PCS), Youtube (FRIMPCS) dan laman sesawang (<https://pcs.frim.gov.my>). Selain daripada itu FRIM PCS turut menyertai pameran peringkat kebangsaan dan antarabangsa seperti Meet & Greet Menteri Kewangan pada 15 Februari 2023, Malaysia International Furniture Fair (MIFF) pada 1-4 Mac 2023, Export Furniture Exhibition pada 7-10 Mac 2023, Taklimat Pensijilan Hijau Kepada Pengusaha Perabot pada 26 Mei 2023 dan Simposium Perabot Hijau Kebangsaan pada 20-21 November 2023.



Meet & Greet with the Minister of Finance

PROMOTION AND AWARENESS CAMPAIGN

FRIM PCS regularly promotes product certification services offered to the public through social media such as Facebook (FRIM PCS), Instagram (FRIM_PCS), Youtube (FRIM PCS) and website (<https://pcs.frim.gov.my>). Apart from that, FRIM PCS also participated in the national and international exhibitions such as Meet & Greet with the Minister of Finance on 15 February 2023, Malaysia International Furniture Fair (MIFF) on 1-4 March 2023, Export Furniture Exhibition on 7-10 March 2023, Green Certification Briefing to Furniture Entrepreneurs on 26 May 2023 and the National Green Furniture Symposium on 20-21 November 2023.



Malaysian International Furniture Fair



Pameran Perabot Eksport
Export Furniture Exhibition



Taklimat Pensijilan Hijau kepada pihak industri
Green Certification Talk to Industries

LATIHAN TRAINING

Sebanyak tujuh latihan telah dijalankan bagi memastikan pengusaha dan personel yang terlibat dengan pensijilan produk sentiasa cakna dengan keperluan teknikal dan dokumentasi yang ditetapkan.

A total of seven training courses were conducted during the year involving FRIM PCS personnel as well as furniture manufacturer. List of training are as follows:

Bil No	Nama Latihan Name of Training	Tarikh Date	Peserta Participant
1.	Latihan Sesi Kesedaran & Ulang kaji ISO/IEC 17065 Awareness & Refresher Course ISO/IEC 17065	30/05/2023	Personel FRIM PCS, ahli CP dan Juruaudit
2	Latihan Pengenalan kepada Mekanik Pesongan Training on Introduction to Deflection Mechanics	13/07/2023	Personel FRIM PCS , MP dan Juruaudit FRIM PCS, MP personel and auditors
3	Latihan Pengenalan kepada Jejak Carbon Carbon Training on Introduction to Carbon Footprint	07/08/2023	Personel FRIM PCS, MP dan Juruaudit FRIM PCS, MP personel and auditors
4	Kursus 1/ Course I: 'Circular Economy and Economic Impact Analysis of the Benefit Streams of FRIM Product Certification Services'	07 - 08/09/2023	Personel FRIM PCS dan MP FRIM PCS and MP personel
5	Kursus/Course on Asset Life Cycle Cost	13 - 14/09/2023	Personel FRIM PCS dan MP FRIM PCS and MP personel
6	Kursus II/ Course II: 'Valuation of Intangible & Non-Market Transacted Impacts and Life Cycle Costing of FRIM Product Certification Services'	12-13/12/2023	Personel FRIM PCS dan MP FRIM PCS and MP personel
7	Kursus/ Course on ISO/IEC 17065:2012 SIRIM Lead Auditor	18-22/12/2023	Personel FRIM PCS, MP dan Juruaudit FRIM PCS, MP personel and auditors



Latihan Sesi Kesedaran & Ulang kaji ISO/IEC 17065
Awareness & Refresher Course ISO/IEC



Latihan Pengenalan kepada Mekanik Pesongan
Introduction to Deflection Mechanics training



Latihan Pengenalan kepada Mekanik Pesongan
Introduction to Deflection Mechanics training



Course I: 'Circular Economy and Economic Impact
Analysis of the Benefit Streams of FRIM Product Certification
Services'



Kursus Asset Life Cycle Cost



Course II: 'Valuation of Intangible & Non-Market
Transacted Impacts and Life Cycle Costing of FRIM Product
Certification Services'



Kursus ISO/IEC 17065:2012 SIRIM Lead Auditor

SENARAI PELANGGAN LIST OF CUSTOMERS

FRIM PCS mempunyai 103 pelanggan bagi Skim Pensijilan Perabot dan Skim Pintu Rintangan Api.
FRIM PCS has 103 customers for Furniture Product Certification Scheme and Fire Door Resistance Scheme

1. ABM Two Sdn. Bhd.
2. Adunan Komersil (M) Sdn. Bhd.
3. Alwy Development Sdn. Bhd.
4. A.M.A.B Bina Enterprise Sdn. Bhd
5. Amizu Industries Sdn. Bhd.
6. Anggun Sofa & Iterior Sdn. Bhd.
7. Apex Office Furniture Exporter Sdn. Bhd.
8. Astonbina Sdn Bhd
9. Axec Services & Trading Sdn. Bhd.
10. Azas Rekalogam Sdn Bhd
11. Bizmart Resources Sdn. Bhd
12. B.Tis Manufacturer Sdn. Bhd.
13. Berestu Resources (M) Sdn. Bhd.
14. Bidin Bin Jasin Sdn. Bhd.
15. BPNP Konsortium Sdn. Bhd
16. Camar Kreatif Sdn. Bhd.
17. Cantuman Anggerik Sdn. Bhd
18. Citarasa Teraju Sdn. Bhd.
19. Coway (Malaysia) Sdn Bhd
20. DPM Sdn. Bhd.
21. Fair Touch Sdn. Bhd
22. Felab Engineering Sdn. Bhd.
23. Firus Sinar Lndustry Sdn. Bhd.
24. Fitters Markering Sdn. Bhd.
25. Furnitech Industries (M) Sdn. Bhd
26. Fuzi Dream Furniture Sdn Bhd
27. Gayadoor Sdn. Bhd.
28. Ghaj Enterprise
29. HL Brothers Industries Sdn. Bhd.
30. Hashim Bakar Sdn Bhd
31. Hasro Furniture Gallery (M) Sdn. Bhd
32. Homestead Wood Industries Sdn. Bhd.
33. Ideation Sdn. Bhd.
34. Impressive Transform Sdn. Bhd.
35. Jatimas Furniture Sdn. Bhd.
36. Jurusanwa Enterprise Sdn. Bhd.
37. Juszjunn Empire Sdn. Bhd.
38. Kabimas Manufacturing Sdn. Bhd
39. Keris Sepakat Sdn. Bhd.
40. Kilasan Venture (M) Sdn. Bhd
41. KNS Creative Sdn. Bhd.
42. Konsortium Bekas Tentera (Utara) Sdn. Bhd.
43. K.U.S Industries (M) Sdn. Bhd
44. Kumpulan Novalab (M) Sdn. Bhd.
45. Lembut Bestari Sdn. Bhd.
46. Mabita Sdn. Bhd.
47. MFL Industry Sdn Bhd
48. Majlis Pemulihan Negeri Kelantan
49. Malpro Industries Sdn. Bhd.
50. Mazarul Enterprise Sdn. Bhd
51. Meranti Marshal Sdn. Bhd.
52. Masitu Moulding Sdn. Bhd.
53. Metro Manufacturing Sdn. Bhd.
54. Mirotrad Sdn. Bhd.
55. Moccis Furniture Sdn. Bhd.
56. Mohd Abidin Yahaya (Perlis) Sdn. Bhd.
57. MS Zabki Sdn Bhd
58. Multisafedor (M) Sdn. Bhd.
59. Murni Sdn. Bhd.
60. Mustajab Ikhlas Sdn. Bhd.
61. Mutiara Woodwork Industries Sdn. Bhd.
62. MYR Construction Sdn. Bhd.
63. Nadya Properties Sdn. Bhd
64. Nagasteel Equipment Sdn. Bhd.
65. Nik Lah Sdn. Bhd.
66. One Tech (M) Sdn Bhd
67. Paharudin Industries Sdn. Bhd.
68. Perabut Manaq (Perak) Sdn. Bhd.
69. Perabot Matang Sdn. Bhd.
70. Perniagaan Hussein Che Lad Sdn Bhd
71. Pointray (Malaysia) Sdn. Bhd.
72. Prisma Tegas Sdn. Bhd
73. Probil Industries (M) Sdn. Bhd
74. PSB Decoration Sdn. Bhd.
75. PT Wood Industry (M) Sdn Bhd
76. Puncak Bumi Utama (M) Sdn. Bhd.
77. Purnama Bersatu Sdn. Bhd.
78. Purplestar Industries Sdn. Bhd
79. Rabvolks Homes Sdn Bhd
80. Ramaco Bena Sdn Bhd
81. Raudah Marketing & Supplies Sdn Bhd
82. Redah Jaya Sdn. Bhd
83. Regal Bonus (M) Sdn. Bhd.
84. Renkon Holdings (M) Sdn. Bhd
85. Ruffntuff Sdn. Bhd.
86. SAS Teknik Sdn. Bhd.
87. Semeru Kabinet Sdn. Bhd.
88. Senada Perkasa Sdn Bhd
89. S.M. Industries (M) Sdn. Bhd.
90. S.M. Plastics Sdn. Bhd.
91. Setia Meranti Sdn. Bhd.
92. Subki Kassim Sdn Bhd
93. Subky Sdn. Bhd.
94. Superwood Industries Sdn. Bhd.
95. Talnoor Enterprise Sdn. Bhd.
96. Teras Kreatif Sdn. Bhd
97. THI Hardware Trading Sdn. Bhd.
98. Timber Dynamic Corporations Sdn. Bhd.
99. Tirai Inovatif Sdn. Bhd.
100. Triumphant Gallery Corporation Sdn. Bhd.
101. Tuju Perkasa Sdn. Bhd.
102. Wadah Emas Sdn. Bhd.
103. Zilanza Urusniaga Sdn. Bhd

PENGURUSAN KUALITI

QUALITY MANAGEMENT



Telosma cordata

LAPORAN TAHUNAN

ANNUAL REPORT

SISTEM PENGURUSAN KUALITI (SPK)

QUALITY MANAGEMENT SYSTEM (QMS)

SISTEM PENGURUSAN KUALITI MS ISO 9001:2015

FRIM telah memperoleh pensijilan MS ISO 9001 secara korporat sejak 2007. Skop pensijilan ini meliputi semua perkhidmatan yang ditawarkan oleh FRIM iaitu penyelidikan & pembangunan, ujian, perundingan, latihan, sewaan, jualan bahan, pembekalan bahan rujukan, rekreasi, pembekalan perkhidmatan khusus, pengurusan harta intelek dan prakomersialisasi serta perkhidmatan sokongan lain.

AUDIT DALAMAN MS ISO 9001:2015

Audit dalaman MS ISO 9001 telah dilaksanakan bagi enam bahagian di FRIM. Penggiliran audit dalaman dilaksanakan sekali dalam tempoh dua tahun bagi setiap Cawangan/ Unit/ Makmal/Bengkel dan Stesyen Penyelidikan (CUMBS) di FRIM mengikut giliran. Pada 2023, audit telah berjaya dilaksanakan ke atas 34 CUMBS di FRIM. Proses audit ini melibatkan 40 orang juruadit dalaman FRIM. Hasil penemuan adalah seperti berikut:

QUALITY MANAGEMENT SYSTEM MS ISO 9001:2015

FRIM has obtained MS ISO 9001 certification corporately since 2007. The scope of certification covers all services offered by FRIM namely research & development, testing, consultancy, training, rental, material sales, supply of reference materials, recreation, provision of specialized services, intellectual property management and pre-commercialisation as well as other support services.

INTERNAL AUDIT MS ISO 9001:2015

MS ISO 9001 internal audit was conducted for six divisions in FRIM. Internal audit rotation is carried out once in two years for each Branch/ Unit/Laboratory/Workshop and Research Station (CUMBS) in FRIM by rotation. In 2023, audits were successfully conducted for 34 CUMBS in FRIM. The audit process involved 40 FRIM internal auditors. The findings are as follows:

Bahagian Division	Tarikh Audit Audit Date	Jumlah CUMBS CUMBS Total	Jumlah Penemuan Number of Findings
Inovasi dan Komersialisasi Innovation and Commercialization	29/5 - 1/6/2023	3	7
Perkhidmatan Teknikal Technical Services	6 - 7/6/2023	4	5
Dasar Pengurusan Management Policy	8 - 16/6/2023	8	12
Pentadbiran Administration	8 - 22/6/2023	4	8
Sumber Manusia Human Resource	21 - 27/6/2023	4	7
Kewangan Finance	22 - 23/6/2023	3	4
Biodiversiti Hutan Forest Biodiversity	24 - 29/6/2023	8	14
JUMLAH / TOTAL		34	57



Sesi audit dalam MS ISO 9001:2015
Internal audit MS ISO 9001:2015 session

AUDIT LUAR MS ISO 9001:2015

Audit Pemantauan MS ISO 9001:2015 telah dilaksanakan dengan jayanya pada 11-12 September 2023 oleh juruaudit dari Intertek International Sdn Bhd. Juruaudit yang terlibat adalah Mohammad Muiz'zuddin dan Ir. Razali Abdul Rahim. Tiada penemuan ketidakpatuhan yang diusulkan oleh juruaudit, hanya tiga peluang penambahbaikan. Tahun ini merupakan tahun ke 17 FRIM mengekalkan skop pensijilan "Provision of Research & Development and Support Services for the Development of Forestry Sector".



EXTERNAL AUDIT MS ISO 9001:2015

The MS ISO 9001:2015 Surveillance Audit was successfully conducted on 11 to 12 September 2023 by auditors from Intertek International Sdn Bhd. The auditors involved were Mohammad Muiz'zuddin and Ir. Razali Abdul Rahim. No findings of non-compliance proposed by the auditor, only three opportunity of improvement.



Sesi audit luar MS ISO 9001:2015
External audit MS ISO 9001:2015 session

SKIM AKREDITASI MAKMAL MALAYSIA (SAMM) MS ISO/IEC 17025:2017

Sebanyak 15 makmal di FRIM masih mengekalkan Sijil Skim Akreditasi Makmal Malaysia (SAMM) sebagaimana keperluan MS ISO/IEC 17025:2017, Polisi Akreditasi, Polisi SAMM dan Kriteria Spesifik ditetapkan oleh Jabatan Standard Malaysia. Bidang dan makmal yang terlibat adalah seperti berikut:

LABORATORY ACCREDITATION SCHEME MALAYSIA (SAMM) MS ISO/IEC 17025:2017

A total of 15 laboratories in FRIM still maintain the Malaysian Laboratory Accreditation Scheme (SAMM) Certificate according to the requirements set by MS ISO/IEC 17025:2017, Accreditation Policy, SAMM Policy and Specific Criteria of the Department of Standards Malaysia. The fields and laboratories involved are as follows:

Bidang Fields	Nombor SAMM SAMM Number	Makmal yang terlibat Laboratories involved
Makmal Pengujian Mekanikal dan Fizikal /Mechanical And Physical Testing Laboratory (MPTL)	SAMM 205	1) Paper Testing Laboratory (PTL) 2) Fire Protection Testing Laboratory (FPL) 3) Furniture Testing Laboratory (FTL) 4) Wood Drying Laboratory (WDL) 5) Timber Engineering Laboratory (TEL) 6) Wood Finishing Laboratory (MKK) 7) Wood Lamination Laboratory (WLL) 8) Wood Composite Testing Laboratory (WCTL) 9) Natural Product Quality Control Laboratory (NPQC)
Makmal Pengujian Kimia/ Chemical Testing Laboratory (CTL)	SAMM 154	1) Wood Preservative Analytical Laboratory (MAAK) 2) Phytochemical Laboratory (FK) 3) Soil Chemistry Laboratory (MKT) 4) Wood Composite Testing Laboratory (WCTL) 5) Natural Product Quality Control Laboratory (NPQC)
Makmal Pengujian Mikrobiologi & Biologi/ Microbiological & Biological Testing Laboratory (MBTL)	SAMM 558	1) Wood Preservative Analytical Laboratory (MAAK) 2) Phytochemical Laboratory (FK) 3) Soil Chemistry Laboratory (MKT) 4) Wood Composite Testing Laboratory (WCTL) 5) Natural Product Quality Control Laboratory (NPQC) 1) Wood Mycology Laboratory (WML) 2) Wood Entomology Laboratory (WEL) 3) Biology Laboratory (MBIO)

AUDIT DALAMAN ISO/IEC 17025:2017

Audit Dalaman MS ISO/IEC 17025 telah dilaksanakan pada 12 hingga 20 Oktober 2023 bagi 15 makmal yang terlibat. Seramai 29 orang juruaudit dalam FRIM terlibat dalam siri auditan mengikut skop ujian yang telah diakreditasi. Sebanyak 3 ketidakpatuhan Minor dan 28 Peluang Penambahbaikan telah diusulkan oleh juruaudit.

INTERNAL AUDIT ISO/IEC 17025:2017

The MS ISO/IEC 17025 Internal Audit was conducted from 12 to 20 October 2023 for 15 laboratories involved. A total of 29 auditors in FRIM were involved in a series of audits according to the scope of the accredited tests. A total of 3 minor non-compliances and 28 Improvement Opportunities were proposed by the auditors.

SISTEM PENGURUSAN KESELAMATAN MAKLUMAT ISO/IEC 27001: 2013

FRIM telah memperoleh Sijil Sistem Pengurusan Keselamatan Maklumat ISO/IEC 27001:2013 bagi skop "Sistem Pengurusan Keselamatan Maklumat (ISMS) Bagi Pengoperasian Pusat Data Dan Pengurusan Maklumat Penyelidikan Perhutanan Tropika Melalui Aplikasi RIMS di FRIM" sejak 3 Mei 2013. Skop pensijilan ini melibatkan Cawangan Teknologi Maklumat dan Cawangan Dasar dan Perancangan Penyelidikan. FRIM akan melaksanakan ISMS mengikut versi standard yang baharu iaitu ISO/EC 27001:2022 pada tahun 2024.

INFORMATION SECURITY MANAGEMENT SYSTEM ISO/IEC 27001:2013

FRIM has obtained the ISO/IEC 27001:2013 Information Security Management System Certificate for the scope of "Information Security Management System (ISMS) for Data Centre Operation and Tropical Forestry Research Information Management through RIMS Application at FRIM" since 3 May 2013. The scope of this certification involves the Information Technology Branch and the Research Policy and Planning Branch. FRIM will implement ISMS according to the new standard version of ISO/EC 27001:2022 in 2024.



Sesi audit luar ISO/IEC 27001:2013
External audit ISO/IEC 27001:2013 session



AKREDITASI FRIM SEBAGAI BADAN PENSIJILAN PRODUK ISO/IEC 17065:2015

FRIM telah diakreditasi sebagai Badan Pensijilan Produk sejak 12 Disember 2014 bagi enam skop ujian perabot mengikut keperluan standard BS EN. Bagi mengekalkan akreditasi ini Audit Dalam telah dilaksanakan pada 8 & 9 Februari 2023. Tiada audit luar yang dilaksanakan pada tahun kerana kitaran audit adalah dalam tempoh satu setengah tahun. Pengembangan skop akan dilaksanakan pada tahun 2024 bagi standard ujian perabot yang belum dimasukkan, skim pensijilan hijau dan pintu rintangan api.

FRIM ACCREDITATION AS ISO/IEC PRODUCT CERTIFICATION BODY 17065:2015

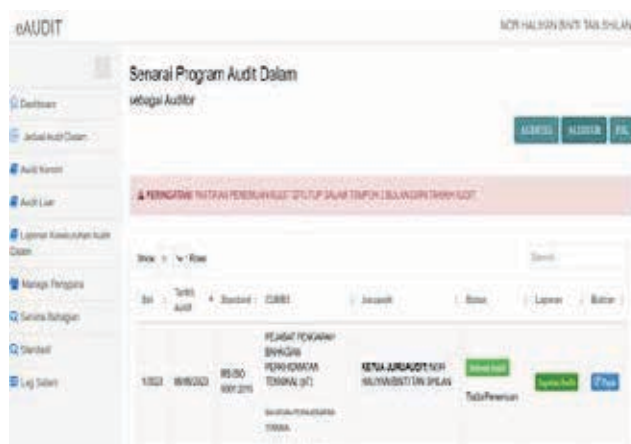
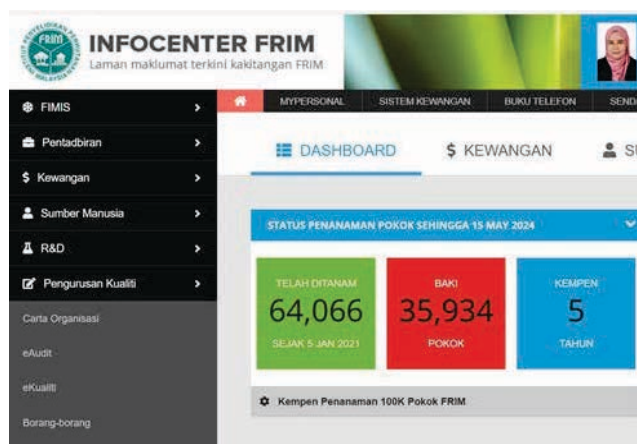
FRIM has been accredited as a Product Certification Body since 12 December 2014 for six scopes of furniture testing in accordance with the requirements of the BS EN standard. To maintain this accreditation, the Internal Audit was conducted on 8 & 9 February 2023. There were no external audits conducted during the year as the audit cycle was within one and a half years. The extension of scope will be implemented in 2024 for other furniture testing standards, green certification schemes and fire resistance doors.

SISTEM E-AUDIT

Cawangan Pengurusan Kualiti dan Cawangan Teknologi Maklumat telah membangunkan Sistem eAudit bagi memudahkan juruaudit dalam FRIM membuat pelaporan penemuan audit secara dalam atas talian. Sistem ini telah digunakan sepenuhnya bermula pada Mei 2023.

E-AUDIT SYSTEM

The Quality Management Branch and Information Technology Branch have developed the eAudit System to facilitate FRIM's auditors to report their audit findings online. This system has been fully adopted starting in May 2023.



LATIHAN TRAINING

Sebanyak tujuh latihan telah dijalankan bagi memastikan kompetensi juruaudit dan personel FRIM di tahap yang baik.

A total of seven trainings were conducted during the year involving FRIM PCS personnel as well as furniture manufacturer. List of training are as follows:

Bil No	Nama Latihan Name of Training	Tarikh Date	Peserta Participant
1.	Awareness and Refresher Course MS ISO 9001:2015	23/05/2023	46
2	Internal Audit MS ISO 9001 Training	24-25/05/2023	61
3	Implementing and Understanding MS ISO/IEC 17025	31/5 & 1/6/2023	58
4	Awareness of MS ISO/IEC 27001:2022	6 /6/2023	30
5	Awareness And Refresher Course MS ISO/IEC 17025 (Genetic Laboratory)	11/07/2023	20
6	ISO/IEC 17025:2017 Documentation Course for Genetic Laboratory	16-17/08/ 2023	20
7	Training on Validation and Verification of Analytical Methods	25/08/2023	20
8	Measurement of Uncertainty Training	3/10/2023	20



Latihan audit dalaman MS ISO 9001
Internal Audit MS ISO 9001 Training



Kursus kesedaran MS ISO/IEC 27001:2022
Awareness courses on MS ISO/IEC 27001:2022



Pelaksanaan dan pemahaman MS ISO/IEC 17025
Implementing and Understanding MS ISO/IEC 17025



Kursus kesedaran dan ulang kaji MS ISO 9001:2015
Awareness and Refresher Course MS ISO 9001:2015

SUMBER MANUSIA

HUMAN RESOURCES



Epiphyllum oxypetalum

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REVISI 2023

KOMPOSISI PENJAWAT AWAM

STAFF COMPOSITION

Perjawatan Establishment

Komposisi Penjawat Awam/Staff Composition

Komposisi Penjawat Awam Staff Composition	Tetap Permanent	Bil./No. Kontrak / Contract
Bilangan penjawat awam/Total number of staff	592	107
Kategori/Categories		
Pegawai/Officer (JUSA)	8	
Pegawai penyelidik/Research officer	167	29
Pegawai (selain pegawai penyelidik)/Officer (Other than research officer)	20	13
Penolong pegawai penyelidik/Assistant research officer	37	10
Penolong pegawai (selain penolong pegawai penyelidik)/ Assistant officer (other than assistant research officer)	41	4
Penjawat awam (Kumpulan Pelaksana)/ Public servant (Support Group)	319	51

Pelantikan (Tetap)/Appointment (Permanent)

Bahagian/Program/ Cawangan Division/programme/ Branch	Nama Name	Jawatan/gred Post/grade	Tarikh Iantikan Date of appointment
Keluaran Hutan/ Perneriksaan Pensijilan Produk	Dr Mohd Amirul Mukmin Abdullah	Pegawai Penyelidik Gred Q43	6/11/2023
Keluaran Hutan	Nur Syahina Yahya	Pegawai Penyelidik Gred Q41	1/11/2023
Keluaran Hutan	Nur Syauqina Syasya Mohd Yusoff	Pegawai Penyelidik Gred Q41	1/11/2023
Keluaran Hutan	Nur Yusra Mt Yusuf	Pegawai Penyelidik Gred Q41	1/11/2023
Dasar Pengurusan/ Audit Dalam	Nor Baiyah Safari	Juruaudit Gred W41 (W41/44)	3/7/2023
Dasar Pengurusan/ Undang- Undang	Nursyahirah Zulkifli	Pegawai Undang- Undang Gred L41 (L41/44)	10/8/2023

Bahagian/Program/ Cawangan Division/programme/ Branch	Nama Name	Jawatan/gred Post/grade	Tarikh Iantikan Date of appointment
Pentadbiran/ Perolehan	Nur Syaqirah Mohamed Fozi	Penolong Akauntan Gred W29	1/2/2023
Perhutanan & Alam Sekitar/ Alam Sekitar & Perubahan Iklim	Mursyida Hanan Mohd Noor	Pembantu Setiausaha Pejabat Gred N19	9/1/2023
Bioteknologi Perhutanan/ Hutan Ladang	Nursyafira Mohd Khir	Pembantu Setiausaha Pejabat Gred N19	1/2/2023
Biodiversiti Hutan/ Biodiversiti Flora	Siti Nurhidayah Dzulkefli	Pembantu Setiausaha Pejabat Gred N19	1/9/2023
Perkhidmatan Teknikal/ Teknologi Maklumat	Muhammad Fadhli Roslan	JuruFotografi Gred B21	1/2/2023
Pentadbiran/ Khidmat Pengurusan	Armain Ihssam Ahmad	Pemandu Kenderaan Gred H11	1/3/2023
Pentadbiran/ Khidmat Pengurusan	Adam Abdullah	Pemandu Kenderaan Gred H11	1/3/2023
Pentadbiran/ Khidmat Pengurusan	Mohd Hafiz Md Mukhtar	Pemandu Kenderaan Gred H11	3/7/2023

Pelantikan ([Kontrak] /Appointment [Contract])

Bahagian Division	Nama Name	Jawatan/gred Post/grade	Tarikh Iantikan Date of appointment
Perhutanan & Alam Sekitar (SPF Pasoh)	Musalmah Nasardin	Pegawai Penyelidik Gred Q41	3/1/2023
Inovasi & Komersialisasi	Adib Zubaidi Rashid	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Norzielawati Salleh	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Syazwani Azeman	Pegawai Penyelidik Gred Q41	3/1/2023
Hasilan Semula Jadi	Madiah Muhammad Nawi	Pegawai Penyelidik Gred Q41	3/1/2023
Inovasi & Komersialisasi	Khairul Iruwan Abdullah	Pegawai Penyelidik Gred Q41	3/1/2023
Inovasi & Komersialisasi	Muhammad Yatimi Othman	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Nor Hazwani Ahmad Ruzman	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Nurfarhana Hizan Hijas	Pegawai Penyelidik Gred Q41	3/1/2023

Bahagian Division	Nama Name	Jawatan/gred Post/grade	Tarikh Iantikan Date of appointment
Perancangan Penyelidikan	Lugman Hakim Adzis	Pegawai Penyelidik Gred Q41	3/1/2023
Perhutanan & Alam Sekitar	Law Shu Hui	Pegawai Penyelidik Gred Q41	3/1/2023
Bioteknologi Perhutanan	Nur Nabilah Alias	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Noor Faradiana Md Fauzi	Pegawai Penyelidik Gred Q41	3/1/2023
Perhutanan & Alam Sekitar	Nurchahaya Khairany Mohamad Azmi	Pegawai Penyelidik Gred Q41	3/1/2023
Perhutanan & Alam Sekitar	Nik Faizu Nik Hassan	Pegawai Penyelidik Gred Q41	3/1/2023
Bioteknologi Perhutanan	Hazwani Humaira' Zakaria	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Muhammad Syaridzwan Baharudin	Pegawai Penyelidik Gred Q41	3/1/2023
Hasilan Semula Jadi	Sahrim Lias	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Muhammad Alif Azyraf Azmi	Pegawai Penyelidik Gred Q41	3/1/2023
Inovasi & Komersialisasi	Nur Ashmalina Tasnim Mohd 'Ashraf	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Sarah Nabila Rosli	Pegawai Penyelidik Gred Q41	3/1/2023
Hasilan Semula Jadi	Nurshahidah Mohd Rusli	Pegawai Penyelidik Gred Q41	3/1/2023
Bioteknologi Perhutanan	Nur Aini Mohd Kasim	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Cheah Yih Horng	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Siti Nur Fatinah Khairi	Pegawai Penyelidik Gred Q41	3/1/2023
Biodiversiti Hutan	Yasmin Sarah Abd Majid	Pegawai Penyelidik Gred Q41	3/1/2023
Perancangan Penyelidikan	Mahmud Husni Abd Hadi	Pegawai Penyelidik Gred Q41	3/1/2023
Bioteknologi Perhutanan	Faridah Ahmad Azam	Pegawai Penyelidik Gred Q41	3/1/2023
Perancangan Penyelidikan	Intan Nurulhani Baharuddin	Pegawai Penyelidik Sosial N41	3/1/2023

Bahagian Division	Nama Name	Jawatan/gred Post/grade	Tarikh Iantikan Date of appointment
Perancangan Penyelidikan	Nor Atiqah Mohd Fauzi	Pegawai Penyelidik Sosial N41	3/1/2023
FRIM PCS	Nurfaizatul Ashikin Mokhtar	Pegawai Tadbir N41	3/1/2023
FRIM PCS	Nur Elysa Shakira Othman	Pegawai Tadbir N41	3/1/2023
Perkhidmatan Teknikal	Intan Dalina Rafidah Othman @ Osman	Pegawai Teknologi Maklumat F41	3/1/2023
Perancangan Penyelidikan	Rosniza Rawi	Pegawai Teknologi Maklumat F41	3/1/2023
FRIM PCS	MaizatulNajwa Mahidan	Pegawai Teknologi Maklumat F41	3/1/2023
Perkhidmatan Teknikal	Nazatul Najlaa' Hazry	Pegawai Teknologi Maklumat F41	3/1/2023
Biodiversiti Hutan	Muhammad Faris Zamri	Pegawai Teknologi Maklumat F41	3/1/2023
Biodiversiti Hutan	Mohd Rosli Che Wan Pura	Pegawai Teknologi Maklumat F41	27/3./023
Hasilan Semula Jadi	Siti Nur Aisyah Mohd Hashim	Pegawai Sains C41	0/08/2023
Keluaran Hutan	Muhammad Azidan Zakaria	Pereka B41	04/01/2023
Keluaran Hutan	Muhammad Ikhwan Mohd Nor	Pereka B41	03/01/2023
Keluaran Hutan	Ahmad Salihin Sulaiman	Pereka B41	3/1/2023
Kewangan	Ahmad Fareez Zainuddin	Akauntan WA41	3/1/2023
Inovasi & Komersialisasi	Mohd Faizal Arsad	Penolong Pegawai Penyelidik Q29	3/1/2023
Perhutanan & Alam Sekitar	Syaierah Abdullah	Penolong Pegawai Penyelidik Q29	3/1/2023
Perhutanan & Alam Sekitar	Norhidayah Abd Rasid	Penolong Pegawai Penyelidik Q29	3/1/2023
Perhutanan & Alam Sekitar	Nur Syuhadah Isa	Penolong Pegawai Penyelidik Q29	3/1/2023
Keluaran Hutan	Nurul Ain Nadirah Jamaluddin	Penolong Pegawai Penyelidik Q29	3/1/2023
Bioteknologi Perhutanan	Fatin Nurina Muhammad Faizal	Penolong Pegawai Penyelidik Q29	3/1/2023

Bahagian Division	Nama Name	Jawatan/gred Post/grade	Tarikh Iantikan Date of appointment
Perhutanan & Alam Sekitar	Nazmi Ma'som	Penolong Pegawai Penyelidik Q29	3/1/2023
Biodiversiti Hutan	Aziemah Kinan	Penolong Pegawai Penyelidik Q29	1/03/2023
Bioteknologi Perhutanan	Mohd Syamin Aizat Mohamed Yusof	Penolong Pegawai Penyelidik Q29	4/1/2023- 30/4/2023(Q19) 2/5/2023- 31/12/2023 (Q29)
Perhutanan & Alam Sekitar	Muhammad Al-Amin Abd Hamid	Penolong Pegawai Penyelidik Q29	3/1/2023 hingga 31/10/2023 (Q19) 1/11/2023 hingga 31/12/2023 (Q29)
Perancangan Penyelidikan	Tuan Anis Nadia Tuan Mohd Saipudin	Penolong Pegawai Tadbir N29	3/11/2023
FRIM PCS	Nur Syazana Yasmin Sholehuddin	Penolong Pegawai Tadbir N29	3/1/2023
Kewangan	Norfazira Muhamad Pauzi	Penolong Akauntan W29	3/1/2023
Perhutanan & Alam Sekitar	Sofiya Zulaikha Ruslan	Penolong Juruukur Bahan JA29	3/1/2023
Pentadbiran	Mazliana Malek	Penolong Juruukur Bahan JA29	3/1/2023
Perancangan Penyelidikan	Mohd Rizzal Mat Yusoff	Pembantu Penyelidik Q19	3/1/2023
Hasilan Semula Jadi	Nur Munirah Sabki	Pembantu Penyelidik Q19	3/1/2023
Perancangan Penyelidikan	Nurul Haslinda Makhtar	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Zulkarnaen Muniran	Pembantu Penyelidik Q19	3/1/2023
Keluaran Hutan	Syed Afif Syed Osthman	Pembantu Penyelidik Q19	3/1/2023
Keluaran Hutan	Muhammad Wafiq Mohd Noor	Pembantu Penyelidik Q19	3/1/2023
Biodiversiti Hutan	Norleyana Azman	Pembantu Penyelidik Q19	3/1/2023
Perancangan Penyelidikan	Hanis Wahida Zahari	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Mohd Fairuznizam Ibrahim	Pembantu Penyelidik Q19	3/1/2023

Bahagian Division	Nama Name	Jawatan/gred Post/grade	Tarikh Iantikan Date of appointment
Perhutanan & Alam Sekitar (SPF Pasoh)	Mohammad Amirul Aswan Ibrahim	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Noor Syahirah Zulkefli	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Nur Ainaa Nabilah Mohamad Bahtiar	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Faizal Irwan Abdullah	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Muhammad Hazrul Izzat Hairul Padillah	Pembantu Penyelidik Q19	6/1/2023
Perancangan Penyelidikan	Muhammad Azmy Sait	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Muhamad Nur Iman Ahmad Azam	Pembantu Penyelidik Q19	3/1/2023
Biodiversiti Hutan	Nur Hazwanie Abd Halim	Pembantu Penyelidik Q19	3/1/2023
Biodiversiti Hutan	Siti Nuratikah Deraman	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Mohd Hafizuddin Hasromi	Pembantu Penyelidik Q19	3/1/2023
Biodiversiti Hutan	Badrul Amin Jaffar	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Susila Hawa Fadzilah	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Nurul Noor Fatiha Ahmad	Pembantu Penyelidik Q19	3/1/2023
Hasilan Semula Jadi	Theresa Luli Anak Rerang	Pembantu Penyelidik Q19	3/1/2023
Perhutanan & Alam Sekitar	Ahmad Ariff Audi Mohamad	Pembantu Penyelidik Q19	4/1/2023
Perhutanan & Alam Sekitar	Mohd Nazrin Mohd Arsat	Pembantu Penyelidik Q19	16/1/2023
Hasilan Semula Jadi	Siti Nasuha Zainodin	Pembantu Penyelidik Q19	1/3/2023
Keluaran Hutan	Puteri Farahin Shameera Badrul Hisyam	Pembantu Penyelidik Q19	1/3/2023
Perhutanan & Alam Sekitar	Aina Zayani Mohammad Amri	Pembantu Penyelidik Q19	1/3/2023
Perhutanan & Alam Sekitar	Nurul Faihira Kamaruzaman	Pembantu Penyelidik Q19	1/3/2023

Bahagian Division	Nama Name	Jawatan/gred Post/grade	Tarikh lantikan Date of appointment
Bioteknologi Perhutanan	Fatin Nadiyah Sukhairi	Pembantu Penyelidik Q19	3/1/2023 22/5/2023
Perancangan Penyelidikan	Nur Athirah Fauzi	Pembantu Penyelidik Q19	1/06/2023 (Lantikan semula)
Hasilan Semula Jadi	Ahmad Lutfil Hadi Zubir	Pembantu Penyelidik Q19	3/7/2023
Hasilan Semula Jadi	Ismail Ramli	Pembantu Penyelidik Q19	15/8/2023
Pusat Informasi Pelawat	Nurul Ain Ahmad	Pembantu Tadbir (P/O) N19	8/9/2023
Pusat Informasi Pelawat	Norizan Mohd Arifim	Pembantu Tadbir (P/O) N19	3/1/2023
Perkhidmatan Teknikal	Siti Hanisah Ramle	Pembantu Tadbir (P/O) N19	3/1/2023
Pusat Informasi Pelawat	Nurfaiezah Mazeri	Pembantu Tadbir (Kew) W19	3/1/2023
Unit Integriti	Mohd Nur Afzan Ab. Wahab	Pembantu Hal Ehwal Islam S19	3/1/2023
Biodiversiti Hutan	Norazmi Amlil	Pembantu Awam H11	3/1/2023
Bioteknologi Perhutanan	Ramli Ponyoh	Pembantu Awam H11	3/1/2023
Perancangan Penyelidikan	Amelia Bah Azmi	Pembantu Awam H11	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Muhammad Syamsul Nizam Yaakub	Pembantu Awam H11	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Nur Emilia Natasha Zulfakar	Pembantu Awam H11	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Muhammad Zulhelmie Mustapa	Pembantu Awam H11	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Khuzairah Ali	Pembantu Awam H11	3/1/2023
Bioteknologi Perhutanan	Muhammad Saufi-Aqmal	Pembantu Awam H11	3/1/2023
Perhutanan & Alam Sekitar (SPF Pasoh)	Nur Aidiel Hakimie Mazlizam	Pembantu Awam H11	3/1/2023
Perhutanan & Alam Sekitar	Mohammad Hanif Mohammad	Pembantu Awam H11	3/1/2023
Perhutanan & Alam Sekitar	Muhammad Haziq Asyraf Sharumin	Pembantu Awam H11	3/1/2023

Bahagian Division	Nama Name	Jawatan/gred Post/grade	Tarikh lantikan Date of appointment
Perhutanan Alam Sekitar	Muhammad Syamim Ikram Shah Harudin	Pembantu Awam H11	3/1/2023
Unit Komunikasi Korporat	Farkhan Halili	Pembantu Awam H11	16/1/2023

Kenaikan Pangkat/Promotions

Nama Name	Jawatan/gred Post/grade	Tarikh/Date
Ismail Hj. Parlan (Dr)	Pegawai Penyelidik Gred Utama A (VU5)	4/12/2023
Lillian Chua Swee Lian (Dr)	Pegawai Penyelidik Gred Utama B (VU6)	23/12/2023
Wan Tarmeze Wan Ariffin (Dr)	Pegawai Penyelidik Gred Utama C (VU7)	30/6/2023
Noraliza Alias	Pegawai Penyelidik Gred Q48	20/2/2023
Nazarudin Ramli	Penolong Pegawai Penyelidik Gred Q36	1/11/2023
Azahari Mohd Yusof	Penolong Pegawai Penyelidik Gred Q36	1/11/2023
Nazri Mohamad	Pemandu Kenderaan Gred H14	1/5/2023
Shamsuri Mohd Som	Pembantu Awam Gred H14	29/4/2023
Mohd Farizth Nor Afandi	Pembantu Awam Gred H14	20/2/2023
Noor Ratul Maleka Sirajuddin	Pembantu Awam Gred H14	1/1/2023
Hasnidarul Ahmad	Pembantu Awam Gred H14	1/1/2023
Mohamad Faizal Sharuddin	Pembantu Awam Gred H14	1/1/2023
Mahat Shumsudin	Pembantu Awam Gred H14	1/1/2023
Shamsuri Mohd Som	Pembantu Awam Gred H14	1/1/2023
Nazri Mohamad	Pemandu Kenderaan Gred H14	1/1/2023

Nama Name	Jawatan Pemangkuan/Gred Acting Post/Grade	Tarikh/Date
Mahmudin Saleh	Pegawai Penyelidik Gred Utama B (VU6)	24/12/2023
Khairul Awang (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Ong Chee Beng (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Hamdan Omar (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Latifah Jasmani (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Fadzureena Jamaludin (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Ng Chin Hong (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Tumirah Khadiran (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023

Nama Name	Jawatan Pemangkuan/Gred Acting Post/Grade	Tarikh/Date
Tnah Lee Hong (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Sam Yen Yen (Dr)	Pegawai Penyelidik Gred Q54	30/9/2023
Nik Adlin Nik Mohamed Sukri (Dr)	Pegawai Penyelidik Gred Q52	24/3/2023
Mohd Shahidan Mohd Arshad	Pegawai Penyelidik Gred Q54	30/9/2023
Liza Ismail	Pegawai Penyelidik Gred Q54	30/9/2023
Norsham Suhaina Yaakob	Pegawai Penyelidik Gred Q52	30/9/2023
Saidatul Husni Saidin	Pegawai Penyelidik Gred Q52	30/9/2023
Shahlinney Lipeh (Dr)	Pegawai Penyelidik Gred Q52	30/9/2023
Hamidah Mamat (Dr)	Pegawai Penyelidik Gred Q48	19/5/2023
Norhayati Ismail	Pegawai Penyelidik Gred Q48	30/9/2023
Salleh Mat	Pegawai Penyelidik Gred Q48	30/9/2023
Mohamad Fakhri Ishak	Pegawai Penyelidik Gred Q48	30/9/2023
Tan Ai Lee	Pegawai Penyelidik Gred Q48	30/9/2023
Mohd Kamal Nik Hasan (Dr)	Pegawai Penyelidik Gred Q48	30/9/2023
Chee Beng Jin	Pegawai Penyelidik Gred Q48	30/9/2023
Azuarni Abdul Adzis	Pegawai Tadbir Gred N48	20/2/2023
Abd. Majid Jalil (Dr)	Pegawai Penyelidik Gred Q44	30/9/2023
Norul Aiman Yusoff	Pegawai Penyelidik Gred Q44	30/9/2023
Dasrul Iskandar Darus	Pegawai Penyelidik Gred Q44	30/9/2023
Ariff Fahmi Abu Bakar	Pegawai Penyelidik Gred Q44	30/9/2023
Noor Hazmira Merous	Pegawai Penyelidik Gred Q44	30/9/2023
Hyrul Izwan Mohd Husin	Pegawai Penyelidik Gred Q44	30/9/2023
Syafiqah Nabilah Samsul Bahari	Pegawai Penyelidik Gred Q44	30/9/2023
Mohamad Danial Md Sabri	Pegawai Penyelidik Gred Q44	30/9/2023
Farah Shahanim Mohamed Mohidin (Dr)	Pegawai Penyelidik Gred Q44	30/9/2023
Siti Suhaila A. Rahman (Dr)	Pegawai Penyelidik Gred Q44	30/9/2023
Abdul Hayat Mat Saad	Pegawai Penyelidik Gred Q44	30/9/2023
Kaviarasu A/L Munian	Pegawai Penyelidik Gred Q44	30/9/2023
Mukrimah Abdullah	Pegawai Penyelidik Gred Q44	30/9/2023
Ummu Hani Badron	Pegawai Penyelidik Gred Q44	30/9/2023
Phon Chooi Khim (Dr)	Pegawai Penyelidik Gred Q44	30/9/2023
Mohd Fahmi Awalludin (Dr)	Pegawai Penyelidik Gred Q44	30/9/2023
Maria Arlene Jackan Anak Siba	Pegawai Penyelidik Gred Q44	30/9/2023
Lim Chung Lu	Pegawai Penyelidik Gred Q44	30/9/2023
Khairul Kamilah Abdul Kadir	Pegawai Penyelidik Gred Q44	30/9/2023

Peletakan Jawatan/**Resignation**

Bahagian/Program/ Cawangan Division/Programme/ Branch	Nama Name	Jawatan/gred Post/grade	Tarikh/Date
Hasilan Semula Jadi/ Fitokimia	Muhammad Khair Mohd Ayob	Pembantu Penyelidik Gred Q19	1/4/2023
Biodiversiti Hutan/ BioD Fauna	Mohamad Abis Ho Mohammad Kamal Ho	Pembantu Setiausaha Pejabat N19	5/8/2023

Persaraan/**Retirement**

Wajib Mandatory	Tarik /Date
Norrahmad Buyong	7/1/2023
Amrah Toha	13/1/2023
Ahmad Fauzi Mohd Shariff	3/3/2023
Rushdan Ibrahim (Dr)	12/4/2023
Selva Kumar Raman	29/4/2023
Abdul Ghani Mohamad	9/5/2023
Noor Azlin Yahya (Dr)	14/5/2023
Mohamad Shapiei Jusoh	3/7/2023
Sabariah Ramuddin	9/7/2023
Yusni Idris	1/8/2023
Wan Zahiri Wan Yaacob	18/8/2023
Mohamad Zin Salim	30/8/2023
Nor Azni Jaafar	24/9/2023
Puad Elham	11/10/2023
Lillian Chua Swee Lian (Dr)	24/12/2023

Persaraan (Pilihan) Retirement (Optional)	Tarikh/Date
Sadali Sahat	1/4/2023
Mohd Afendi Hussin	1/5/2023
Nazly Jamaludin	1/5/2023
Angan Atan	1/6/2023
Mohd Zulfadli Mat Yasin	1/7/2023
Razali Mustaffa	8/11/2023
Mohamad Akhir Abdul Rahman	8/11/2023
Jefery Zainudin	8/11/2023
Zainol Ahmad	23/11/2023

Meninggal Dunia / Deceased

Nama Name	Tarikh Date
Zalina Mustaffa	14/11/2023

Latihan Akademik / Academic Training

Nama Name	Bahagian Division	Universiti University
Hamidah Mamat (Dr)	Biodiversiti Hutan	PhD/Universiti Putra Malaysia
Nik Adlin Nik Mohamed Sukri (Dr)	Perhutanan dan Alam Sekitar	PhD/Universiti Teknologi MARA
Abdul Majid Jalil (Dr)	Hasilan Semula Jadi	PhD/Universiti Putra Malaysia
Mohd Parid Mamat (Dr)	Perancangan Penyelidikan	PhD/Universiti Putra Malaysia

PENGURUSAN FRIM FRIM MANAGEMENT

Senarai pengarah dan ketua program/cawangan
List of director and head of programme/branch

PEJABAT KETUA PENGARAH DIRECTOR GENERAL'S OFFICE

Ketua Pengarah/Director General

Dr Ismail Hj. Parlan, PhD Botany (UKM)

Timbalan Ketua Pengarah (Penyelidikan dan Pembangunan)

Deputy Director General (Research and Development)

Dr Norwati Muhammad, PhD For. Genetic (Reading, UK)

Timbalan Ketua Pengarah (Operasi)

Deputy Director General (Operations)

Dr Nor Azlin Yahya, PhD For. Recreation Mgmt. (UPM) (hingga/until 13/5/2023)

Dr Lillian Chua Swee Lian, PhD (Bath) (mulai/from 14/5/2024) (hingga/untill 23/12/2023)

Mahmudin Saleh, MSc Mech. Eng. (UiTM) (mulai/from 24/12/2023)

Unit Undang-Undang/Legal Unit

Ketua/Head

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

Unit Audit Dalam/Internal Audit Unit

Ketua/Head

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

Unit Komunikasi Korporat/Corporate

Communication Unit

Ketua/Head

Toh An Nee, B Mass Comm. (USM)

Unit Integriti/Integrity Unit

Ketua/Head

Suhana Rafidah Md. Yusof, MSc Qty & Product. Improve. (UKM)

Unit Perkhidmatan Pensijilan Produk/Product Certification Services Unit

Pengarah Urusan/Managing Director

Dr Sharmiza Adnan, PhD Chem. Engineering (Monash)

BAHAGIAN PERHUTANAN DAN ALAM SEKITAR FORESTRY AND ENVIRONMENT DIVISION

Pengarah/Director

Dr Wan Mohd Shukri Wan Ahmad, PhD Env. Sc. (UKM)

Program Hutan Asli/Natural Forest Programme Ketua/Head

Nur Hajar Zamah Shari, MSc Trop. Forest Mgmt. (UPM)

Program Ekopelancongan dan Hutan Bandar/ Ecotourism and Urban Forestry Programme Ketua/Head

Ahmad Azaruddin Mohd Noor, MSc Landscape Studies (UPM)

Program Alam Sekitar dan Perubahan Iklim/ Environment and Climate Change Programme Ketua/Head

Dr Elizabeth a/p M.P. Philip, PhD (Plant Physiology)

Program Pengurusan Tapak Warisan FRIM (FRIM-WHS)

FRIM World Heritage Site Management Programme (FRIM-WHS)

Ketua/Head

Noorsiha Ayop, BSc Botany (UM)

BAHAGIAN KELUARAN HUTAN FOREST PRODUCTS DIVISION

Pengarah/Director

Dr Wan Tarmeze Wan Ariffin, PhD Civil Eng. (Birmingham)

Program Pemprosesan dan Sifat-sifat Kayu/ Wood Processing and Properties Programme

Ketua/Head

Dr Zaihan Jalaludin, PhD Wood Sci. (Edinburgh)

Program Kualiti Produk Kayu/ Wood Product Quality Programme

Ketua/Head

Hashim W. Samsi, MSc Wood Tech. (UPM)

Program Kimia Kayu dan Penggunaan Hasil Hutan Bukan Kayu/Wood Chemistry and Non- Wood Utilisation Programme

Ketua/Head

Dr Latifah Jasmani, PhD Chemistry (Nottingham)

BAHAGIAN BIOTEKNOLOGI PERHUTANAN FORESTRY BIOTECHNOLOGY DIVISION

Pengarah/Director

Dr Mohd Zaki Abdullah (AMP), PhD Genetics (UKM)

Program Bioteknologi/ Biotechnology Programme

Ketua/Head

Dr Nor Hasnida Hassan, PhD Botany (UKM)

Program Hutan Ladang/ Forest Plantation Programme

Ketua/Head

Dr Rosdi Koter, PhD Forest Silv. (UPM)

Program Membaik Biak Tumbuhan/ Plant Improvement Programme

Ketua/Head

Dr Farah Fazwa Md Ariff, PhD Genetics (UKM)

BAHAGIAN BIODIVERSITI HUTAN FOREST BIODIVERSITY DIVISION

Pengarah/Director

Dr Lillian Chua Swee Lian, PhD (Bath)
(hingga/until 13/5/2023)

Dr Richard Chung Cheng Kong FLS, PhD (UM)
(mulai/from 14/5/2024)

Program Biodiversiti Flora/ Floral Biodiversity Programme

Ketua/Head

Dr Sam Yen Yen, PhD (UM)

Program Biodiversiti Fauna/ Fauna Biodiversity Programme

Ketua/Head

Dr Nada Badruddin, PhD (Univ. of Sheffield)

Program Kesihatan dan Pemuliharaan Hutan/ Forest Health and Conservation Programme

Ketua/Head

Dr Mohd. Farid Ahmad, PhD (USM)

BAHAGIAN HASILAN SEMULA JADI NATURAL PRODUCTS DIVISION

Pengarah/Director

Dr Ling Sui Kiong, PhD Nat. Prod. Chem. (Nagasaki)

Program Sumber Biologi/ Bioresources Programme

Ketua/Head

Dr Fadzureena Jamaludin, PhD Nat. Prod. Chem. (UPM)

Program Kawalan Kualiti Herba/ Herbal Quality Control Programme

Ketua/Head

Dr Zunoliza Abdullah, PhD Nat. Prod. Chem. (USM)

Program Bioprospek/ Bioprospect Programme

Ketua/Head

Dr Mastura Mohtar, PhD Biomedic. Sc. (UKM)

BAHAGIAN PERANCANGAN PENYELIDIKAN RESEARCH PLANNING DIVISION

Pengarah/Director

Dr Mohd Rosli Haron, PhD Molec. Bio. & Genetic Eng. (UPM)

Cawangan Dasar dan Perancangan Penyelidikan/Research Policy and Planning Branch

Ketua/Head

Dr Mohamad Nasir Mat Arip, PhD Chemistry (UKM)

Program Ekonomi dan Analisis Strategik/ Economic and Strategic Analysis Programme

Ketua/Head

Rohana Abd. Rahman, MSc Marketing (UPM)

Program Perhutanan Sosial/Social Forestry Programme

Ketua/Head

Dr Mohd Parid Mamat, PhD Environ. Econs. (UPM)

BAHAGIAN PENTADBIRAN ADMINISTRATION DIVISION

Pengarah/Director

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

Cawangan Pentadbiran Am/ General Administration Branch

Ketua/Head

Suharti Samod, MSc Qty & Product. Improv. (UKM)

Cawangan Perolehan/Procurement Branch Ketua/Head

Zamri Mohd Zangi, MSc Env. Mgmt (UKM)

Cawangan Pembangunan dan Penyelenggaraan/ Development and Maintenance Branch

Ketua/Head

Sharifuddin Hj. Samin, MSc. Civil Eng. (Const.) (UiTM)

Unit Pengurusan Kualiti/ Quality Management Unit

Ketua/Head

Nor Haliyan Tan Shilan, MSc IT (UiTM)

BAHAGIAN KEWANGAN FINANCE DIVISION

Pengarah/Director

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

Cawangan Kewangan dan Belanjawan/ Finance and Budget Branch

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

Cawangan Pengurusan Aset/ Asset Management Branch

Zainorasri Yahya, B Acc. (Hons) (UiTM)

BAHAGIAN INOVASI DAN KOMERSIALISASI INNOVATION AND COMMERCIALISATION DIVISION

Pengarah/Director

Mahmudin Saleh, MSc Mech. Eng. (UiTM)
(hingga/until 23/12/2023)

Abdul Jabbar Hj. Sabli, MSc Business
Administration (UKM) (mulai/from 24/12/2023)

Program Inovasi dan Inkubasi/ Innovation and Incubation Programme

Ketua/Head

Dr Fadhilah Zainudin, PhD Plant Science
(Birmingham)

Program Pengembangan Teknologi/ Technology Services Programme

Mohd Shahidan Mohd Arshad, BSc Biochemistry
(Hon) (UM)

Pusat Teknologi Herba/ Herbal Technology Center

Ketua/Head

Dr Zamree Md Shah, PhD Pharmacology (UiTM)

BAHAGIAN SUMBER MANUSIA **HUMAN RESOURCE DIVISION**

Pengarah/Director

Mohd. Asmawee Ismail, MBA (Human Res. Mgmt) (UPM)

Cawangan Perkhidmatan/Services Branch

Ketua/Head

Azuarni Abdul Adzis, B (Hons) Malay Lang. & Linguist. (UPM)

Cawangan Perjawatan/Establishment Branch

Ketua/Head

Nur Azani Abdul Rasid, B HRM (Hons) (UUM)

Cawangan Latihan/Training Branch

Ketua/Head

Kosong/Vacant

BAHAGIAN PERKHIDMATAN TEKNIKAL **TECHNICAL SERVICES DIVISION**

Pengarah/Director

Sarifah Kunju Ahmad, M Biotech. (UM)

Cawangan Penerbitan/Publications Branch

Ketua/Head

Ida Suraini Abd. Shukor, MSc Pentadbiran Perniagaan (UIAM)

Cawangan Perpustakaan/Library Branch

Ketua/Head

Norain Mohd Arif, MSc IT (UiTM)

Cawangan Teknologi Maklumat/ Information Technology Branch

Ketua/Head

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

KEPAKARAN FRIM FRIM'S EXPERTISE

Bahagian Perhutanan dan Alam Sekitar Forestry and Environment Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Dr Wan Mohd Shukri Wan Ahmad	PhD (Environmental Science)	Forest Management
2	Dr Elizabeth A/P M.P. Philip	PhD (Plant Physiology)	Climate Change
3	Dr Siti Aisah Shamsuddin	PhD (Hydrology & Water Resource Management)	Forest Hydrology
4	Dr Ahmad Nazarudin Mohd Roseli	PhD (Plant Eco-physiology & Landscape)	Urban Forestry & Arboriculture
5	Noorsiha Ayop	BSc (Botany Science)	Ex-situ Conservation
6	Ahmad Azaruddin Mohd Noor	MSc (Landscape Studies)	Urban Forestry & Arboriculture
7	Dr Marryanna Lion	PhD (Agriculture Science)	Forest Hydrology
8	Dr Hamdan Omar	PhD (Forest Engineering & Operation)	Remote Sensing & GIS
9	Nur Hajar Zamah Shari	MSc (Forest Management)	Forest Management
10	Norsham Suhaina Yaakob	MSc (Conservation Biology)	Park & Recreation Management)
11	Dr Azian Mohti	PhD (Environmental Science)	Forest Adaption Towards Climate Change
12	Tariq Mubarak Husin	BSc (Forest Science)	Mangrove & Peat Swamp
13	Azharizan Mohamad Norizan	MSc (Forest Product Management & Marketing)	Forest Mangement Certification
14	Dr Nik Adlin Nik Mohamed Sukri	PhD (Built Environment)	Urban Tree Protection
15	Salleh Mat	MSc (Forest Economics)	Natural Resources Economics
16	Nik Azyyati Abdul Kadir	BSc (Forestry Science)	Environmental Education
17	Tan Sek Aun	MSc (Remote Sensing & GIS)	Remote Sensing & GIS
18	Yao Tze Leong	MSc (Plant Systematics)	Forest Management
19	Mohd Rizuwan Mamat	MSc (Civil Engineering)	Forest Engineering
20	Mohd Azahari Faidi	MSc (Science Remote Sensing)	Remote Sensing & GIS
21	Mohamad Danial Md Sabri	MSc (Forest Ecology)	Forest Management

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
22	Hyrul Izwan Mohd Husin	BSc (Forest Science)	Mangrove & Peat Swamp Forest
23	Dr Farah Shahanim Mohamed Mohidin	PhD (Eco-physiology)	Terrestrial & Peat Swamp Forest
24	Abdul Hayat Mat Saad	MSc (Park & Recreation Mangement)	Urban Forestry
25	Muhamad Afizzul Misman	MSc (GIS & Geomatic)	Remote Sensing & GIS
26	Ainnur Amira Anuar Musadad	BSc (Forestry)	Ex-situ Conservation
27	Norsheilla Mohd Johan Chuah	MSc (Science Remote Sensing)	Remote Sensing
28	Nurfarah Aqilah Mohd Noh	BSc (Forest Management)	Forest Management

Bahagian Bioteknologi Perhutanan Forestry Biotechnology Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Dr Mohd Zaki Abdullah	PhD (Plant Genetics)	Plant Improvement & Breeding
2	Dr Lee Soon Leong	PhD (Forest Genetics)	Molecular Ecology
3	Dr Kevin Ng Kit Siong	PhD (Forest Genetics)	Population Genetics & Genomics of Tropical Plants
4	Dr Lee Chai Ting	PhD (Genetic Resource)	Conservation Genetic
5	Dr Rosdi Koter	PhD (Forest Silviculture)	Forest Silviculture
6	Dr Nor Hasnida Hassan	PhD (Plant Biotechnology)	Plant Genetic Transformation
7	Dr Norlia Basherudin	PhD (Plant Molecular Biology & Genetic Engineering)	Genetic Engineering
8	Dr Farah Fazwa Md Ariff	PhD (Genetics)	Plant Improvement & Breeding
9	Dr Ho Wai Mun	PhD (Forest Restoration)	Plant Physiology
10	Dr V Jeyanny a/p Vijayanathan	PhD (Soil Science)	Soil Chemistry
11	Dr Ng Chin Hong	PhD (Genetics)	Population Genetics
12	Dr Shawn Cheng	PhD (Genetic Engineering & Molecular Biology)	Molecular Genetics
13	Dr Tnah Lee Hong	PhD (Phylo-Geography & Evolution)	Forensic Forestry
14	Dr Siti Salwana Hashim	PhD (Genetics)	Macropropagation Technology

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
15	Nashatul Zaimah Noor Azman	MSc (Applied Plant Science)	Seed Technology
16	Haliza Ismail	MSc (Micropropagation)	Tissue Culture
17	Rozita Ahmad	BSc (Industrial Chemistry)	Soil Chemistry
18	Ahmad Fauzi Mohd Shariff	BSc (Agricultural)	Macropropagation Technology
19	Noraliza Alias	MSc (Proteome Science)	Seed Technology
20	Nadiah Salmi Nadzri	BSc (Genetics)	Tissue Culture
21	Mohamad Fakhri Ishak	MSc (Forest Rehabilitation)	Survey & Soil Chemistry
22	Dr Nurnadiah Roslan	PhD (Biotechnology)	Tissue Culture
23	Dr Siti Suhaila A Rahman	PhD (Plant Biotechnology)	Tissue Culture
24	Syafiqah Nabilah Samsul Bahari	MSc (Plant Biotechnology)	Plant Improvement
25	Nurul Farhanah Zakaria	MSc (Plant Biotechnology)	Population Genetics
26	Nor Fadilah Wook	MSc (Plant Biotechnology)	Plant Improvement
27	Nazirah Abdullah	MSc (Plant Biotechnology)	Tissue Culture
28	Dasrul Iskandar Darus	MSc (Forestry Science)	Forest Silviculture
29	Amir Saaiffudin Kassim	MSc (Forest Plantation)	Forest Silviculture

Bahagian Biodiversiti Hutan Forest Biodiversity Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Dr Richard Chung Cheng Kong	PhD (Plant Taxonomy)	Plant Taxonomy
2	Dr Mohd Farid Ahmad	PhD (Forest Pathology)	Tree Health Diagnosis
3	Dr Sam Yen Yen	PhD (Plant Systematics)	Plant Systematics
4	Dr Nada Badruddin	PhD (Biodiversity Conservation)	Insect Ecology
5	Patahayah Mansor	MSc (Forest Rehabilitation)	Plant Pathology
6	Syahida Emiza Suhaimi	MSc (Plant Systematics)	Botany
7	Siti Munirah Mat Yunoh	MSc (Plant Systematics)	Plant Biodiversity & Conservation

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
8	Lau Kah Hoo	MSc (Botany)	Plant Taxonomy & Herbarium Management
9	Dr Hamidah Mamat	PhD (Forest Management & Ecosystem Sciences)	Threatened Plants Conservation
10	Ummul Nazrah Abdul Rahman	MSc (Conservation)	Plant Taxonomy & Herbarium Management
11	Thi Bee Kin	MSc (Genetics)	Fungal Taxonomy, Biodiversity & Conservation
12	Nor Ezzawanis Abdullah Thani	MSc (Botany)	Pteridology
13	Ong Su Ping	BSc (Animal Biology)	Forest Entomology
14	Suhaida Mustafa	MSc (Ecology & Biodiversity)	Ex-situ Conservation
15	Mohammad Shahfiz Azman	MSc (Human Wildlife Conflict & Landscape)	Wildlife Ecology
16	Rafidah Abdul Rahman	MSc (Plant Systematics)	Plant Taxonomy & Herbarium Management
17	Nur Zati Akma Mustafa	MSc (Zoology)	Entomology
18	Wendy Yong Sze Yee	MSc (Plant Systematics)	Conservation Biology
19	Dr Phon Chooi Khim	PhD (Ecology & Biodiversity)	Entomology
20	Kaviarasu A/L Munian	MSc (Genetic & Genomics)	Ichthyology

Bahagian Hasil Semula Jadi

Natural Products Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Dr Ling Sui Kiong	PhD (Natural Products Chemistry)	Natural Products Chemistry
2	Dr Getha A/P R Krishnasamy	PhD (Microbial Biotechnology)	Microbial Bioprospecting
3	Dr Mastura Mohtar	PhD (Biomedical Sciences)	Bioprospecting & Development of Natural Products Based Anti-Infective
4	Dr Nik Musa'adah Mustapha	PhD (Biomedical Sciences)	Biomedical Science
5	Dr Nurhanan Murni Yunos	PhD (Biomedical Sciences)	Cancer Biology
6	Dr Zunoliza Abdullah	PhD (Natural Products Chemistry)	Natural Products Chemistry
7	Dr Fadzureena Jamaludin	PhD (Natural Products Chemistry)	Ethnobotany & Traditional Knowledge Documentation

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
8	Dr Mary Khoo Gaik Hong	PhD (Biochemical Sciences)	Toxicology of Natural Products
9	Dr Mazura Md Pisar	PhD (Natural Products)	Biomedical and Health Sciences of Natural Products
10	Abd Rashid Li	MSc (Chemistry)	Natural Products Chemistry
11	Dr Nor Hayati Abdullah	PhD (Medicinal Chemistry)	Phytochemistry
12	Dr Fauziah Abdullah	PhD (Chemistry/ Natural Products Chemistry)	Natural Products Chemistry
13	Mailina Jamil	MSc (Pharmacy/ Natural Products Chemistry)	Natural Products Chemistry
14	Noor Rasyila Mohamed Noor	MSc (Genetic Engineering & Molecular Biology)	Product Formulation Technology (F&B)
15	Saidatul Husni Saidin	MSc (Biohealth Science)	Product Development
16	Dr Saiful Azmi Johari	PhD (Microbiology)	Plant-Based Antibacterial Agents
17	Nor Datiakma Mat Amin	MSc (Biotechnology)	Proteomics
18	Zaridah Mohd Zaki	MSc (Biomedical Sciences)	Parasitology
19	Lili Sahira Husin	MSc (Health Biotechnology)	Microbe Biotechnology
20	Norhayati Ismail	MSc (Biohealth Science)	Pharmaceutical
21	Tan Ai Lee	MSc (Plant Systematics)	Ethnobotany
22	Dr Mohd Kamal Nik Hasan	PhD (Pharmacology)	Animal Laboratory Study
23	Adiana Mohamed Adib	MSc (Chemistry)	Natural Products Chemistry
24	Hada Masayu Ismail @ Dahlan	MSc (Postharvest Engineering)	Pre- & Postharvest Technology
25	Ihsan Safwan Kamarazaman	MSc (Physiology)	Antioxidants
26	Dr Abd Majid Jalil	PhD (Bioresources Management)	Natural Products Resources
27	Ummu Hani Badron	MSc (Botany)	Plant Identification/ Authentication
28	Firdaus Kamarulzaman	MSc (Biomedical Science)	Medical & Helath Sciences
29	Norulaiman Yusoff	MSc (Microbe Biotechnology)	Safety Quality Control
30	Hema a/p Thopla Govender	MSc (Microbiology)	Microbiology
31	Muhammad Syamil Azahar	MSc (Chemistry)	Plant & Microbe Secondary Metabolite
32	Nurhazwani Mohd Hirmizi	MSc (Material Technology)	Herbal Quality Control

Bahagian Keluaran Hutan

Forest Products Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Dr Wan Tarmeze Wan Ariffin	PhD (Computational Engineering)	Forest Products
2	Dr Mohd Rushdan Ibrahim	PhD (Paper Science)	Pulp, Paper & Lignocellulose Technology
3	Dr Zaihan Jalaludin	PhD (Wood Science)	Forest Products
4	Hashim W. Samsi	MSc (Wood Tech)	Wood Utilisation
5	Dr Mohd Khairun Anwar Uyup	PhD (Wood Science & Technology)	Impregnation & Modification
6	Dr Roszaini Kadir	PhD (Wood Technology)	Forest Products
7	Dr Rafeadah Rusli	PhD (Material Science – Nanotechnology)	Biocomposites
8	Dr Suffian Misran	PhD (Wood Science)	Forest Products
9	Dr Sharmiza Adnan	PhD (Chemical Engineering)	Pulp, Paper & Lignocellulose Technology
10	Dr Sik Huei Shing	PhD (Material Science)	Forest Products
11	Dr Latifah Jasmani	PhD (Chemistry)	Forest Products
12	Dr Tumirah Khadiran	PhD (Nanoscience)	Forest Products
13	Puad Elham	MSc (Wood Industry)	Charcoal, pellet, briquette and vinegar
14	Dr Khairul Awang	PhD (Wood Science & Technology)	Forest Products
15	Dr Ong Chee Beng	PhD (Timber Engineering)	Forest Products
16	Dr Nordahlia Abdulah Siam	PhD (Botany)	Wood Anatomy & Identification
17	Dr Rafidah Jalil	PhD (Chemical Engineering)	Forest Products
18	Dr Shahlinney Lipeh	PhD (Wood Science)	Forest Products
19	Dr Mahanim Sarif @ Mohd Ali	PhD (Advance Materials)	Charcoal & Vinegar
20	Zairul Amin Rabidin	MSc (Wood Science & Technology)	Wood Processing
21	Yanti Abdul Kadir	MSc (Wood Science)	Forest Products
22	Khairul Maseat	MSc (Wood Science & Technology)	Forest Products
23	Shaharuddin Hashim	BSc (Analytical Chemistry)	Forest Products
24	Siti Zaliha Ali	BSc (Manufacturing Engineering)	Manufacturing Engineering

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
25	Khairul Azmi Jabar	MSc (Fire Safety)	Construction Materials
26	Noor Azrieda Abd Rashid	MSc (Wood Science – composite)	Wood & Wood Based Products (composite)
27	Mohd Jamil Abdul Wahab	MSc (Timber Engineering)	Timber Processing
28	Dr Mohd Fahmi Awalludin	PhD (Wood Properties)	Wood Coating & Finishing
29	Dr Geetha a/p Ramasamy	PhD (Wood Science & Technology)	Wood Processing
30	Dr Asniza Mustapha	PhD (Bioresources/ Biocomposite)	Forest Products
31	Nur Areisman Mohd Salleh	MSc (Composite Polymer)	Material Science

Bahagian Perancangan Penyelidikan Research Planning Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Dr Mohd Rosli Haron	PhD (Molecular Biology & Genetic Engineering)	Recombinant DNA
2	Dr Mohd Parid Mamat	PhD (Environmental Economics)	Environmental Economics
3	Dr Mohamad Nasir Mat Arip	PhD (Chemistry)	Wood Preservation
4	Dr Asiah Osman	PhD (Biological Sciences)	Molecular Docking
5	Dr Huda Farhana Mohamad Muslim	PhD (Tourism Science)	Community Based Ecotourism
6	Norliyana Adnan	MSc (Environmental Management)	Ecosystem Services
7	Rohana Abdul Rahman	MSc (Marketing)	Economic Valuation
8	Ariff Fahmi Abu Bakar	BSc (Forestry)	Economic Valuation
9	Mukrimah Abdullah	MSc (Environmental Economics)	Environmental Economics
10	Noor Hazmira Merous	MSc (Natural Resources & Environmental Economics)	Market Feasibility

Bahagian Inovasi dan Komersialisasi Innovation and Commercialisation Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Abdul Jabbar Hj Sabli	MSc Business Administration (UKM)	Business Administration
2	Dr Fadhilah Zainudin	PhD (Plant Science)	IP Management & Commercialisation
3	Mohd Shahidan Mohamad Arshad	BSc (Biochemistry)	Technology & Business Development
4	Dr Zamree Md Shah	PhD (Pharmacology)	Herbal Processing
5	Dr Pin Kar Yong	PhD (Chemical Engineering)	Herbal Processing - Drying
6	Khairul Kamilah Abdul Kadir	MSc (Physiology)	System Physiology

Bahagian Perkhidmatan Teknikal Technical Services Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Sarifah Kunju Ahmad	M (Biotechnology)	Editing
2	Zahari Othman	BSc (Information Technology)	System Analyst & Database Design
3	Dr Vimala a/p P Subramaniam	PhD (Biotechnology)	Biotechnology
4	Wan Zahiri Wan Ya'acob	BSc (Computer Science)	System Analyst & Database Design
5	Maizura Ishak	BSc (Computer Science)	Information Safety System Management
6	Noor Atizza Mansor	MSc (Information Technology)	Information Material Management
7	Norul Maslissa Ahmad	MSc (Visual Informatic)	System & Database Development
8	Chee Beng Jin	MSc (Plant and Animal Physiology)	Scientific Publications (Editor) & Complementary/ Alternative Medicine (Toxicology)
9	Ida Suraini Abd Shukor	MBA (General Management)	Editing, Writing, Translation and Publishing Management
10	Norain Mohd Arif	MSc (Information Technology)	Data Security, Information Design & Packaging

Bahagian Pentadbiran

Administration Division

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Liza Ismail	MSc (Human Resource Management)	Operational Management
2	Suharti Samod	MSc (Quality Management)	Forest Recreation & Management

Dasar Pengurusan

Management Policy

Bil No	Nama Name	Bidang Pengajian Field of Study	Bidang Kepakaran Field of Expertise
1	Dr Ismail Hj Parlan	PhD (Botany)	Reforestation
2	Dr Norwati Muhammad	PhD (Forest Genetic)	Genetic Diversity
3	Dr Lillian Chua Swee Lian	PhD (Biodiversity Conservation)	Plant Biodiversity & Conservation
3	Dr Noor Azlin Yahya	PhD (Forest Recreation Management)	Parks & Protected Areas Conservation
4	Suhana Rafidah Md Yusof	MSc (Quality & Productivity Increment)	Quality Management
5	Praveena A/P Balai Kerishnan	MSc (Landscape Studies)	Forest Recreation
6	Maria Arlene Jackan Anal Siba	MSc (Landscape)	Public Relation & Communication
7	Lim Chung Lu	MSc (Plant Systematics)	Media Writing & Management

HARI ANUGERAH

AWARD DAY

Institut Penyelidikan Perhutanan Malaysia (FRIM) telah berjaya menganjurkan majlis yang berkonsepkan 2 dalam 1 iaitu Hari Anugerah FRIM dan Majlis Jasamu Dikenang pada 15 Jun 2023. Penganjuran majlis bagi meraikan kecemerlangan warga FRIM yang menunjukkan prestasi unggul bagi tahun 2022 serta khidmat bakti pesara FRIM sebagai sebahagian dari komitmen pihak pengurusan dalam menghargai penjawat awam FRIM. 132 orang warga kerja FRIM serta 17 pesara telah dirai di Dewan Alwy, Bahagian Latihan Perhutanan Jabatan Perhutanan Semenanjung Malaysia (JPSM) untuk menerima anugerah kecemerlangan dalam 11 kategori berlainan yang bukan hanya dinilai dari segi usaha dalam bidang tugas, tetapi juga aspek sosial, kesukanan dan semangat berpasukan.

Forest Research Institute Malaysia (FRIM) has successfully organised a 2 in 1 event which is FRIM Award Day and Jasamu Dikenang Ceremony on 15 June 2023 at Dewan Alwy, Forestry Training Division, Forestry Department of Peninsular Malaysia (FDPM). The ceremony was organised to demonstrate its appreciation towards staff for their outstanding contributions and achievements in 2022. A total of 132 FRIM staff received excellence awards in 15 different categories based not only on their commitment to work, but also on their involvement in social activities, sports, and team spirit. A total of 17 retirees will also receive awards and appreciation certificates for their long and faithful service.

Senarai Penerima Anugerah/ List of Award Recipient:

- A. Anugerah Khas Institut/ Special Institute Award:** Tiada penerima/No recipient
- B. Anugerah Ketua Pengarah/Director General's Award:**
Dr Noor Azlin Yahya & Mohd Afendi Hussin
- C. Anugerah Saintis Terbaik/ Best Scientist Award:**
Dr Nik MUSAADAH MUSTAPHA

D. Anugerah Penyelidikan Terbaik/Best Research Award Pertama/First:

Production of Eucalyptus Plantlets Using Tissue Culture Techniques

Ahli Kumpulan/Group Members

Dr Nor Hasnida Hassan
Dr Nor Azah Mohamad Ali
Dr Norwati Muhammad
Datuk Chua Hock Gee
Dr Mohd Zaki Abdullah
Datuk Wira Sheikh Othman Sheikh Abdul Rahman
Nazirah Abdullah
Rozidah Khalid
Muhammad Fuad Yahya
Sabariah Ramuddin
Mohd Saifuldullah Abd Wahid
Rohani Abdullah
Dr Siti Suhaila A. Rahman
Naemah Hashim
Dr Rosdi Koter
Rukiah Mirin

Dasrul Iskandar Darus
Normah Basir
Mailina Jamil
Noor Ratul Maleka Sirajuddin
Dr Ahmad Zuhaidi Yahya
Zairul Amin Rabidin
Dato' Dr Marzalina Mansor
Dr Suffian Misran

Kedua/ Second:

Penanaman Herba Terpilih Secara Sistem
Selingan Bagi Penghasilan Produk Berkualiti
Tinggi

Ahli Kumpulan/ Group Members

Dr Farah Fazwa Md Ariff
Mohd Zaini Zainol
Syafiqah Nabilah Samsul Bahari
Nur Izatty Atikah Jefri Sham
Norhayati Shaffie
Muhammad Ihsan Bahazain
Dr Fadhillah Zainudin
Halim Man
Mazdiana Mohd Zain
Amran Haron
Masitah Mohd Taini
Yahya Hamid
Samsuri Toh Harun
Dr Mohd Zaki Abdullah
Rohaidah Ngah
Mahmudin Saleh

Tempat Ketiga/ Third

Production of Liquid Organic Fertilizer
Formulated with Activated Beneficial
Microorganisms(LOF-ABeM) for Salanova
Lettuce Growth Via Automated Nutrient Film
Technique(NFT)System using Distillery Waste
Generated from Bioethanol Production of
Fermented Oil Palm Trunk (OPT)Sap

Ahli Kumpulan/Group Members

Dr Rafidah Jalil
Dr Tumirah Khadiran
Puad Elham
Siti Hawa Bakar
Mohd Shukri Said
Muzalina Mohamad
Hamsinah Hashim

**E. Pingat Perkhidmatan Cemerlang/
Excellent Service Medal**

Dr V. Jeyanny Vijayanathan
Abd Majid Jalil

**F. Anugerah Pekerja Terbaik Tahunan/
Yearly Best Employee Award**

Kumpulan Pengurusan dan Profesional/
Management and Professional Group:
Maizura Ishak

Kumpulan Pelaksana I/
Implementor I Group:
Sabariah Ramuddin

Kumpulan Pelaksana II/
Implementor II Group:
Mahat Shumsudin

**G. Anugerah Perkhidmatan Cemerlang
— Individu / Excellent Service Award —
Individual**

Kumpulan Pengurusan & Profesional
Management and Professional Group

Dr Nor Hasnida Hassan
Dr Suffian Misran
Dr Mazura Md Pisar
Dr Mary Khoo Gaik Hong
Suharti Samod
Ilyani Mazlan
Azurni Abdul Adzis
Siti Zaliha Ali
Chee Beng Jin
Hyrul Izwan Mohd Husin
Dr Farah Shahanim Mohamed Mohidin
Syafiqah Nabilah Samsul Bahari
Nor Fadilah Wook
Nor Hazwani Ahmad Ruzman
Madiah Muhammad Nawi
Khairul Kamillah Abdul Kadir
Nur Elysa Shakira Othman
Law Shu Hui

Kumpulan Pelaksana I/
Implementor I Group:
 Intan Farah Wahida Khabir
 Muhammad Faiz Kamarudin
 Masitah Mohd Taini
 Syaierah Abdullah
 Tuan Nur Atiqah Tuan Hussin
 Tuan Anis Nadia Tuan Mohd Saipudin
 Noorazlan Amiruddin Mohd Noor
 Norazian Syahid Tay
 Reduan Zammir Gul
 Syarmiza Anuar Abdul Razak
 Zaitihaiza Khamaruddin
 Yahya Marhani
 Hanan Abdul Wahab
 Ridzuan A.Rahman
 Mohd Safuan Abdullah
 Zuraida Mat Ali
 Nurul Idayu Baharom
 Mus'ab Mohd Azahar
 Mohamad Hj. Sahak
 Shahani Saad
 Rohaidah Ngah
 Mohd Nazri Abdul Latif
 Norleyana Azman
 Nurul Haslinda Makhtar
 Nurhajar Sudin
 Siti Hanisah Ramle
 Shamira Aida Sahimi
 Najwa Nafi'ah Fauzi
 Jamaluddin Osman
 Nurul Faihira Kamaruzaman
 Nornazirah Mokhtar

Kumpulan Pelaksana II/
Implementor II Group:
 Muhamad Saiful Azhar Nordin
 Rose Ainun Rosman
 Amir Nurdin Abdul Rahman
 Yahaya Hamid
 Sukeri Don
 Shahmirul Azahar Samihon
 Hairol Nizam Haron
 Mohd Soffian Mohd Ali
 Rosli Abdul Majid
 Mohd Nasoha Abdul Wahid
 Suhaimi Mohammed Eskak@Khairi

H. **Anugerah Perkhidmatan Cemerlang— Kumpulan/Excellent Service Award— Group**

Cawangan Teknologi Maklumat
 Ahli Kumpulan/**Group Members**
 Zahari Othman
 Maizura Ishak
 Norul Maslissa Ahmad
 Intan Dalina Rafidah Othman @ Osman
 Nordaiman Shairi
 Siti Zaleha Abd Goni
 Omarali Abdul Rahim
 Nazatul Najlaa' Hazry
 Intan Farah Wahida Khabir
 Muhamad Jeeфри Govel
 Yusni Idris
 Mohd Khaidir Othman
 Nik Yasmin Nik Yahya
 Zalina Mustaffa
 Md Azharulzaman Mohamed Said

Malaysia Biodiversiti Information System
 (MyBIS)
 Ahli Kumpulan/**Group Members**
 Tan Kok Kiat
 Nurfarhana Hizan Hijas
 Sarah Nabila Rosli
 Nur Hazwanie Abd Halim
 Badrul Amin Jaffar
 Aziemah Kinan
 Fatin Quratul 'Ain Saberam

Journal of Tropical Forest Science(JTFS)
 System Team
 Ahli Kumpulan/**Group Members**
 Chee Beng Jin
 Sarifah Kunju Ahmad
 Norul Maslissa Ahmad
 Intan Farah Wahida Khabir
 Zahari Othman
 Siti Hanisah Ramle
 Nazatul Najlaa' Hazry
 Rohayu Yunus

I. **Anugerah Khidmat Masyarakat/ Community Service Award:** Baharudin Kamaruddin

**J. Anugerah Khidmat Setia/
Loyal Service Award:**

Dr Wan Mohd Shukri Wan Ahmad
Mohd Rizal Mohd Kassim
Mahamad Sakri Ismail
Yazid Nyan
Ismail Mansor
Siti Sanisah Kamsah

K. Anugerah Penerbitan/Publication Award

KATEGORI A: PENERBITAN TEKNIKAL

CATEGORY A: TECHNICAL PUBLICATIONS

Pertama/First:

Latifah Jasmani, Nurul Ain Nadirah
Jamaluddin, Rafeadah Rusli, Sharmiza Adnan
& Sarani Zakaria

Different preparation method of
nanocellulose from *Macaranga gigantea*
and its preliminary study on packaging film
potential

Polymers 14: 4591. [https://doi.org/10.3390/
polym14214591](https://doi.org/10.3390/polym14214591)

Kedua/Second:

Ng Chin Hong, Kevin Ng Kit Siong, Lee Soon
Leong, Nurul Farhanah Zakaria, Lee Chai Ting
& Tnah Lee Hong

DNA databases of an important tropical
timber tree species *Shorea leprosula*
(Dipterocarpaceae) for forensic timber
identification

Scientific Reports 12: 9546. [https://doi:
10.1038/s41598-022-13697-x](https://doi.org/10.1038/s41598-022-13697-x)

Ketiga/Third:

Tnah Lee Hong, Lee Chai Ting, Ng Chin Hong,
Kevin Ng Kit Siong, Nurul Farhanah Zakaria &
Lee Soon Leong

Tracing the geographic origin of planted
tropical timber *Neobalanocarpus heimii*
(chengal) with DNA approach

Conservation Genetic Resources 14: 413–419.
<https://doi.org/10.1007/s12686-022-01288-x>

Hadiah Merit/ Merit Prize

Nurhanan Murni Yunos, Nor Dafiakma Mat
Amin, Muhammad Haffiz Jauri, Ling Sui Kiong,
Nor Hasnida Hassan & Nor Jannah Sallehudin
The in vitro anti-cancer activities and
mechanisms of action of 9-methoxycanthin-
6-one from *Eurycoma longifolia* in selected
cancer cell lines

Molecules 27: 585. [https://doi: 10.3390/
molecules27030585](https://doi.org/10.3390/molecules27030585).

KATEGORI B: PENERBITAN SEPARA/BUKAN
TEKNIKAL

CATEGORY B: SEMI-TECHNICAL/NON-
TECHNICAL PUBLICATIONS

Pertama/First:

Mohd Farid Ahmad, Razak Terhem, Mohd
Aswad R, Luciasih Agustini, Ho Wai Mun, Heru
Indrayadi & Hidayati N

Diseases of Acacia and control measures in
the tropics

Pp 375–400 in Asiegbu FO & Kovalchuck (eds)
A Forest Microbiology: Forest Tree Health.
Volume 2. Academic Press, London.

Kedua/Second:

V Jeyanny Vijayanathan

Fertiliser use in Malaysian forest plantations—
trends of the past and strategies for the future
Journal of Tropical Forest Science 34: 426–438.

Ketiga/Third:

Tumirah Khadiran, Latifah Jasmani &
Rafeadah Rusli

Application of nanomaterials for wood
protection

Pp 179–196 in Taghiyari HR et al. Emerging
Nanomaterials. Opportunities and Challenges
in Forestry Sectors. Springer Nature, Cham.

Hadiah Merit/ Merit Prize

Lillian Chua Swee Lian, Julia Sang, Joan T
Pereira, Eyen Khoo & Colin R Maycock

Current state of knowledge on the extinction
risk of Malaysian tree species: proximate
needs to mitigate loss

Plants People Planet. Pp 1–13

KATEGORI C: BUKU/ CATEGORY C: BOOK

Madiah Muhammad Nawati, Tan Ai Lee, Intan Nurulhani Baharudin, Amizan Nazri, Dionysia Modingin, Fadzureena Jamaludin, Abdul Hayat Mat Saad, Amelia Bah Azmi & Nurul Husna Zaidi

Discovering the Forest Secrets, Heritage of the Orang Asli Peninsular Malaysia.

Forest Research Institute Malaysia, Kepong.

Hadiah Merit/ Merit Prize

Nik Musa'adah Mustapha, Norbaiah Mat Yaacob, Dionysia Modingin, Abdul Hayat Mat Saad, Madiah Muhammad Nawati, Tan Ai Lee, Md Azharulzaman Mohamed Said, Fadzureena Jamaludin, Intan Nurulhani Baharuddin, Firdaus Kamarulzaman, Rohana Sahdan & Nurul Husna Zaidi

Khazanah Perubatan Melayu Tumbuhan Ubatan Jilid 4.

Institut Penyelidikan Perhutanan Malaysia, Kepong.

KATEGORI D: BUKU PANDUAN/ CATEGORY D: HANDBOOK

Tiada pemenang/No recipient

KATEGORI E: BUKU MESRA ILMU/ CATEGORY E: KNOWLEDGE-FRIENDLY BOOK

ANUGERAH BUKU MESRA ILMU

Zawiah Ngah, Dasrul Iskandar Darus & Rosdi Koter

Bunga-Bunga yang Boleh Dimakan.

FRIM Special Publication 59. Institut Penyelidikan Perhutanan Malaysia, Kepong.

KATEGORI: TESIS/ CATEGORY: THESIS

Tesis Sarjana Sains/ MSc thesis:

Aisyah Marliza Muhamad Kamarulzaman

Pengesanan indikator impak selepas pembalakan memilih menggunakan imej pesawat udara tanpa pemandu

Universiti Kebangsaan Malaysia

Tesis Doktor Falsafah/ PhD thesis:

Alia Syahirah Yusoh

Adhesion characteristics and strength properties of cross laminated timber manufactured from tropical hardwood species

Universiti Putra Malaysia

L. Insentif Artikel yang Diterbitkan dalam Jurnal Berfaktor Impak/ Incentive for Article Published in Journal with Impact Factor

KATEGORI: FAKTOR IMPAK DAN INSENTIF INDIVIDU

CATEGORY: IMPACT FACTOR AND INDIVIDUAL INCENTIVE

Ihsan Safwan Kamarazaman, Nor Azah Mohamad Ali, Fauziah Abdullah, Mohamad Nazrin Che Saad, Aida Azlina Ali, Salfarina Ramli, Pornchai Rojsitthisak & Hasseri Halim

In vitro wound healing evaluation, antioxidant and chemical profiling of *Baekea frutescens* leaves ethanolic extract. IF: 6.212

Arabian Journal of Chemistry 15 (103871): 1-11

Mohd Farid Ahmad, Rozihawati Zahari, Mastura Mohtar, Wan Muhammad Azrul Wan Azhar, Muhammad Syahmi Hishamuddin, Nik Iskandar Putra Samsudin, Affendy Hassan & Razak Terhem

Diversity of endophytic fungi isolated from different plant parts of *Acacia mangium*, and antagonistic activity against *Ceratocystis fimbriata*, a causal agent of *Ceratocystis* wilt disease of *A. mangium* in Malaysia. IF: 6.064
Frontiers in Microbiology 13 (887880)

Ng Chin Hong, Kevin Ng Kit Siong, Lee Soon Leong, Nurul Farhanah Zakaria, Lee Chai Ting & Tnah Lee Hong

DNA databases of an important tropical timber tree species *Shorea leprosula* (Dipterocarpaceae) for forensic timber identification. IF: 4.997

Scientific Reports 12 doi: 10.1038/s41598-022-13697-x

Latifah Jasmani, Nurul Ain Nadirah Jamaluddin, Rafeadah Rusli, Sharmiza Adnan & Sarani Zakaria

Different preparation method of nanocellulose from macaranga gigantea and its preliminary study on packaging film potential. IF: 4.967

Polymers 14 <https://doi.org/10.3390/polym14214591>

Nurhanan Murni Yunos, Nor Datiakma Mat Amin, Muhammad Haffiz Jauri, Ling Sui Kiong, Nor Hasnida Hassan & Nor Jannah Sallehudin The in vitro anti-cancer activities and mechanisms of action of 9-methoxycanthin-6-one from Eurycoma longifolia in selected cancer cell lines. IF: 4.927

Molecules 27 (585) doi: 10.3390/molecules27030585

Lee Soon Leong, Nurul Farhanah Zakaria, Tnah Lee Hong, Ng Chin Hong, Kevin Ng Kit Siong, Lee Chai Ting, Lau Kah Hoo & Lillian Chua Swee Lian

DNA databases of a CITES listed species *Aquilaria malaccensis* (Thymelaeaceae) as the tracking tools for forensic identification and chain of custody certification. IF: 4.453
Forensic Science International-Genetics 57 (102658) doi:10.1016/j.fsigen.2021.102658

Hamidah Mamat, Mohd Hasmadi I, Lillian Chua Swee Lian, Wendy Yong Sze Yee, Lau Kah Hoo, Faridah Hanum I, Pakhriazad HZ Development of a protocol for Malaysian important plant areas criterion weights using multi-criteria decision making—analytical hierarchy process (MCDM-AHP). IF: 3.970
Global Ecology and Conservation 34 <https://doi.org/10.1016/j.gecco.2022.e02033>

Abd Majid Jalil, Hazandy Abdul Hamid, Sahrim Lias, Mohd Khairun Anwar Uyup, Paridah Md Tahir, Sheriza Mohd Razali, Ahmad Azaruddin Mohd Noor, Samsuddin Syazwan Ahmad, Alliesya Shamelia Shamsul Anuar, Mohamad Roslan Mohamad Kasim, Johar Mohamed & Rambod Abiri

Assessment of the effects of artificial fungi inoculations on agarwood formation and sap flow rate of *Aquilaria malaccensis* Lam. using sonic tomography (SoT) and sap flow meter (SFM). IF: 3.282
Forests 10:13 (1731)

Sures Kumar Muniandi, Norwati Muhammad, Farah Fazwa Md Ariff & Yaghoob T Improved clonal propagation through rejuvenation of mature branch cutting of four important *Acacia* species. IF: 3.282
Forests 13 <https://doi.org/10.3390/f13091403>

Kaviarasu Munian, Farah Farhana R, Mohd Ilham Norhakim L, Nursyuhada O, Nur Aina Amira M, Hidayah H, Nur Hartini S, Najmuddin Mf, Salim A, Salman Faris Z & Abdul-Latif MAB First insight into freshwater fish assemblages in the western part of the Endau-Rompin landscape, Malaysia. IF: 2.431
Nature Conservation-Bulgaria 50 <http://doi:10.3897/natureconservation.50.86090>

Ng Chin Hong, Kevin Ng Kit Siong, Lee Soon Leong, Rempei Suwa, Lee Chai Ting, Tnah Lee Hong
Growth performance and scale insect infestation of *Shorea leprosula* in a common garden experimental plot. IF: 2.631
Journal of Forestry Research 12 <https://doi.org/10.1007/s11676-022-01510-4>

Zulkifree AL, Sofiya Zulaikha Ruslan, Nurul Ain MZ, Mohd Nazip S, Hamdan Omar, Tajul Rosli R, Shukor Sanim MF, Gining Ragm Optimization of power transmission line location at tropical forest area in avoiding endangered tree species. IF: 1.827
Arabian Journal of Geosciences 15 (822) <https://doi.org/10.1007/s12517-022-10007-7>

Alia Syahirah Yusoh, Fatimah Atiyyah S, Paridah MT, Mohd Khairun Anwar Uyup, Hamdan Hussein & Salim H

Shear strength and hardness of two tropical wood species as function of heat treatment. IF: 1.767

Maderas-Ciencia Y Tecnologia 24 (29) doi: 10.4067/s0718-221x2022000100429

Nordahlia Abdullah Siam, Shahlinney Lipeh, Mohd Khairun Anwar Uyup, Muhammad Amirul Aiman Ahmad Juhari, Noraini Talip, Che Nurul Aini Che Amri & Nor Azahana Abdullah

Anatomical and physical properties of three lesser-known timber species from Malaysia. IF: 1.747

Bioresources 17 doi: 10.1537/biores.17.1.1090-1105

Muhammad Syahmi Hishamuddin, Ahmad Syazwan Samsuddin & Rozi Mohamed

Mining and analysis of chloroplast simple sequence repeats (SSRs) from eight species of Aquilaria. IF: 1.429

Turkish Journal of Botany 46: 26–36

Siti Munirah Mat Yunoh & Nikong Dome

Thismia latiffiana (Thismiaceae), an unusual new species from Terengganu, Peninsular Malaysia. IF: 1.317

PhytoKeys 188 <https://doi.org/10.3897/phytokeys.188.77061>

Siti Munirah Mat Yunoh, Suhaida Mustafa & Eddie Chan

Thismia limkokthayi (Thismiaceae): A new mycoheterotrophic species from Genting Highlands in Pahang, Malaysia. IF: 1.317

PhytoKeys 211: 1–11

Nur Nabilah Alias, Norlia Basherudin, Nazirah Abdullah, Nor Hasnida Hassan & Kamalrul Azlan Azizan

Differentiation of Eurycoma longifolia using high-performance liquid chromatography-quadrupole time-of-flight mass spectrometry-based metabolomic approach. IF: 1.237

Journal of Analytical Chemistry 77 (10): 1325–1332

Tnah Lee Hong, Lee Chai Ting, Ng Chin Hong, Kevin Ng Kit Siong, Nurul Farhanah Zakaria, Lee Soon Leong

Tracing the geographic origin of planted tropical timber Neobalanocarpus heimii (chengal) with DNA approach. IF: 0.991

Conservation Genetics Resources <https://doi.org/10.1007/s12686-022-01288-x>

Azian Mohti, Nizam MS, Nik Norafida NA, Ismail Parlan, Samsudin Musa & Noor Farahanizan Z

Projection of soil carbon changes and forest productivity for 100 years in Malaysia using dynamic vegetation model Lund-Potsdam-Jena. IF: 0.957

Journal of Tropical Forest Science 34: 275–284

V Jeyanny Vijayanathan

Fertiliser use in Malaysian forest plantations trends of the past and strategies for the future. IF: 0.957

Journal of Tropical Forest Science 34: 426–438

Roszaini Kadir, Mailina Jamil, Shaharuddin Hashim, Zaihan Jalaludin & Nor Azah Mohd Ali

Biotoxicity of tropical plant essential oils against subterranean termites Coptotermes curvignathus. IF: 0.957

Journal of Tropical Forest Science 34: 210–220

KATEGORI: FAKTOR IMPAK DAN INSENTIF BAHAGIAN

CATEGORY: IMPACT FACTOR AND DIVISION INCENTIVE

Pemenang/ Winner	Faktor impak terkumpul Accumulative impact factor
Pertama/First: Keluaran Hutan	43.106
Kedua/Second: Perhutanan dan Alam Sekitar	27.748
Ketiga/Third: Bioteknologi Perhutanan	26.408

M. Insentif bagi Artikel yang Diterbitkan dalam JTFS Incentive for Articles published in JTFS

Pengarang/Artikel/Jurnal Author/Article/Journal

Azian Mohti, Nizam MS, Nik Norafida NA, Ismail Parlan, Samsudin Musa & Noor Farahanizan Z
Projection of soil carbon changes and forest productivity for 100 years in Malaysia Using Dynamic Vegetation Model
Lund-Potsdam-Jena.
Journal of Tropical Forest Science 34: 275–284

V Jeyanny Vijayanathan
Fertiliser use in Malaysian forest plantations trends of the past and strategies for the future.
Journal of Tropical Forest Science 33(1): 77–87.

Roszaini Kadir, Mailina Jamil, Shaharuddin Hashim, Zaihan Jalaludin & Nor Azah Mohamad Ali
Biotoxicity of tropical plant essential oils against subterranean termites *Coptotermes curvignathus*.
Journal of Tropical Forest Science. 34: 210–220

Rozihawati Z, Wan Muhammad Azrul Wan Azhar, Noor Baity, Sheriza MR, Hazandy AH, Mohd Farid Ahmad & Zaiton S
Formulation of alternative media for fungal growth and its application as agarwood-inducing agent in *Aquilaria* trees
Journal of Tropical Forest Science 34: 127–132
Forest Science 33(3): 240–246.

N. Penghargaan Khas Penerbitan/ Special Publication Appreciation

Siri Alam dan Rimba Edisi Kanak-kanak (SAR18). Kepong.
Institut Penyelidikan Perhutanan Malaysia, Kepong.

Insentif Penulisan Buku/ Book Writing Incentive

Ahmad Zuhaidi & Amir Saaiffudin Kassim
20 Years Reforestation Of Bukit Hari: Sustaining Timber Supply Through Plantation Forests.
Forest Research Institute Malaysia, Kepong.

Roszaini Kadir, Nordahlia Abdullah Siam, Mohd Jamil Abdul Wahab, Noor Azrieda Abd Rashid, Wan Rasidah Wan Ab Kadir, Mohamad Nasir Mat Arip, Khairul Awang & Ida Suraini Abd Shukor
Wood Characteristics of Planted *Acacia mangium*, *Hopea odorata* And *Khaya ivorensis* At Different Sites. Forest Research Institute Malaysia, Kepong.

Khairul Awang, Mohd Fahmi Awalludin, Wan Tarmeze Wan Ariffin & Zairul Amin Rabidin
Sumbangan Bengkel Kerja Kayu Dalam Pembangunan Infrastruktur FRIM 2003-2020.
Institut Penyelidikan Perhutanan Malaysia, Kepong.

Zawiah Ngah, Dasrul Iskandar Darus & Rosdi Koter
Bunga-Bunga yang Boleh Dimakan.
Institut Penyelidikan Perhutanan Malaysia, Kepong.

Gemma LC Bramly, Sandy Atkins, Ruth Kiew,
Richard Chung Cheng Kong, Cheah Yih
Horng, Saw Leng Guan (eds)
Flora of Peninsular Malaysia Series II: Seed
Plants,
Vol. 9. Forest Research Institute Malaysia,
Kepong.

O. **Anugerah Kecemerlangan Sukan/ Sports Excellent Award**

Pasukan Terbaik/**Best Team**: Pingpong

Pengurus Pasukan Terbaik/**Best Team**

Manager: Azam Shah Mat Rata

Olahragawan/**Best Sportsman**: Mohamad
Faizal Sharuddin

Olahragawati/**Best Sportswoman**: Saizatul
Maheran Ramle

Anugerah Kepimpinan Sukan/**Sports**

Leadership Award: Abdul Halim Talha



Pingat Perkhidmatan Cemerlang/
Excellent Service Medal: Dr Abdul Majid Jalil



Anugerah Ketua Pengarah/**Director General's Award**:
Dr Noor Azlin & Mohd Afendi Hussin



ANUGERAH DAN PENGIKTIRAFAN

AWARD AND RECOGNITION

Senna siamea

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ANUGERAH DAN PENGIKTIRAFAN

AWARD AND RECOGNITION

Pada tahun 2023, FRIM menerima beberapa anugerah dan pengiktirafan dari agensi luar, termasuk organisasi antarabangsa. Penghargaan ini menunjukkan sumbangan signifikan FRIM dalam penyelidikan perhutanan, usaha pemuliharaan, serta amalan pembangunan lestari.

In 2023, FRIM received several awards and recognition from external agencies, including international organisations. These accolades likely reflect FRIM's significant contributions to forestry research, conservation efforts, and sustainable development practices.

INTERNATIONAL INVENTION, INNOVATION & TECHNOLOGY EXHIBITION MALAYSIA (ITEX MALAYSIA) 2023

FRIM telah memenangi memenangi satu (1) pingat emas dan tiga (3) pingat perak di International Invention, Innovation & Technology Exhibition Malaysia (ITEX Malaysia) 2023. ITEX'23 yang diadakan pada 11-12 Mei 2023 menerima 700 penyertaan dari 19 negara.

i. Pingat emas

- The effect of *Clitoria ternate* towards Alzheimers diseases/memory deficit and Parkinson disease (Product name; Neurovit) - Muhammad Danial Che Ramli (MSU), Anita Zara Weinheimner (MSU), Mahathir Mohd Uzir (MSU), Husin Muhammad (IMR), Mohd Kamal Nik Hasan (FRIM), Syntyche Seow Ling Sing (Ganofarm), Nur Arissa Syazwani (MSU) & Hani Qistina Dayana (MSU).

ii. Pingat perak

- BambooNxtor - Dr Wan Tarmeze Wan Ariffin, LAr Dr Nik Adlin Nik Mohamed Sukri & Dr Khairul Awang.
- r-Agaresin (Rapid Agarwood Resin Content Determination) – Dr Abd Majid Jalil, Sahrim Lias, Saidatul Husni Saidin, Mailina Jamil, Mohammad Faridz Zoll Patah & Theresa Luli Anak Rerang.
- Floating Lotus - Mohd Rizuwan Mamat, Dr Marryyanna Lion, Dr Wan Mohd Shukri Wan Ahmad, Dr Siti Aisah Shamsuddin, Mohd Azahari Faidi, Abdul Razak Abd Rahman, Rashidah Hasnim @ Hashim, Nurul Faihira Kamaruzaman, Mohd Hahazami Md. Tahar, Azam Shah Mat Rata, Khairul Anuar Mohamed, Wan Adanan Wan Ishak, Zamri Mohd Zain & Hamidul Muhsi Mohd Salleh.

INTERNATIONAL INVENTION, INNOVATION & TECHNOLOGY EXHIBITION MALAYSIA (ITEX MALAYSIA) 2023

FRIM has won one gold medal and three silver medals at the International Invention, Innovation & Technology Exhibition Malaysia (ITEX Malaysia) 2023. ITEX'23, held on May 11-12, 2023, received 700 entries from 19 countries.

i. Gold medal

- The effect of *Clitoria ternate* towards Alzheimers diseases/memory deficit and Parkinson disease (Product name; Neurovit) - Muhammad Danial Che Ramli (MSU), Anita Zara Weinheimner (MSU), Mahathir Mohd Uzir (MSU), Husin Muhammad (IMR), Mohd Kamal Nik Hasan (FRIM), Syntyche Seow Ling Sing (Ganofarm), Nur Arissa Syazwani (MSU) & Hani Qistina Dayana (MSU).

ii. Silver medal

- BambooNxtor - Dr Wan Tarmeze Wan Ariffin, LAr Dr Nik Adlin Nik Mohamed Sukri & Dr Khairul Awang.
- r-Agaresin (Rapid Agarwood Resin Content Determination) – Dr Abd Majid Jalil, Sahrim Lias, Saidatul Husni Saidin, Mailina Jamil, Mohammad Faridz Zoll Patah & Theresa Luli Anak Rerang.
- Floating Lotus - Mohd Rizuwan Mamat, Dr Marryyanna Lion, Dr Wan Mohd Shukri Wan Ahmad, Dr Siti Aisah Shamsuddin, Mohd Azahari Faidi, Abdul Razak Abd Rahman, Rashidah Hasnim @ Hashim, Nurul Faihira Kamaruzaman, Mohd Hahazami Md. Tahar, Azam Shah Mat Rata, Khairul Anuar Mohamed, Wan Adanan Wan Ishak, Zamri Mohd Zain & Hamidul Muhsi Mohd Salleh.



Dari kiri: Saidatul, Dr Wan Tarmeze, Dr Siti Aisah & Rashidah Hasnim bersama medal masing-masing

From left: Saidatul, Dr Wan Tarmeze, Dr Siti Aisah & Rashidah Hasnim posing with their medals



Para penyelidik FRIM di reruai pameran
FRIM researchers posing at FRIM booth

SEOUL INTERNATIONAL INVENTION FAIR (SIIF) 2023

FRIM telah menyertai Seoul International Invention Fair (SIIF 2023) yang diadakan di COEX, Seoul, Korea Selatan pada 1-4 November 2023, diketuai oleh Dr Muhd Noor Muhd Yunus, Presiden Malaysian Association of Research Scientists (MARS). SIIF2023 menerima 484 penyertaan dari 18 negara. Projek inovasi FRIM yang memenangi anugerah ialah:

- i. Pingkat perak & Anugerah Khas daripada Vietnam Fund for Supporting Technological Creations (VIFOTEC)
r-Agaresin (Rapid Resin Content Determination for Agarwood Grading Classification) - Dr Abd Majid Jalil, Sahrim Lias, Mailina Jamil, Saidatul Husni Saidin, Noor Rasyila Mohamed Noor, Theresa Luli Anak Rerang, Mohammad Faridz Zoll Patah, Wan Muhammad Syafiq Wan Mat dan Hazandy Abdul Hamid
- ii. Pingkat gangsa
Goutree: Aspiring A New Antigout Botanical Drug - Dr Fadzureena Jamaludin, Siti Nur Aisyah Mohd Hashim, Dr Zunoliza Abdullah, Dr Fadhilah Zainudin, Khairul Iruwan Abdullah, Saidatul Husni Saidin, Khairul Kamilah Abd Kadir, Mohd Shahidan Mohamad Arshad dan Dr Farah Fazwa Md Ariff

SEOUL INTERNATIONAL INVENTION FAIR (SIIF) 2023

FRIM has participated in Seoul International Invention Fair (SIIF 2023) which was held at COEX, Seoul, South Korea from 1-4 November 2023, headed by Dr Muhd Noor Muhd Yunus, Malaysian Association of Research Scientists President (MARS). SIIF 2023 received 484 entries from 18 countries. The award-winning FRIM innovation projects were:

- i. Silver medal & Special Prize from Vietnam Fund for Supporting Technological Creations (VIFOTEC)
r-Agaresin (Rapid Resin Content Determination for Agarwood Grading Classification) - Dr Abd Majid Jalil, Sahrim Lias, Mailina Jamil, Saidatul Husni Saidin, Noor Rasyila Mohamed Noor, Theresa Luli Anak Rerang, Mohammad Faridz Zoll Patah, Wan Muhammad Syafiq Wan Mat and Hazandy Abdul Hamid
- ii. Bronze medal
Goutree: Aspiring A New Antigout Botanical Drug - Dr Fadzureena Jamaludin, Siti Nur Aisyah Mohd Hashim, Dr Zunoliza Abdullah, Dr Fadhilah Zainudin, Khairul Iruwan Abdullah, Saidatul Husni Saidin, Khairul Kamilah Abd Kadir, Mohd Shahidan Mohamad Arshad and Dr Farah Fazwa Md Ariff



Dari kiri: Dr Fadhilah, Dr Muhd Noor, Dr Abd Majid bergambar bersama medal masing-masing

From left: Dr Fadhilah, Dr Muhd Noor, Dr Abd Majid posing with their medals

MALAYSIA TECHNOLOGY EXPO (MTE) 2023

FRIM memenangi masing-masing dua pingat emas dan pingat perak bagi kategori International Innovation Awards (IIA) serta satu Anugerah Khas daripada International Federation of Inventors' Associations - IFIA for Best Invention Medal' di Malaysia Technology Expo (MTE) 2023 pada 16-18 Mac 2023. Selain daripada pertandingan inovasi, FRIM juga dijemput oleh Kementerian Sains, Teknologi dan Inovasi (MOSTI) untuk mempromosikan produk inovasi Teh Anggerik yang merupakan produk terpilih sebagai Key Performance Indicator (KPI) khas *Malaysia Commercialisation Year 2022 (MCY 2022)*.

i. Pingkat emas dan Special Award IFIA for Best Invention Medal

- Cièra: Nature Inspired Eco Friendly Hand Wash product- Dr Mastura Mohtar, Mohd Ramdan Parman, Wan Sabariah Shuib, Saiful Azmi Johari, Mazurah Mohd Isa dan Hannan Abdul Wahab
- *Floating Lotus* - Mohd Rizuwan Mamat, Dr Marryanna Lion, Dr Wan Mohd Shukri Wan Ahmad, Dr Siti Aisah Shamsuddin, Mohd Azahari Faidi, Abdul Razak Abdul Rahman, Rashidah Hasnim @ Hashim dan Nurul Faihira Kamaruzaman

MALAYSIA TECHNOLOGY EXPO (MTE) 2023

FRIM won two gold awards and two silver awards in the International Innovation Awards (IIA) category, as well as a Special Award from the International Federation of Inventors' Associations (IFIA) for the Best Invention Medal at the Malaysia Technology Expo (MTE) 2023, held on 16-18 March 2023. In addition to the innovation competition, FRIM was also invited by the Ministry of Science, Technology, and Innovation (MOSTI) to promote its innovative product, Teh Anggerik, which was selected as a special Key Performance Indicator (KPI) for *Malaysia Commercialisation Year 2022 (MCY 2022)*.

i. Gold medal and Special Award IFIA for Best Invention Medal

- Cièra: Nature Inspired Eco Friendly Hand Wash product - Dr Mastura Mohtar, Mohd Ramdan Parman, Wan Sabariah Shuib, Saiful Azmi Johari, Mazurah Mohd Isa and Hannan Abdul Wahab
- *Floating Lotus* - Mohd Rizuwan Mamat, Dr Marryanna Lion, Dr Wan Mohd Shukri Wan Ahmad, Dr Siti Aisah Shamsuddin, Mohd Azahari Faidi, Abdul Razak Abdul Rahman, Rashidah Hasnim @ Hashim and Nurul Faihira Kamaruzaman



Penyelidik FRIM bergambar dengan pingat dan sijil anugerah masing-masing
FRIM researchers posing with their medals and certificates



Dr Mohd Khairun Anwar Uyup,
Ketua Unit Buluh,
Rotan dan Palma,
Bahagian Keluaran Hutan FRIM
telah **diiktiraf sebagai Saintis Penyelidikan Terbaik Malaysia (TRSM)** 2023 pada 17 Oktober 2023.

Dr Mohd Khairun Anwar Uyup, Head of the Bamboo, Rattan and Palm Unit, FRIM Forest Products Division **received Top Research Scientists Malaysia (TRSM) award** for 2023 on 17 October 2023

ii. Pingat perak

- Nano crystalline cellulose (NCC) from *Kombucha pellicles* - Abd Rashid Li, Muhammad Khair Mohd Ayob, Saidatul Husni Saidin, Dr Maryam Husain, Nor Hidayatul Khamariah Zainul Abidin dan Nursyafinatul Nadhirah Mohd Azizi
- Portable Sensor CLTM - Gs. Dr Azian Mohti, Nurul Ain Abdul Manaf, Dr Nik Norafida Nek Ali @ Nik Ali dan Dr Wan Mohd Shukri Wan Ahmad

ANUGERAH SAINTIS PENYELIDIKAN TERBAIK MALAYSIA (TRSM)

Dr Mohd Khairun Anwar Uyup, Ketua Unit Buluh, Rotan dan Palma, Bahagian Keluaran Hutan FRIM telah diiktiraf sebagai Saintis Penyelidikan Terbaik Malaysia (TRSM) 2023 pada 17 Oktober 2023.

Beliau telah memperoleh Ijazah Kedoktoran dalam Sains dan Teknologi Kayu dari Universiti Putra Malaysia pada 2008. Penyelidikannya yang paling memberi impak merupakan kajian bagi meningkatkan kualiti produk hutan kayu dan bukan kayu melalui penggunaan polimer yang diperkuat dengan nanomaterial serta monomer, khususnya untuk aplikasi luar.

Inovasi penyelidikan beliau telah menyumbang kepada pembangunan kaedah mudah untuk menghasilkan komposit berdasarkan buluh yang tahan lama. Selain itu, beliau juga terlibat dalam pembangunan kayu berlapis silang (CLT) yang menggunakan spesies kayu Malaysia untuk industri kayu dan pembinaan. Penyelidikan yang dijalankan oleh Mohd Khairun bukan hanya menyumbang kepada pengetahuan baharu, tetapi juga berjaya memperoleh beberapa paten. Selain sumbangan penyelidikan, beliau juga memainkan peranan penting dalam membentuk dasar dan 'standard' berkaitan kayu dan buluh, sama ada di peringkat kebangsaan atau antarabangsa.

ii. Silver medal

- Nano crystalline cellulose (NCC) from *Kombucha pellicles* - Abd Rashid Li, Muhammad Khair Mohd Ayob, Saidatul Husni Saidin, Dr Maryam Husain, Nor Hidayatul Khamariah Zainul Abidin and Nursyafinatul Nadhirah Mohd Azizi
- Portable Sensor CLTM - Gs. Dr Azian Mohti, Nurul Ain Abdul Manaf, Dr Nik Norafida Nek Ali @ Nik Ali and Dr Wan Mohd Shukri Wan Ahmad

TOP RESEARCH SCIENTISTS MALAYSIA (TRSM)

Dr Mohd Khairun Anwar Uyup, Head of the Bamboo, Rattan and Palm Unit, FRIM Forest Products Division received Top Research Scientists Malaysia (TRSM) award for 2023 on 17 October 2023 along with 30 others scientists.

Dr Mohd Khairun obtained his Doctorate in Wood Science and Technology from Universiti Putra Malaysia in 2008. His most impactful research involves studying ways to enhance the quality of wood and non-wood forest products through the use of polymer reinforced with nanomaterials and monomers, particularly for outdoor applications.

His research innovation has contributed to the development of an easy method to produce long-lasting bamboo-based composites. Additionally, he has been involved in the development of Cross Laminated Timber (CLT) using Malaysian wood species for the timber and construction industry. Mohd Khairun's research not only contributes to new knowledge but has also successfully obtained several patents. Apart from his research contributions, he also plays a crucial role in shaping policies and standards related to wood and bamboo, both nationally and internationally.



Beliau merupakan saintis FRIM keempat yang menerima anugerah TRSM, selepas mantan Ketua Pengarah, **Datuk Dr Abd Latif Mohmod (2013), Dr Nor Azah Mohamad Ali (2015) dan Dr Lee Soon Leong (2022).**

Head of the Bamboo, He is the **fourth FRIM scientist** to receive the **TRSM award**, following former Director-General **Datuk Dr Abd Latif Mohmod (2013), Dr Nor Azah Mohamad Ali (2015), and Dr Lee Soon Leong (2022).**

Beliau merupakan saintis FRIM keempat yang menerima anugerah TRSM, selepas mantan Ketua Pengarah, Datuk Dr Abd Latif Mohmod (2013), Dr Nor Azah Mohamad Ali (2015) dan Dr Lee Soon Leong (2022).

He is the fourth FRIM scientist to receive the TRSM award, following former Director-General Datuk Dr Abd Latif Mohmod (2013), Dr Nor Azah Mohamad Ali (2015), and Dr Lee Soon Leong (2022).



Dr Mohd Khairun bergambar bersama sijil dan plak anugerah
Dr Mohd Khairun posing with the certificate and plaque

FRIM TERIMA MALAYSIA BOOK OF RECORDS (MBR) KE-46

Saintis tanah FRIM, Dr V. Jeyanny Vijayanathan telah menerima pengiktirafan Malaysia Book of Records (MBR) bagi sebagai 'First Malaysian soil scientist to be selected as panel for Food and Agriculture Organization (FAO) Intergovernmental Technical Panel of Soils (ITPS)' yang merupakan rekod MBR ke-46 bagi FRIM yang disampaikan oleh Siti Hajar Johor, Perunding Rekod Kanan MBR di Ibu Pejabat MBR, Kuala Lumpur pada 14 April 2023.

Dr Jeyanny dilantik sebagai ahli ITPS oleh Food and Agriculture Organization of the United Nations (FAO) pada 2 Jun 2022. Pelantikan ini tersebut merupakan pelantikan pertama bagi warga Malaysia. Jeyanny merupakan salah seorang daripada 27 pakar yang dipilih daripada sejumlah 95 calon dari seluruh dunia.

ITPS berfungsi untuk memberikan

FRIM RECEIVES 46th MALAYSIA BOOK RECORDS

FRIM soil scientist, Dr V. Jeyanny Vijayanathan, has been recognised by the Malaysia Book of Records (MBR) as the 'First Malaysian soil scientist to be selected as a panel for Food and Agriculture Organization (FAO) Intergovernmental Technical Panel of Soils (ITPS)', which is the 46th record for FRIM presented by Siti Hajar Johor, Senior Records Consultant of MBR at the MBR Headquarters in Kuala Lumpur on 14 April 2023.

Dr Jeyanny was appointed as a member of the ITPS by the Food and Agriculture Organization of the United Nations (FAO) on June 2, 2022. This appointment is the first of its kind for a Malaysian. Jeyanny is one of 27 experts selected from a total of 95 candidates from around the world.

ITPS functions to provide scientific and technical advice on global soil issues to the Global Soil Partnership

nasihat saintifik dan teknikal mengenai isu tanah global kepada Global Soil Partnership serta institusi lain. ITPS juga mempromosikan pengurusan tanah lestari dalam pelbagai agenda pembangunan. Pelantikan ini penting kepada Malaysia dan FRIM sebagai platform untuk memberi sumbangan saintifik dan teknikal mengenai isu tanah global. Dr Jeyanny akan menyertai sesi-sesi kumpulan kerja utama yang membincangkan dan menyediakan manual serta rujukan seperti Laporan Status Tanah Dunia (Status of the World Soil Resources Report) untuk rujukan global.

and other institutions. ITPS also promotes sustainable land management in various development agendas. This appointment is important for Malaysia and FRIM as a platform to contribute scientifically and technically to global soil issues. Dr Jeyanny will join key working group sessions discussing and preparing manuals and references such as the Status of the World Soil Resources Report for global reference.



Dari kiri: Dr V. Jeyanny, Dr Ismail dan Siti Hajar
From left: Dr V. Jeyanny, Dr Ismail and Siti Hajar

ANUGERAH BUKU NEGARA

FRIM telah menerima Anugerah Buku Negara 2023 Kategori Perdana: Institusi Penyelidikan Terbaik di majlis anugerah yang diadakan pada 27 Mei 2023 bagi menghargai sumbangan FRIM dalam memperbanyakkan penerbitan ilmiah tentang penjagaan dan perlindungan hutan tropika, biodiversiti hutan, penggunaan kayu-kayuan dan lain-lain khazanah, penanaman semula pokok-pokok hutan serta perlindungan alam sekitar. Ketua Pengarah FRIM, Dr Ismail Parlan menerima trofi dan sijil yang disampaikan oleh DYMM Sultan Nazrin Muizzuddin Shah Ibni Almarhum Sultan Azlan Muhibbuddin Shah Al-Maghfur-Lah.

Selain itu, FRIM turut menerima Anugerah Buku Negara 2023 (Sidang 2) bagi buku penerbitan berjudul 'Bunga-bunga yang boleh dimakan' untuk Kategori Industri: Buku Umum Terbaik (Flora & Fauna) pada 22 Disember 2023. Buku ini dihasilkan oleh Zawiah Ngah, Dasrul Iskandar Darus dan Dr Rosdi Koter serta disunting oleh Ida Suraini Abd Shukor dan Chee Beng Jin.

Ketua Pengarah FRIM, Dr Ismail Parlan menerima trofi dan sijil anugerah tersebut yang disampaikan oleh Tan Sri Prof. Datuk Wira Dr Abdul Latiff Abu Bakar, Pengerusi Lembaga Pengelola Yayasan Pembangunan Buku Negara (YPBN).

NATIONAL BOOK AWARD

FRIM has received the National Book Award 2023 in the Prime Category: Best Research Institution at the award ceremony held on 27 May 2023, to recognise FRIM's contribution to increasing scientific publications on the conservation and protection of tropical forests, forest biodiversity, the use of wood and other resources, reforestation, and environmental protection. FRIM Director General, Dr Ismail Parlan received the trophy and certificate presented by HRH Sultan Nazrin Muizzuddin Shah Ibni Almarhum Sultan Azlan Muhibbuddin Shah Al-Maghfur-Lah.

Additionally, FRIM also received the National Book Award 2023 (Session 2) for the publication titled 'Bunga-bunga yang boleh dimakan' in the Industry Category: Best General Book (Flora & Fauna) on 22 December 2023. This book was written by Zawiah Ngah, Dasrul Iskandar Darus, and Dr Rosdi Koter and edited by Ida Suraini Abd Shukor and Chee Beng Jin.

FRIM Director General, Dr Ismail Parlan, received the trophy and award certificate, presented by Tan Sri Prof. Datuk Wira Dr Abdul Latiff Abu Bakar, Chairman of the Board of Trustees of the National Book Development Foundation (YPBN).



DYMM Paduka Seri Sultan Nazrin menyampaikan anugerah kepada Dr Ismail
HRH Sultan Nazrin presenting the award to Dr Ismail



FRIM menerima anugerah daripada Tan Sri Prof. Datuk Wira Dr Abdul Latiff (tengah)
FRIM receiving award from Tan Sri Prof. Datuk Wira Dr Abdul Latiff (middle)

ANUGERAH KECEMERLANGAN MAKMAL

FRIM telah menerima Anugerah Kecemerlangan Makmal (Laboratory Excellence Awards) pada majlis Malam Kimia anjuran Institut Kimia Malaysia (IKM) pada 1 Disember 2023 di Petaling Jaya:

- Makmal Pengujian Komposit Kayu FRIM: Anugerah kecemerlangan Platinum (IKM Laboratory Excellence Platinum Award) atas kejayaan mengekalkan kecemerlangan makmal selama 20 tahun berturut-turut
- Makmal Analisis Awetan Kayu, Makmal Kimia Tanah dan Makmal Kawalan Kualiti Hasil Semula Jadi atas kecemerlangan makmal bagi 2023

Malam Kimia merupakan acara tahunan bagi mengiktiraf kecemerlangan dalam bidang kimia di Malaysia. Anugerah-anugerah diberikan meliputi pelbagai sektor serta disiplin termasuk akademik, pendidikan, industri, perkhidmatan, sektor korporat, generasi muda dan makmal.

LABORATORY EXCELLENCE AWARDS

FRIM received the Laboratory Excellence Awards at the Chemistry Night event organised by the Malaysian Institute of Chemistry (IKM) on 1 December 2023, in Petaling Jaya:

- FRIM Wood Composite Testing Laboratory: Platinum Excellence Award (IKM Laboratory Excellence Platinum Award) for maintaining laboratory excellence for 20 consecutive years
- Wood Preservation Analysis Laboratory, Soil Chemistry Laboratory, and Natural Product Quality Control Laboratory for laboratory excellence in 2023

Chemistry Night is an annual event to recognise excellence in the field of chemistry in Malaysia. Awards are given across various sectors and disciplines including academia, education, industry, service, corporate sector, youth, and laboratories.



Para penyelidik FRIM bergambar dengan sijil anugerah masing-masing
FRIM researchers posing with their certificates

LOYALTY AWARD DARIPADA MALAYSIAN INTERNATIONAL FURNITURE FAIR (MIFF)

FRIM telah menerima 'Loyalty Award' pada Majlis 'Gala Dinner' sempena Ulang Tahun ke-30 Malaysian International Furniture Fair (MIFF) yang diadakan di Malaysia International Trade and Exhibition Centre (MITEC), Kuala Lumpur pada 8 Disember 2023.

Dr Ismail Parlan, Ketua Pengarah FRIM menerima sijil dan trofi anugerah tersebut yang diberikan kepada organisasi serta syarikat-syarikat yang telah menyertai acara MIFF selama lebih 25 tahun.

Majlis penyampaian anugerah tersebut disempurnakan oleh Dato' Sri Fadillah Yusof, Timbalan Perdana Menteri (TPM) merangkap Menteri Perladangan dan Komoditi yang diiringi Dato' Dr Tan Chin Huat, Pengasas dan Pengerusi MIFF.

FRIM merupakan salah sebuah organisasi yang telah menyertai setiap acara pameran MIFF selama lebih 25 tahun. FRIM mula menyertai acara tersebut pada 1996 dan kemudiannya, dijemput menjadi rakan kerjasama bagi MIFF.

LOYALTY AWARD FROM MALAYSIAN INTERNATIONAL FURNITURE FAIR (MIFF)

FRIM has received the 'Loyalty Award' at the Gala Dinner in conjunction with the 30th Anniversary of the Malaysian International Furniture Fair (MIFF) held at the Malaysia International Trade and Exhibition Centre (MITEC), Kuala Lumpur on 8 December 2023.

Dr Ismail Parlan, FRIM Director General received the certificate and trophy for the award, which was presented to organisations and companies that have participated in the MIFF event for more than 25 years.

The award presentation ceremony was officiated by Dato' Sri Fadillah Yusof, Deputy Prime Minister (DPM) cum Minister of Plantation Industries and Commodities, accompanied by Dato' Dr Tan Chin Huat, Founder and Chairman of MIFF.

FRIM is one of the organisations that has participated in every MIFF exhibition for over 25 years. FRIM began participating in the event in 1996 and was later invited to become a partner for MIFF.



Dr Ismail (tiga dari kiri) menerima anugerah daripada Dato' Sri Fadillah (tengah)
Dr Ismail (3rd from the left) receiving the award from Dato' Sri Fadillah (centre)



FRIM telah menerima **Anugerah AKRAB Kategori Organisasi Dinamik** sempena **Majlis Perasmian Konvensyen AKRAB Kebangsaan Tahun 2023** pada **3 Oktober 2023** di **Putrajaya**.

FRIM has received the **AKRAB Award** in the **Dynamic Organisation** category at the **National AKRAB Convention 2023** on **3 October 2023** in **Putrajaya**.

FRIM TERIMA ANUGERAH AKRAB

FRIM telah menerima Anugerah AKRAB Kategori Organisasi Dinamik sempena Majlis Perasmian Konvensyen AKRAB Kebangsaan Tahun 2023 pada 3 Oktober 2023 di Putrajaya. Dr Norwati Muhammad, Timbalan Ketua Pengarah (TKP) (Penyelidikan) FRIM menerima anugerah tersebut daripada Datuk Azhar Ahmad, TKP Perkhidmatan Awam (Pembangunan).

AKRAB berperanan sebagai agen transformasi perkhidmatan awam, memberi motivasi untuk mengekalkan perubahan dan menjadi pembimbing kehidupan berkerjaya.

FRIM RECEIVES AKRAB AWARD

FRIM has received the AKRAB Award in the Dynamic Organisation category at the National AKRAB Convention 2023 on 3 October 2023 in Putrajaya. Dr Norwati Muhammad, FRIM Deputy Director General (Research), received the award from Datuk Azhar Ahmad, Deputy Director General of Public Service (Development).

AKRAB serves as a public service transformation agent, providing motivation to sustain change and serving as a career life coach.



Dr Norwati (empat dari kiri) menerima sijil daripada Datuk Azhar (tengah)
Dr Norwati (fourth from left) receiving certificate from Datuk Azhar (centre)

PENCAPAIAN FRIM DALAM SEMINAR/ PERSIDANGAN

Penyelidik FRIM turut menerima anugerah dalam seminar dan persidangan yang disertai.

FRIM ACHIEVEMENTS AT SEMINAR/ CONFERENCE

FRIM researchers also received awards at the seminars and conferences attended.

Seminar/Persidangan Seminar/Conference	Anugerah Award	Tajuk & Penerima Title & Recipient
International Meeting - 47th Annual Conference of the Malaysian Society for Biochemistry & Molecular Biology (IM-MSBMB)	Poster Terbaik Best Poster	Utilisation of DNA Barcoding in Assessing the Phlogenetic Relationships of <i>Diospyros</i> sp. (Ebenaceae)" - Nur Nabilah Alias
International Soil Science Conference' (SOILS 2023)	Poster Terbaik Best Poster	Soild properties and Plant growth in Two Agroforestry Models in SPF Maran, Pahang' - Rozita Ahmad, Nurul Izzati Mohamad Afandi, Rosdi Koter, Mohamad Fakhri Ishak, Muhammad Asri Lias, Jeyanny Vijayanathan & Nor Farhana Khadiran
33rd Malaysian Society of Plant Physiology Conference (MSPPC) 2023	Poster Terbaik Best Poster	1. Effectiveness of Selected Tree Architectures for Filtering Solar Radiation - Abdul Hayat Mat Saad, Dr Ahmad Nazarudin Mohd Roseli, Mohd Amril Ramzi Mohd Rahimi, Alia Shazwani Shaifudin, Noor Syazwani Sharul Zaman, Rosfarizal Kamaruzaman & Afiq Musa 2. Comparing Traits and Chlorophyll Fluorescence in Sun and Shade Leaves of Eucalyptus hybrid - Dr Ho Wai Mun, Fatin Nadiyah Sukhairi, Dasrul Iskandar Darus, Dr Rosdi Koter & Dr Mohd Zaki Abdullah

PENGLIBATAN DAN SUMBANGAN ANTARABANGSA

INTERNATIONAL INVOLVEMENT AND
CONTRIBUTION



Syzygium malaccense

LABORANTARUM

2024.01.01

PENGLIBATAN DAN SUMBANGAN ANTARABANGSA

INTERNATIONAL INVOLVEMENT AND CONTRIBUTIONS

Bagi memastikan FRIM kekal relevan dan sebagai peneraju dalam penyelidikan, pembangunan, komersialisasi dan inovasi (R,D,C&I) perhutanan tropika, usaha dan keterlibatan FRIM terus dipergiat ke peringkat antarabangsa. Ini dapat direalisasikan dengan meluaskan sumbangan dan rangkaian antarabangsa dalam penyelidikan dan pembangunan (R&D), kerjasama penyelidikan, perkhidmatan perundingan, penerbitan dan pembentangan, penglibatan dalam kumpulan kerja teknikal serta anugerah dan pengiktirafan yang diterima.

To ensure that FRIM remains relevant and a leader in tropical forestry research, development, commercialization, and innovation (R,D,C&I), its efforts and involvement toward internationalization are continually intensified. This can be accomplished by expanding international networks in research and development (R&D), research collaborations, consulting services, publications and presentations, involvement in technical working groups as well as awards and recognitions.



Penyelidik FRIM telah menyumbangkan sebanyak

30 kertas kerja di persidangan luar negara dan menerbitkan sejumlah **78** penerbitan **jurnal antarabangsa**

FRIM's researchers have resented

30 papers at overseas conferences and published in **78 international journals**

Pada tahun 2023, FRIM telah menjalankan sebanyak 5 projek penyelidikan dana antarabangsa yang mana satu (1) adalah projek baharu. Sebanyak 9 kerjasama antarabangsa sedia ada telah dijalankan dengan satu adalah kerjasama baharu telah dimeterai. FRIM juga telah menyediakan perkhidmatan perundingan melalui kepakaran yang ditawarkan kepada sebanyak satu syarikat luar negara. Penyelidik FRIM telah menyumbangkan sebanyak 30 kertas kerja di persidangan luar negara dan menerbitkan sejumlah 78 penerbitan jurnal antarabangsa. Penyelidik FRIM juga terlibat dalam kumpulan kerja teknikal, termasuklah penglibatan 15 orang pakar dalam rundingan dan input teknikal di forum antarabangsa, manakala seramai 11 penyelidik telah menyumbang dan menganggotai dalam organisasi antarabangsa berkaitan perhutanan dan alam sekitar yang memberi impak kepada negara. Di samping itu, FRIM telah dilantik sebagai badan pengujian oleh pihak Certification

In 2023, FRIM has carried out 5 international projects of which one are new project. A total of 9 existing international collaborations were carried out with one new collaboration was signed. FRIM has also provided consulting services through expertise offered to one overseas company. FRIM's researchers have presented 30 papers at overseas conferences and published in 78 international journals. FRIM researchers also Involved in the technical working groups including the involvement of 10 experts in negotiation and provision of technical input at international forum, while 6 researchers have contributed and are members of international organisations related to forestry and environment which is of impact to the country. FRIM also has been appointed by Certification Services International, LLC for testing services in respect of Environmental Protection Agency Toxic Substances Control Act Title IV dan California Air Resource Board

Services International, LLC untuk menjalankan perkhidmatan ujian berkenaan Environmental Protection Agency Toxic Substances Control Act Title IV dan California Air resource Board Airborne Toxic Control Measure. Kepakaran penyelidik FRIM telah diiktiraf di peringkat antarabangsa dengan pencapaian anugerah dan pengiktirafan yang diterima, antaranya ialah Anugerah Penyelidik Wanita Cemerlang bagi kategori kesuburan tanah dalam bidang Sains Pertanian daripada Venus International Foundation, India yang diterima oleh Dr Jeyanny Vijayanathan.

Airborne Toxic Control Measure. The expertise of FRIM researchers has been recognized internationally through the achievement of awards and recognition. The Outstanding Female Researcher Award for the soil fertility category in the field of Agricultural Science from the Venus International Foundation, India was received by Dr Jeyanny Vijayanathan.



5

Projek/Projects
1 baharu/new

Penyelidikan & Pembangunan
Research & Development



78

Jurnal Antarabangsa/
International Journal

Penerbitan
Publication



9

Kerjasama/Collaboration
1 baharu/new

Kerjasama Penyelidikan (MoU/MoA)
Research Collaboration



15

Forum & Dialog/Forum & Dialogue
3 Organisasi Antarabangsa/
International Organisation

Kumpulan Kerja Teknikal
Technical Working Group



1

Pelanggan/
Client

Perkhidmatan Perundingan
Consultation Services



1

Pensijilan/
Certification



26

Pembentangan Lisan/
Oral Presentation
4 poster

Persidangan/Seminar
Conference/Seminar



2

Anugerah & Pengiktirafan/
Award & Recognition

1 Pingat Perak & 1 Gangsa
1 Silver & 1 Bronze Medals

Penglibatan dan Sumbangan FRIM di Peringkat Antarabangsa Tahun 2023
FRIM Contribution and Involvement at the International Level in 2023

Perkara Item	Negara Country	Perincian Details
Penyelidikan dan pembangunan Research & development	Australia	Building an Effective Forest Health and Biosecurity Network in Southeast Asia
Kerjasama penyelidikan (MoU/MoA) Research Collaboration (MoU/MoA)	Japan	Japan International Research Center for Agricultural Sciences (JIRCAS)
Perkhidmatan Perundingan Consultation Services	Vietnam	Provide advisory services on the resistance of the company's product against wood borers
Persidangan/Seminar Conference/Seminar	Korea, Indonesia, Australia, China, India, Philippines, Cambodia, Vietnam, Panama, Japan, Czech Republic, Thailand, Turkeye, Trinidad & Tobago	Pembentangan lisan / Oral presentation -26 Pembentangan poster/ Poster presentation -4 Rujuk bahagian Penerbitan di mukasurat 247-274 Refer to the Publication section on page 247-274
Penerbitan Jurnal Antarabangsa International Journal Publication		78 Rujuk bahagian Penerbitan di mukasurat 224-231 Refer to the Publication section on page 224-231
Kumpulan Kerja Teknikal Technical Working Group	ASEAN, Canada, Japan, Cambodia, Indonesia, Italy, Brunei, Korea, UAE, USA, Vietnam, Thailand	Lampiran 1/ Annex 1 (Sumbangan dan Penglibatan dalam Kumpulan Kerja Teknikal) (Contributions and Involvement in Technical Working Groups)
Pensijilan Certification	USA	Testing services in respect of Environmental Protection Agency Toxic Substances Control Act Title IV dan California Air Resource Board Airborne Toxic Control Measure
Anugerah & pengiktirafan Awards & recognition	Korea	Anugerah Perak dan Gangsa di Seoul International Invention Fair (SIIF 2023) Silver and Brown Medal at the Seoul International Invention Fair (SIIF 2023)

Lampiran/ Annex 1

Sumbangan dan Penglibatan dalam Kumpulan Kerja Teknikal Contributions and Involvement in Technical Working Groups

	Pegawai bertanggungjawab Person in charge	Negara Country	Forum/Dialog/Pertubuhan Forum/Dialogue/Organisation
Penglibatan dalam rundingan termasuk input teknikal di forum antarabangsa yang berkaitan dengan perhutanan dan alam sekitar yang memberi impak kepada negara <i>Involvement in negotiation and provision of technical input at international forum related to forestry and environment which is of impact to the country</i>	Dr Nik Musaadah Mustapha	Australia	Building an Effective Forest Health and Biosecurity Network in Southeast Asia
		Japan	1st ASIAN Asian Academic Access and Benefit Sharing (ABS) Forum National Institute of Genetics Japan
	Dr Mastura Mohtar	Vietnam	Provide advisory services on the resistance of the company's product against wood borers
	Mailina Jamil	Itali	Joint FAO/WHO Food Standards Programme (online)
	Dr Huda Farhana Mohamad Muslim	Japan	Visiting researcher at Tokyo Metropolitan University
		Indonesia	Asean Guiding Principles on Social Forestry Enabling Legal Frameworks for Effective Social Forestry Legal Framework
	Dr V. Jeyanny Vijayanathan	Japan	25th Intergovernmental Meeting of The Acid Deposition Monitoring Network in East Asia (EANET)
		Italy	The 18th Working Session of The ITPS Global Soil Partnership, FAO
	Dr Elizabeth M.P. Philip	Japan	20th Working Group on CHG Inventories Asia (WGIA)
		Brunei	Regional Workshop on Introducing Peatland Ecosystems and Sustainable Management
	Dr Ahmad Nazaruddin Mohd Roseli	Korea	2nd Workshop of Asian Urban Forests Networks (AUFN) for People Environment: The Role of Urban Forest in Mitigating the Impact of Heat Waves in Cities,
	Norsheilla Mohd Johan Chuah	United Arab Emirate	28th Conference of Parties To The United Nations Framework Convention On Climate Change (UNFCCC-COP 28)
	Hyrul Izwan Mohd Hussin	Indonesia, Thailand	2nd & 3rd Sub-Regional Knowledge Exchange Promotion of Knowledge Sharing Mechanism on Peatland Restoration and Rehabilitation In Southern ASEAN Member States Workshop

	Pegawai bertanggungjawab Person in charge	Negara Country	Forum/Dialog/Pertubuhan Forum/Dialogue/Organisation
	Tariq Mubarak Husin	China	International Workshop On Mangrove Conservation And Collaboration
Sumbangan dan keanggotaan dalam organisasi antarabangsa yang berkaitan dengan bidang kepakaran FRIM Contribution and membership in national/international organisation in FRIM areas of expertise	Dr Ismail Parlan	IUFRO Countries	International Union Of Forest Research Organizations (IUFRO) (Malaysia Representative)
	Dr Lee Soon Leong	IUFRO	IUFRO Unit 5.16.03: Multidisciplinary Identification of Wood
	Dr Mohamad Nasir Mat Arip	IUFRO Countries	International Union of Forest Research Organizations (IUFRO) (member)
	Dr Pin Kar Yong	IUFRO Countries	International Union of Forest Research Organizations (IUFRO) (member)
	Dr Getha Krishnasamy	Vietnam	Member of ASEAN Network on Microbial Utilization (AnMicro)
	Ahmad Azaruddin Mohd Noor	USA	Certified Arborist (MY-0223A)

SOROTAN MEDIA

MEDIA HIGHLIGHTS



Plumeria rubra

LAPORAN TARIKHIAN

ANALISIS KANDUNGAN

LAPORAN PRESTASI MEDIA

TAHUNAN 2023

ANNUAL MEDIA PERFORMANCE REPORT 2023



Anggaran nilai perhubungan awam (**PR Value, PRV**) berjumlah **RM 9 juta**

Estimated Public Relations **Value (PRV)** of **RM 9 million**



Sebanyak **92%** diperoleh daripada **media cetak** manakala **televisyen (4.6%)** dan **radio (3.4%)**

92% were obtained from **print media**, while **television (4.6%)** and **radio (3.4%)**

Unit Komunikasi Korporat (CCU) telah melaksanakan aktiviti promosi media bagi tujuan meningkatkan kesedaran umum mengenai pentingnya pemuliharaan sumber alam dan hutan serta mengetengahkan pencapaian, aktiviti penyelidikan dan pembangunan (R&D) FRIM dalam 2023.

Laporan berita dan artikel rencana/laporan yang mengandungi maklumat mengenai FRIM daripada media cetak dan siaran sebanyak 238 dengan anggaran nilai perhubungan awam (PR Value, PRV) berjumlah RM 9 juta. Dari jumlah kesemua laporan media yang dipantau, sebanyak 92% diperoleh daripada media cetak manakala televisyen (4.6%) dan radio (3.4%).

Antara laporan media, 74 laporan dengan anggaran PRV sebanyak RM 3.4 juta adalah mengenai R&D. Penggunaan media sosial sebagai saluran publisiti utama untuk berkongsi maklumat umum terus dipertingkatkan pada 2023.

Corporate Communication Unit (CCU) has carried out media promotion activities to increase public awareness on the importance of conservation of natural resources and forests, as well as highlighting FRIM's achievements, research, and development (R&D) activities in 2023.

News reports and feature articles/reports containing information about FRIM from print and broadcast media amounted to 238 with an estimated Public Relations Value (PRV) of RM 9 million. Of all the monitored media reports, 92% were obtained from print media, while television (4.6%) and radio (3.4%) accounted for the rest.

Among the media reports, 74 reports with an estimated PRV of RM 3.4 million were related to R&D. The use of social media as a main publicity channel for sharing general information continued to be enhanced in 2023.



74 laporan dengan anggaran **PRV** sebanyak **RM 3.4 juta** adalah mengenai **R&D**

74 reports with an estimated PRV of **RM 3.4 million** were related to **R&D**

Jumlah pengikut (followers)/ pelanggan (subscribers) platform media sosial FRIM pada 2023 adalah seperti berikut:

The number of followers/subscribers on FRIM's social media platforms in 2023 are as follows:

Platform media sosial	Bilangan/No of followers/ subscribers
Facebook	49,125
Instagram	4,344
Twitter	4,196
Youtube	2,850
TikTok	994

Senarai Laporan Media Berkaitan Penyelidikan di FRIM (Januari – Disember 2023)
List of Research Related Media Reports on FRIM (January - December 2023)

Bil No	Tarikh Date	Tajuk Title	Tajuk Media Media Title	Jenis Media Media Type	PRV (RM)
1	6/3/2023	TNB laksana THySIS kesan spesies pokok terancam	Berita Harian	Newspaper	39,636
2	6/3/2023	TNB bangunkan sistem THySIS untuk lindungi spesies pokok terancam	Utusan Borneo Sarawak	Newspaper	2,460
3	6/3/2023	TNB bangunkan sistem THySIS untuk lindungi spesies pokok terancam	Utusan Borneo Sabah	Newspaper	669
4	6/3/2023	TNB develops THySIS system to protect endangered tree species	Borneo Post (KK)	Newspaper	2,090.91
5	6/3/2023	TNB develops THySIS system to protect endangered tree species	Borneo Post (Kuching)	Newspaper	5,113.65
6	6/3/2023	TNB develops system to detect endangered tree species	See Hua Daily News	Newspaper	9,015
7	7/3/2023	THySIS TNB bantu pelihara hutan simpan	Kosmo	Newspaper	17,205
8	13/3/2023	Ekspedisi Saintifik Mossy Forest 61 penyelidik kumpul info	Harian Metro	Newspaper	22,485
9	13/3/2023	Focus on sustainable forest practices	The Star	Newspaper	62,808
10	25/3/2023	Koh Chong-lek: Dedicate life to scientific research	Sin Chew Daily	Newspaper	89,007
11	10/4/2023	Usaha pemuliharaan kekalkan status Tasik Chini Rizab Biosfera	Berita Harian	Newspaper	83,166.72
12	11/4/2023	Home Lulie reelected as Malaysian Peat Society president for term 2023-2025	Borneo Post (Kuching)	Newspaper	4,029.54
13	15/4/2023	Chini Lake trying hard to come back to life	Sin Chew Daily	Newspaper	51,454.56

Bil No	Tarikh Date	Tajuk Title	Tajuk Media Media Title	Jenis Media Media Type	PRV (RM)
14	12/5/2023	Going beyond just preserving the wetlands	The Star	Newspaper	291,390
15	20/5/2023	A masterplan to rule them all?	The Star	Newspaper	465,468
16	23/5/2023	Seven golds from ITEX 2023	The Sun	Newspaper	39,342
17	25/5/2023	NRECC studies legislation to compensate crops damaged by wild animals	Sin Chew Daily	Newspaper	26,115
18	25/5/2023	Nilai eksport produk kayu Sarawak menurun tahun ini	Utusan Sarawak	Newspaper	8,784
19	20/6/2023	Accolades from tech expo	The Star	Newspaper	73,377
20	25/6/2023	Awang Tengah: Sarawak Forest management model for others to emulate	Sin Chew Daily (Kuching)	Newspaper	5,271
21	25/6/2023	Sarawak's sustainable forest management can become a model for other countries	United Daily News (Kuching)	Newspaper	7,452
22	25/6/2023	S'wak forest mgmt model for others to emulate	New Sunday Tribune	Newspaper	3,330
23	25/6/2023	Awang Tengah: Sarawak study on high quality timber products	See Hua Daily News	Newspaper	5,652
24	25/6/2023	Awang Tengah: Sarawak study on high quality timber products	See Hua Daily News	Newspaper	4,944
25	16/7/2023	Giving states a boost to protect the environment	Sunday Star	Newspaper	16,3812
26	16/7/2023	Unveiling the wonders of fireflies	Borneo Post (KK)	Newspaper	4,533
27	16/7/2023	Unveiling the wonders offireflies	The Sunday Post (Kuching)	Newspaper	10,473
28	4/8/2023	FRIM continues national flora biodiversity documentation efforts	Borneo Post (Kuching)	Newspaper	7,609.08
29	4/8/2023	Country's flora has not been fully documented: FRIM	Daily Express (KK)	Newspaper	867
30	27/8/2023	Ekspedisi teroka hutan Brazil, demi benih getah	Berita Harian Ahad	Newspaper	5,1954
31	31/8/2023	Perlis `teak orchard` beckons tourists with new attractions	Borneo Post (Kuching)	Newspaper	39,108
32	3/9/2023	FRIM, MTIB anjur Seminar Buluh Kebangsaan pada 18 dan 19 Sept ini	Utusan Borneo Sabah	Newspaper	1,341
33	3/9/2023	FRIM, MTIB to hold national seminar on bamboo from Sept 18-19	The Sunday Post (Kuching)	Newspaper	5,604
34	3/9/2023	National Bamboo Seminar to be jointly held by FRIM and Malaysian Timber Industry Board	Traxx FM	Radio	1,470

Bil No	Tarikh Date	Tajuk Title	Tajuk Media Media Title	Jenis Media Media Type	PRV (RM)
35	7/9/2023	The ecosystem services and the implementation of its program will not only benefit the environment but also the local community	Traxx FM	Radio	1,218
36	16/9/2023	1,311 Spesies Tumbuhan Sudah Direkod	Harian Metro	Newspaper	66,516
37	17/9/2023	`Karas tree studies aid in agarwood theft loss`	Sunday Star	Newspaper	68,694
38	17/9/2023	Penyelidikan karas dan gaharu lindungi spesies daripada ancaman kepupusan	Utusan Borneo Sabah	Newspaper	993
39	18/9/2023	Studies on karas trees help reduce agarwood theft, prevent extinction - FRIM	Borneo Post (KK)	Newspaper	3,027
40	19/9/2023	Special honours at expo	The Star	Newspaper	79,113
41	22/9/2023	Fadillah: Vast potential for bamboo industry to grow	The Star	Newspaper	60,240
42	22/9/2023	Exports of bamboo products up 66.1 pct last year	China Press	Newspaper	15,918.54
43	22/9/2023	Exports of bamboo products up 66 pct	Sin Chew Daily	Newspaper	20,090.91
44	22/9/2023	FRIM to mainstream commercialisation activities	Borneo Post (KK)	Newspaper	1,029
45	22/9/2023	Fadillah: Holistic approach needed for transformation of bamboo industry	Borneo Post (Kuching)	Newspaper	10,185
46	22/9/2023	Holistic approach needed for transformation of bamboo industry in Malaysia, says DPM Fadillah	See Hua Daily News	Newspaper	3,498.18
47	22/9/2023	DPM: Bamboo product exports increased by 66pct last year, and the bamboo industry must undergo a comprehensive transformation	See Hua Daily News	Newspaper	3,397.26
48	22/9/2023	Fadillah says Vast potential for bamboo industry to grow	Bernama News Channel	TV	98,499.99
49	23/9/2023	DPM: Exports of bamboo products up 66 pct	Nanyang Siang Pau	Newspaper	2,818.17
50	23/9/2023	Nilai eksport produk buluh naik 66.1 peratus	Utusan Sarawak	Newspaper	10,650
51	25/9/2023	Transformasi industri buluh perlu holistik	Utusan Sarawak	Newspaper	8,856
52	26/9/2023	MSU wins awards for Sustainable Development	The Sun	Newspaper	39,573
53	27/9/2023	Perak MB: NR-REE Pilot Project at Gerik brings in RM16 million to state govt	Kwong Wah Yit Poh	Newspaper	8,241

Bil No	Tarikh Date	Tajuk Title	Tajuk Media Media Title	Jenis Media Media Type	PRV (RM)
54	5/10/2023	US-based Top-Line eyes more furniture imports from M'sia	New Sarawak Tribune	Newspaper	8,163
55	3/11/2023	Lenggong Valley: A treasure trove of Malaysian heritage	Borneo Post (Kuching)	Newspaper	37,635
56	4/11/2023	Usaha berterusan pelihara Lembah Lenggong	Sinar Harian	Newspaper	49,545
57	6/11/2023	Lenggong geopark museum will opens for public visit	China Press (Northern)	Newspaper	52,513
58	8/11/2023	Extract of eaves tree	Al Hijrah	TV	29,040
59	9/11/2023	Enzim daun cucur atap mampu rencat asid urik pesakit gout	Harian Metro	Newspaper	30,138
60	9/11/2023	Produk antigout daripada ekstrak daun cucur atap	Berita Harian	Newspaper	45,498
61	11/11/2023	Gallery at Lenggong Geopark will be opened by this year end	China Press (East Coast)	Newspaper	52,473
62	13/11/2023	Lenggong valley, a heritage treasure trove	New Sarawak Tribune	Newspaper	56,643
63	14/11/2023	Into the heart of nature	The Sun	Newspaper	114,561
64	14/11/2023	Teak farm full of treasures	China Press	Newspaper	103,500
65	14/11/2023	FRIM hasil produk antigout guna pati daun cucur atap	Kosmo	Newspaper	17,829
66	19/11/2023	KOMPLEKS GUA NIAH	Metro Ahad	Newspaper	210,836
67	23/11/2023	Potensi bisnes `trillion dollar'	Harian Metro	Newspaper	43,491
68	23/11/2023	Industri perobot hijau, `the next trillion dollar business'	Utusan Sarawak	Newspaper	12,915
69	4/12/2023	Placemaking innovation and digitilazation are key	The Edge	Newspaper	98,763
70	5/12/2023	Pengiktirafan plot ekologi hutan paling tua dipantau berterusan	Utusan Malaysia	Newspaper	26,865
71	6/12/2023	UTM first university to have own rock aquifer tubewell in M'sia	Borneo Post (Kuching)	Newspaper	6,054
72	7/12/2023	UTM first to have rock aquifer tubewell	Daily Express (KK)	Newspaper	822
73	17/12/2023	40 years of success and the future of Danum Valley	Daily Express (KK)	Newspaper	12,528
74	25/12/2023	Preserving biodiversity	The Edge	Newspaper	312,246

THE FUTURE Female

WOMEN IN STEM BEYOND THE BACHELOR'S



DR LIM SHIANG CHENG
Global Health Scientist



DR JEANNY VIJAYANATHAN
Soil Scientist, FRIM

SUNDAY • 30 APRIL 2023 • 10.00 PM
Watch it on CH 501 | Live TV - astroawani.com & Astro AWANI App

Produk antigout daripada ekstrak daun cucur atap

Hasil kajian FRIM sejak 2012 mampu mencatatkan penghasilan asid urik dalam badan

oleh Nuzli Harni
Nuzli@frim.gov.my

Kuala Terengganu: Institut Penyelidikan Perhutanan Malaysia (FRIM) telah berjaya menghasilkan produk antigout daripada ekstrak daun cucur atap yang mampu mencatatkan penghasilan asid urik dalam badan. Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012.



Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012. Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012.

Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012. Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012.

Kita terbuka bagi peminat industri untuk berhubung dengan FRIM bagi mengetahui hasil kajian yang dijalankan.



Dr. Ismail Parlan, Ketua Program FRIM

Teknologi FRIM ini di sebuah pusat di sini, semalam. Beliau berkata, hasil kajian FRIM ini, FRIM akan menghasilkan produk antigout yang mampu mencatatkan penghasilan asid urik dalam badan. Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012.

Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012. Produk ini dihasilkan melalui kajian yang dijalankan sejak 2012.

FRIM hasil produk antigout guna pati daun cucur atap

KUALA TERENGGANU – Institut Penyelidikan Perhutanan Malaysia (FRIM) mengeluarkan produk antigout, CurAtap yang diperbuat daripada pati daun pokok cucur atap.

Ketua Pengarah FRIM, Dr. Ismail Parlan berkata, produk tersebut merupakan penyelidikan, Ketua Program Sumber Biologi FRIM, Dr. Fadzureena Jamaludin.

Beliau berkata, Dr. Fadzureena telah melakukan penyelidikan bagi menghasilkan produk tersebut sejak 11 tahun lalu.

"Produk CurAtap berbentuk cecair untuk diminum itu diperbuat daripada ekstrak pokok cucur atap yang banyak terdapat di pesisir pantai di Pantai Timur ini."

"Kajian mendapati ekstrak pokok itu mengandungi enzim yang mampu menghalang pengumpulan asid urik pada sendi tulang yang menjadi punca penyakit gout," katanya di sini

semalam.

Ujarnya, FRIM telah menjalin kerjasama dengan syarikat pemasaran, Asnaf Legacy Sdn. Bhd. yang berpangkalan di Shah Alam bagi mengkomersialkan produk CurAtap itu.

Beliau berkata, produk CurAtap kini sudah boleh didapati di pasaran dengan sasaran pelanggan dalam kalangan individu menderitanya gout.

"Produk CurAtap sudah dipatenkan sejak 2021. Ia merupakan sebahagian hasil penyelidikan FRIM daripada flora dan fauna yang terdapat dalam hutan belantara negara ini."

"Setiap tahun, FRIM menghasilkan kira-kira 40 produk penyelidikan dengan sasaran sekurang-kurangnya lima daripada akan dipatenkan," katanya.

Jelasnya, FRIM giat menjalin kerjasama dengan pihak industri bagi mengkomersialkan lebih banyak hasil penyelidikan yang sudah dipatenkan.



DR. ISMAIL dan Dr. Fadzureena menunjukkan produk CurAtap untuk mencegah gout di Kuala Terengganu semalam.

RUANG BICARA

SIARAN LANGSUNG

BERITA

21:03:04

Keperluan darah terus meningkat. Orang ramai dirayu tampil menderma, layari www.pdn.gov.my



FRIM

August 20, 2023 · 🌐

...

🌱 55 TANAM POKOK DI FRIM, RAI BULAN KEBANGSAAN 🌳

20 Ogos 2023 – Seramai 55 orang awam telah menanam 60 pokok di **FRIM** semalam untuk meraikan 🇲🇾 **Bulan Kebangsaan** 🇲🇾 serta menyokong Program Penghijauan Malaysia - **Kempen Penanaman 100 Juta Pokok**.

Program '**Forester for a Day**' ini dirasmikan oleh Dr Norwati Muhammad, Timbalan Ketua Pengarah (Penyelidikan) FRIM. Harfendy Osman, staf Cawangan Pengurusan Hutan (CPH) memberi taklimat keselamatan serta cara penanaman pokok. Turut hadir, ... [See more](#)



SOROTAN AKTIVITI/ MAJLIS/LAWATAN RASMI

HIGHLIGHTS OF ACTIVITIES/EVENTS/OFFICIAL
VISITS



Limnocharis flava

AKTIVITI/MAJLIS/ LAWATAN RASMI

ACTIVITIES/EVENTS/OFFICIAL VISITS

Sepanjang tahun, FRIM menganjurkan pelbagai program rasmi bagi menyalurkan informasi secara strategik berdasarkan objektif yang komprehensif yang melibatkan komuniti dalaman serta pemegang taruh FRIM. FRIM juga sering kali menerima kunjungan rasmi daripada badan-badan korporat awam dan swasta, universiti/sekolah, serta badan bukan kerajaan dari dalam dan luar negara. Selaras dengan misi dan visi FRIM yang mementingkan perkembangan dan kemajuan dalam bidang penyelidikan dan pembangunan perhutanan, inisiatif ini amat penting bagi memantapkan imej serta reputasi sebagai institusi penyelidikan tersohor negara, malah membangunkan hubungan baik, memperluaskan jaringan dan peluang berkolaborasi dengan pelbagai pihak.

Throughout the year, FRIM organises various official programmes to strategically disseminate information based on comprehensive objectives that involve the internal community and FRIM stakeholders. FRIM also frequently receives official visits from public and private corporate bodies, universities/schools, as well as non-governmental organisations from within and outside the country. In line with FRIM's mission and vision that prioritise development and progress in various field of forestry research and development, these initiatives are crucial in consolidating its image and reputation as a renowned national research institution, and in developing good relationships, expanding networks, and collaborating with various parties.

MENTERI NRECC JEJANTAS RIMBA FRIM

YB Tuan Nik Nazmi Nik Ahmad, Menteri Sumber Asli, Alam Sekitar dan Perubahan Iklim (NRECC) telah merasmikan Jejantas Rimba (Forest Skywalk) FRIM pada 27 Jun 2023 di Taman Botani Kepong. Turut hadir, Dato' Rosli Isa, Ketua Setiausaha NRECC; Dr Ismail Parlan, Ketua Pengarah FRIM; Mohd Khairul Kassim, wakil Kementerian Pelancongan, Seni dan Budaya Malaysia; Azreen Basir, Pengarah Kawalan Kualiti Tanaman, Jabatan Pertanian Malaysia (DOA); serta Elizabeth Wong, mantan Ahli Dewan Undangan Negeri (ADUN) Bukit Lanjan. Jejantas Rimba atau dikenali sebagai 'Forest Skywalk', iaitu satu tarikan ekopelancongan utama FRIM. Tarikan tersebut membantu menyokong industri pelancongan negara ke arah mempromosikan kelestarian sumber biodiversiti negara.

MINISTER OF NRECC LAUNCHES FRIM FOREST SKYWALK

YB Tuan Nik Nazmi Nik Ahmad, Minister of Natural Resources, Environment and Climate Change (NRECC), launched FRIM Forest Skywalk on 27 June 2023, at Kepong Botanic Gardens. Also present were Dato' Rosli Isa, Secretary General NRECC; Dr Ismail Parlan, FRIM Director General; Mohd Khairul Kassim, representative of the Ministry of Tourism, Arts and Culture Malaysia; Azreen Basir, Director of Plant Quality Control, Department of Agriculture Malaysia (DOA); and Elizabeth Wong, former Bukit Lanjan State Assemblywoman (ADUN). Forest Skywalk is a main ecotourism attraction at FRIM, which supports the country's tourism industry in promoting the conservation of national biodiversity resources.



YB Tuan Nik Nazmi Nik Ahmad, Menteri Sumber Asli, Alam Sekitar dan Perubahan Iklim (NRECC) telah merasmikan **Jejantas Rimba (Forest Skywalk)** FRIM pada 27 Jun 2023 di Taman Botani Kepong.

YB Tuan Nik Nazmi Nik Ahmad, Minister of Natural Resources, Environment and Climate Change (NRECC), launched **FRIM Forest Skywalk** on 27 June 2023, at Kepong Botanic Gardens.

Menteri turut melancarkan rangkaian produk penghalau serangga jenama Ciéra yang diperkasakan oleh teknologi FRIM dan berjaya mendapat pelbagai pengiktirafan di peringkat kebangsaan serta antarabangsa. Beliau juga menyaksikan penyerahan Sijil Pendaftaran Varieti Baru Tumbuhan dan Pemberian Hak Pembiak Baka klon FAFAF01; iaitu baka elit kacip fatimah yang merupakan varieti tumbuhan hutan baharu pertama dipatenkan di bawah Plant Variety Protection (PVP) oleh DOA kepada FRIM. Selain itu, beliau menanam pokok damar minyak (*Agathis borneensis*) sebagai acara simbolik bagi memperingati program pada hari ini dan melawat Jejantas Rimba FRIM.

The Minister also launched the Ciéra brand insect repellent product line empowered by FRIM technology, which has received various national and international recognitions. Nik Nazmi also witnessed the presentation of the Certificate of Registration of New Plant Varieties and Grant of Plant Breeder Rights for clone FAFAF01; the first elite kacip fatimah plant variety patented under the Plant Variety Protection (PVP) by the DOA to FRIM. Furthermore, he planted agarwood trees (*Aquilaria borneensis*) as a symbolic gesture to commemorate the program of the day and to visit the FRIM Forest Skywalk.



YB menteri menandatangani plak jejantas Rimba FRIM
YB minister signing the FRIM Forest Skywalk plaque



YB Nik Nazmi bergambar di jejantas bersama wakil FRIM dan NRECC
YB Nik Nazmi posing at the skywalk with FRIM and NRECC representatives



Pelancaran produk Ciera (kiri) dan penyerahan Sijil Pendaftaran Varieti Baharu Tumbuhan dan Pemberian Hak Pembiak (kanan)
Ciéra product launch (left) and the presentation of the Certificate of Registration of New Plant Variety and the Grant of Plant Breeder's Rights (right)



MB SELANGOR LAWAT FRIM

YAB Dato' Seri Amirudin Shari, Menteri Besar (MB) Selangor telah melawat FRIM bersama Ahli Mesyuarat Majlis Tindakan Pembangunan Negeri (MTPNg) Selangor pada 27 November 2023. Beliau diiringi YB Dato' Salim Soib @ Hamid, Penasihat Undang-Undang Negeri Selangor; YB Dr Ahmad Fadzli Ahmad Tajuddin, Pegawai Kewangan Negeri Selangor; YB Datuk Rizam Ismail, Exco Kemajuan Desa, Perpaduan & Pengguna; YB Mohd Najwan Halimi, Exco Belia, Sukan & Keusahawanan; YB Jamaliah Jamaluddin, Exco Kesihatan Awam & Alam Sekitar; YB Dr. Fahmi Ngah, Exco Agama Islam & Pembudayaan Inovasi; dan YB Anfaal Saari, Exco Pembangunan Wanita & Kebajikan Masyarakat.

Dato' Seri Amirudin turut menanam pokok merbau (*Intsia palembanica*) iaitu Pokok Kebangsaan Malaysia sebagai acara simbolik untuk memperingati program tersebut. Program diakhiri dengan lawatan ke Jejantas Rimba.

SELANGOR MB VISITS FRIM

Selangor Chief Minister (MB), YAB Dato' Seri Amirudin Shari, visited FRIM with the State Development Action Council (MTPNg) members of Selangor on 27 November 2023. He was accompanied by YB Dato' Salim Soib @ Hamid, Legal Advisor to the State of Selangor; YB Dr Ahmad Fadzli Ahmad Tajuddin, State Financial Officer of Selangor; YB Datuk Rizam Ismail, Rural Development, Unity & Consumer Affairs Exco; YB Mohd Najwan Halimi, Youth, Sports & Entrepreneurship Exco; YB Jamaliah Jamaluddin, Public Health & Environment Exco; YB Dr. Fahmi Ngah, Islamic Affairs & Innovation Culture Exco; and YB Anfaal Saari, Women's Development & Social Welfare Exco.

Dato' Seri Amirudin also planted a Merbau tree (*Intsia palembanica*), the National Tree of Malaysia, symbolically commemorating the programme. The programme concluded with a visit to the Forest Skywalk.



Dato' Seri Amirudin (hujung kanan) menanam pokok merbau sebagai tanda kenangan lawatan

Dato' Seri Amirudin (far right) planted merbau tree to commemorate the visit

MB PERLIS RASMIKAN FASILITI PELANCONGAN STESEN PENYELIDIKAN FRIM

YAB Tuan Mohd Shukri Ramli, Menteri Besar Perlis, telah merasmikan fasiliti pelancongan FRIM iaitu Denai Cenderai, Tapak Campervan Jati dan Chalet Kesinai yang terletak di Stesen Penyelidikan FRIM (SPF) Mata Ayer, Perlis pada 27 Julai 2023.

Fasiliti tersebut menyokong usaha kerajaan negeri menjadikan Perlis sebagai tumpuan pelancong yang dapat memberi sumbangan positif kepada sektor ekonomi dan pelancongan negeri tersebut. SPF tersebut juga telah dimasukkan ke dalam Peta Pelancongan Negeri Perlis dan menjadi sebahagian daripada hala tuju pelancongan untuk Tahun Melawat Perlis 2024-2025. Denai Chenderai sepanjang 500 meter ini dinamakan sempena taburan spesies chenderai yang banyak di kawasan tersebut. Tapak Campervan Jati pula dibuka untuk peminat *camper* yang ingin menikmati suasana bermalam dalam hutan ladang yang menenangkan, manakala bagi mereka yang menginginkan pengalaman menginap yang lebih selesa, mereka boleh bermalam di Chalet Kesinai.

MB Perlis juga merasmikan sebuah bengkel larik di SPF Mata Ayer. Bengkel tersebut akan menjadi pusat latihan komuniti untuk menghasilkan produk jati bernilai tinggi. Inisiatif ini bertujuan meningkatkan industri pelancongan negeri Perlis dan mendapat pengiktirafan *Geographical Indicator* (GI) bagi produk kraftangan berasaskan jati.

PERLIS MB LAUNCHES TOURISM FACILITIES AT FRIM RESEARCH STATION

YAB Tuan Mohd Shukri Ramli, Perlis Chief Minister has launched the tourism facilities of FRIM namely Denai Cenderai, Tapak Campervan Jati, and Chalet Kesinai located at the FRIM Research Station (SPF) in Mata Ayer, Perlis on 27 July 2023.

These facilities support the state government's efforts to make Perlis a tourist destination that can contribute positively to the state's economic and tourism sectors. The SPF has also been included in the Perlis State Tourism Master Plan and is part of the tourism direction for the Tourism Malaysia 2024-2025. The 500-meter-long Denai Chenderai is named after the abundance of chenderai species in the area. The Tapak Campervan Jati is open for campers who wish to enjoy a peaceful night in the plantation forest, while for those seeking a more comfortable overnight experience, they can stay at the Chalet Kesinai.

The Perlis MB also officiated a sawmill workshop at the SPF Mata Ayer. The workshop will serve as a community training center to produce high-value teak products. This initiative aims to enhance Perlis' tourism industry and obtain Geographical Indication (GI) recognition for teak-based craft products.



YAB Menteri Besar Perlis (tengah) merasmikan majlis
YAB Perlis Chief Minister (middle) officiated the event

FRIM ANJUR FRIM MERDEKA RUN

FRIM telah menganjurkan FRIM Merdeka Run pada 26 Ogos 2023 di kampus utama FRIM di Kepong. Menteri Sumber Asli, Alam Sekitar dan Perubahan Iklim (NRECC), YB Nik Nazmi Nik Ahmad yang telah menyempurnakan upacara 'flagoff' larian dengan diiringi Ketua Pengarah (KP) FRIM, Dr Ismail Parlan.

Seramai 547 peserta telah menyertai acara tersebut yang terdiri daripada orang awam, warga FRIM serta jabatan dan agensi di bawah NRECC. Program ini diakhiri dengan ucapan penutup oleh KP FRIM, Ismail serta Dr Norwati Muhammad, Timbalan KP (Penyelidikan) FRIM; Dr Wan Mohd Shukri Wan Ahmad, Pengarah Perhutanan dan Alam Sekitar; Dr Wan Tarmeze Wan Ariffin, Pengarah Keluaran Hutan; Badrulhisham Abdul Ghani dan Masni Ahmad, wakil NRECC juga menyampaikan hadiah kepada pemenang larian dan cabutan bertuah. Turut hadir, Zainudin Suhaimi, Amanah Raya Trustee; serta wakil-wakil Kelab Sukan FRIM.

Larian yang diadakan sempena sambutan Bulan Kebangsaan ini bertujuan menggalakkan gaya hidup sihat serta memberi peluang kepada peserta untuk menikmati keindahan persekitaran hutan.

FRIM ORGANISES FRIM MERDEKA RUN

FRIM has organised the FRIM Merdeka Run on 26 August 2023 at FRIM main campus in Kepong. The Minister of Natural Resources, Environment, and Climate Change (NRECC), YB Nik Nazmi Nik Ahmad, officiated the flag-off ceremony accompanied by FRIM Director General (KP), Dr Ismail Parlan.

A total of 547 participants joined the event, including the public, FRIM staff, and departments and agencies under NRECC. The programme ended with closing remarks by KP FRIM, Ismail, as well as Dr Norwati Muhammad, Deputy KP (Research) FRIM; Dr Wan Mohd Shukri Wan Ahmad, Director of Forestry and Environment; Dr Wan Tarmeze Wan Ariffin, Director of Forest Products; Badrulhisham Abdul Ghani and Masni Ahmad, NRECC representatives also presented prizes to the winners of the race and lucky draw. Zainudin Suhaimi, Amanah Raya Trustee, and representatives of the FRIM Sport Club were also present.

The run, held in conjunction with National Month celebrations, aims to promote a healthy lifestyle and provide participants with the opportunity to enjoy the beauty of the forest environment.



Gambar berkumpul sebelum acara larian bermula
Group photo before the running event starts

FRIM ANJUR PROGRAM EDUTOURISM PERLIS – SOUTHERN THAI SIRI 1

FRIM menganjurkan Program 'Jaulah Edutourism Perlis–Southern Thai Series 1' pada 25-28 September 2023 di stesen penyelidikan Mata Ayer (SPF Mata Ayer) di Perlis.

Program ini dianjurkan bersama oleh Pejabat Ahli Parlimen Padang Besar, FRIM dan Pusat Keunggulan Al-Jazari (COE) dengan kerjasama Jabatan Perhutanan Negeri Perlis (JPNPS), Perbadanan Kemajuan Ekonomi Negeri Perlis, Pusat Kejuruteraan Sukan & Kecerdasan Buatan (SEA-IC) UiTM, Pusat Penyelidikan Keselamatan Makanan, Inovasi dan Pembangunan (FinDER) Universiti Utara Malaysia, serta Inisiatif Madani Serantau (IMAR) - Kumpulan Pertanian & Keselamatan Makanan dan Kumpulan Ekonomi.

Sejumlah 41 peserta terdiri daripada 27 petani, pensyarah, penyelidik, aktivis NGO dan pemimpin masyarakat dari Selatan Thailand menyertai program ini. Program ini bertujuan untuk memperkukuhkan kerjasama antara dua negara dalam pelbagai bidang, dengan menekankan pemindahan teknologi dan perkongsian ilmu melalui COE Al-Jazari.

FRIM HOSTS PERLIS-SOUTHERN THAI EDUTOURISM PROGRAMME SERIES 1

FRIM hosted 'Jaulah Edutourism Perlis – Southern Thai Series 1' Programme on 25-28 September 2023 at Mata Ayer research station (SPF Mata Ayer) in Perlis.

The programme was jointly organised by Padang Besar Member of Parliament Office, FRIM and Al Jazari Centre of Excellence (COE) with the collaboration of Perlis State Forestry Department (JPNPS), Perlis State Economic Development Corporation, Sports Engineering & Artificial Intelligence Centre (SEA-IC) UiTM, Food Security, Innovation and Development Research Centre (FinDER) Universiti Utara Malaysia, as well as Inisiatif Madani Serantau (IMAR) - Agriculture & Food Security Cluster and Economy Cluster.

A total of 41 participants comprising 27 farmers, lecturers, researchers, NGO activists and community leaders from Southern Thailand joined the programme. This programme aimed to foster collaboration between the two nations in diverse fields, emphasising technology transfer and knowledge sharing through the Al-Jazari COE.



Para peserta melawat Bengkel Larik
Participants visiting Larik Workshop

FRIM ADAKAN PROGRAM KENALI SPF SETIU

FRIM telah mengadakan Program 'Kenali SPF Setiu' di Stesen Penyelidikan FRIM (SPF) Setiu, Terengganu pada 9 November 2023.

Program ini telah dirasmikan oleh Ahmad Rizal Mamat, Pegawai Daerah dan Pentadbir Tanah Setiu. Turut hadir, Dr Ismail Parlan, Ketua Pengarah (KP) FRIM; Dr Norwati Muhammad, Timbalan KP (Penyelidikan); Lokman Mohamad, Anggota Institut FRIM; Dr Mohd Zaki Abdullah, Pengarah Bioteknologi Perhutanan; Wan Radzi W. Abdullah, Pengarah Hutan Daerah Terengganu Utara yang mewakili Jabatan Perhutanan Negeri Terengganu –(JPNT). Program ini bertujuan memperkenalkan SPF Setiu kepada agensi-agensi kerajaan negeri serta komuniti di sekitar stesen tersebut.

Stesen ini ditubuhkan pada 1996 sebagai 'Pusat penyelidikan Tanah BRIS (Beach Ridges Interspersed with Swales)' untuk menjalankan aktiviti-aktiviti penyelidikan pemulihan tanah dan penanaman pelbagai spesies pokok hutan. Dalam program yang dihadiri 150 peserta ini, sebanyak 300 pokok cucur atap (*Baeckea Frutescens*) ditanam bagi menyokong Kempen Penanaman 100 Juta Pokok.

FRIM ORGANISED 'KENALI SPF SETIU' PROGRAMME

FRIM organised the 'Get to Know SPF Setiu' Program at the FRIM Research Station (SPF) in Setiu, Terengganu on November 9, 2023.

The programme was officiated by Ahmad Rizal Mamat, Setiu District and Land Officer. Also present were Dr Ismail Parlan, FRIM Director-General (DG); Dr Norwati Muhammad, Deputy DG (Research); Lokman Mohamad, FRIM Member of Institute; Dr Mohd Zaki Abdullah, Director of Forestry Biotechnology; Wan Radzi W. Abdullah, Director of Northern Terengganu District Forest Office representing the Terengganu State Forestry Department (JPNT). The programme aimed to introduce SPF Setiu to state government agencies and the surrounding community.

Established in 1996 as the 'BRIS Land Research Center (Beach Ridges Interspersed with Swales)' to conduct land rehabilitation research activities and plant various species of trees. In this program attended by 150 participants, a total of 300 beach cabbage palm trees (*Baeckea frutescens*) were planted to support the Plant 100 Million Trees Campaign.



Tetamu jemputan dan wakil FRIM melawat fasiliti di SPF Setiu
Invited guest and FRIM representatives visiting facility at SPF Setiu

LAWATAN PELAWAT LUAR NEGARA KE FRIM

Lawatan Pegawai Rasmi Jerman

FRIM menerima kunjungan hormat daripada pegawai tertinggi dari agensi Jerman berkaitan hutan dan alam sekitar pada 17 Februari 2023. Delegasi Jerman termasuk Mike Schamotzki, Setiausaha Ke-3, Bahagian Ekonomi, Komersial dan Hal Ehwal Alam Sekitar, Kedutaan Jerman Kuala Lumpur (Ketua Delegasi); Prof. Dr Katrin Böhning-Gaese, Pusat Penyelidikan Biodiversiti dan Iklim Senckenberg; Prof. Dirk Messner, Presiden, Umweltbundesamt (Agensi Alam Sekitar Republik Persekutuan Jerman); Marina Kem, Ketua Pegawai Eksekutif dan Pengarah, STERNTAUCHER Filmproduktion; serta Alexander Hinrichs, Pengarah Program Pejabat Wilayah Asia Institut Hutan Eropah (EFI). Lawatan itu bertujuan untuk mengetahui tentang R&D FRIM, membincangkan isu berkaitan pemuliharaan hutan, biodiversiti, dan alam sekitar, serta meneroka potensi kerjasama. Delegasi juga melawat denai alam FRIM dan Jejantas Rimba.

OVERSEAS VISITOR VISITS TO FRIM

German Officials Visit

FRIM has received a courtesy visit from high-ranking officials of German agencies related to forests and the environment 17 February 2023. The German delegation included Mike Schamotzki, 3rd Secretary, Section for Economic, Commercial, and Environmental Affairs, German Embassy Kuala Lumpur (Delegation Leader); Prof. Dr Katrin Böhning-Gaese, Senckenberg Biodiversity and Climate Research Centre; Prof. Dirk Messner, President, Umweltbundesamt (Environmental Agency of the Federal Republic of Germany); Marina Kem, CEO and Director, STERNTAUCHER Filmproduktion; as well as Alexander Hinrichs, Programme Director of the European Forest Institute (EFI) Asia Regional Office. The visit aimed to learn about FRIM's R&D, discuss issues related to forest conservation, biodiversity, and the environment, as well as explore potential collaborations. The delegation also visited FRIM's nature trail and the Forest Skywalk.



Para delegasi bergambar di Jejantas Rimba FRIM
Delegation posing at FRIM Forest Skywalk

Lawatan Kedutaan Jerman

FRIM telah menerima kunjungan Duta Besar Jerman ke Malaysia, H.E. Dr Peter Blomeyer, isterinya Sabine Blomeyer dan staf kedutaan pada 16 Mac 2023. Lawatan ke FRIM, Kepong oleh seramai 29 orang delegasi merupakan sebahagian daripada program outing staf kedutaan. Delegasi disambut Pengarah Biodiversiti Hutan FRIM Dr Lillian Chua, yang mewakili Ketua Pengarah FRIM. Chua menyampaikan taklimat mengenai sejarah, penyelidikan dan aktiviti (R&D) FRIM khususnya berkaitan pemuliharaan biodiversiti serta tarikan ekopelancongan.

Selepas sesi taklimat dan perbincangan, Blomeyer menanam pokok jelutong (*Dyera costulata*) sebagai tanda kenangan serta sokongan terhadap Kempen Penghijauan Malaysia: 100 Juta Pokok. Diiringi oleh jurupandu alam FRIM, para delegasi turut dibawa ke denai alam untuk melihat fenomena titian silara serta Jejantas Rimba di Taman Botani Kepong.

Visit from German Embassy

FRIM has received a visit from the German Ambassador to Malaysia, H.E. Dr Peter Blomeyer, his wife Sabine Blomeyer and the embassy staff on 16 March 2023. The visit to FRIM in Kepong by the delegation of 29 was part of the embassy's team outing day programme. The delegation was greeted FRIM Forest Biodiversity Director Dr Lillian Chua, who represented the FRIM Director General. Chua presented a briefing about FRIM's history, research and development (R&D) activities particularly in relation to biodiversity conservation as well as ecotourism attractions.

Following the briefing and discussion, Blomeyer planted a jelutong tree (*Dyera costulata*) to commemorate the visit as well as to demonstrate support for the Greening Malaysia: 100 Million Trees Campaign. Led by FRIM's nature guides, the delegates were also brought for nature trekking to see the 'Crown Shyness' phenomenon and they also visited the Forest Skywalk at the Kepong Botanic Gardens.



H.E. Peter Blomeyer (kanan) menanam pokok jelutong diiringi oleh Dr Lillian (tengah) dan Toh (kiri)
H.E. Peter Blomeyer (right) planting jelutong tree accompanied by Dr Lillian (middle) dan Toh (left)



Yang di-Pertuan Agong Al-Sultan Abdullah Ri'ayatuddin Al-Mustafa Billah Shah dan Raja Permaisuri Agong Tunku Hajah Azizah Aminah Maimunah Iskandariah menyertai persidangan pada 19 Mei 2023 di Putrajaya.

Yang di-Pertuan Agong Al-Sultan Abdullah Ri'ayatuddin Al-Mustafa Billah Shah and Raja Permaisuri Agong Tunku Hajah Azizah Aminah Maimunah Iskandariah graced the conference on 19 May 2023 in Putrajaya

Lawatan 120 Peserta ACWW

Seramai 120 peserta daripada Associated Country Women of the World (ACWW) Triennial World Conference 2023 (ACWW) telah melawat FRIM, Kepong pada 21 Mei 2023 sebagai sebahagian daripada lawatan harian persidangan. FRIM dipilih sebagai salah satu daripada empat lokasi untuk program sampingan persidangan tersebut. Yang di-Pertuan Agong Al-Sultan Abdullah Ri'ayatuddin Al-Mustafa Billah Shah dan Raja Permaisuri Agong Tunku Hajah Azizah Aminah Maimunah Iskandariah menyertai persidangan pada 19 Mei 2023 di Putrajaya. Persidangan ACWW 2023, yang dihadiri oleh kira-kira 500 ahli daripada 84 negara, dianjurkan oleh Institut Wanita Pahang (WI Pahang). Para peserta telah dibawa menggunakan buggy untuk lawatan kampus, manakala peserta lain telah menyertai lawatan berpandu untuk melihat bangunan tertua di FRIM serta melawat Galeri Penyelidikan FRIM.

Visit from 120 ACWW Participants

A total of 120 participants of the 30th edition of the Associated Country Women of the World (ACWW) Triennial World Conference 2023 visited FRIM, Kepong on 21 May 2023 as part of the conference day trip. FRIM was selected as one of four sites for the conference side programme. Yang di-Pertuan Agong Al-Sultan Abdullah Ri'ayatuddin Al-Mustafa Billah Shah and Raja Permaisuri Agong Tunku Hajah Azizah Aminah Maimunah Iskandariah graced the conference on 19 May 2023 in Putrajaya. The ACWW 2023 conference was attended by about 500 members from 84 countries, was organised by Women's Institute of Pahang (WI Pahang). Most of the participants were given a tour to the FRIM campus on buggies, while others joined the guided nature walk to see the oldest building at FRIM as well as to visit the FRIM Research Gallery.



Sesi taklimat oleh Dr Ismail (KP FRIM) kepada para delegasi ACWW
Briefing session by Dr Ismail (FRIM DG) to the ACWW delegation

Lawatan daripada Delegasi Vietnam

FRIM menerima lawatan daripada delegasi Vietnam untuk meneroka kerjasama berpotensi dalam bidang perhutanan, pengurusan hutan, dan amalan lestari. Delegasi yang terdiri daripada 12 orang itu diketuai oleh YBrs H.E. Nguyen The Giang, Naib Pengerusi Jawatankuasa Kerajaan Tempatan Tuyen Quang, Vietnam. Delegasi disambut Timbalan Ketua pengarah (Operasi), Dr Lillian Chua yang mewakili Ketua Pengarah FRIM. Dr Lillian menyampaikan taklimat mengenai sejarah, penyelidikan dan aktiviti (R&D) FRIM khususnya berkaitan pemuliharaan biodiversiti serta tarikan ekopelancongan.

Visit from Vietnam Delegation

FRIM received a visit from a Vietnam delegation yesterday to explore potential collaborations in forestry, forest management and sustainable practices. The 12-member delegation was led by H.E. Nguyen The Giang, the Vice Chairman of Tuyen Quang Provincial People's Committee, Vietnam. The delegation was greeted by FRIM Deputy Director General (Operations), Dr Lillian Chua who represented the FRIM Director General. Dr Lillian presented a briefing about FRIM's history, research and development (R&D) activities particularly in relation to biodiversity conservation as well as ecotourism attractions.



Gambar berkumpul delegasi Vietnam bersama wakil FRIM
Group photo with Vietnam delegates and FRIM representative

Lawatan daripada Kedutaan Perancis

Pegawai Kedutaan Perancis ke Malaysia, H.E. Axel Cruau, melawat FRIM pada 9 Jun 2023 untuk menilai lokasi dan tarikan di kampus sebagai persiapan bagi lawatan Menteri Perancis yang mungkin berlangsung pada hujung Jun atau awal Julai 2023. Beliau disambut oleh Timbalan Pengarah Agung FRIM (Operasi), Dr. Lillian Chua yang memberikan taklimat mengenai sejarah, misi, visi FRIM serta aktiviti penyelidikan dan tarikan ekopelancongan di kampus.

Visit from French Ambassador

French Ambassador to Malaysia, H.E. Axel Cruau visited FRIM on 9 June 2023 to assess the location and attractions at the campus in preparation for a French Minister's visit which may take at the end of June or early July 2023. He was greeted by FRIM Deputy Director General (Operations) Dr Lillian Chua, who provided a briefing on FRIM's history, mission, vision as well as research activities and ecotourism attractions at the campus.



H.E. Axel Cruau bersama wakil-wakil FRIM
H.E Axel Cruau with FRIM representatives

Lawatan daripada Universiti Perhutanan Nanjing

Delegasi dari Universiti Perhutanan Nanjing (NJFU), China, melawat FRIM untuk meneroka potensi kerjasama antara kedua-dua pihak. Delegasi tersebut, yang dipimpin oleh Presiden NJFU Prof. Dr Yong Qiang, disertai oleh Penasihat Senior Deloitte Malaysia Dato' Dr Tan Yew Chong dan Dato' Dr Mohd Puat Dahalan.

Mereka disambut oleh Ketua Pengarah FRIM Dr Ismail Parlan, yang juga memberikan taklimat korporat tentang FRIM. Turut hadir, Timbalan Ketua Pengarah (Penyelidikan) FRIM Dr Norwati Muhammad, Ketua Eksekutif FRIM Incorporated Sdn Bhd Wan Jusaini Rizal Wan Nasruddin, Pengarah Keluaran Hutan Dr Wan Tarmeze Wan Ariffin, Pengarah Bioteknologi Perhutanan Dr Mohd Zaki Abdullah, Pengarah Inovasi dan Komersialisasi Mahmudin Saleh, Ketua Makmal Penyelidikan Biomolekul Dr Getha Krishnasamy serta Ketua Komunikasi Korporat Toh An Nee. Program tersebut diakhiri dengan lawatan ke Pusat Teknologi Herba (HTC) yang disambut oleh Ketua HTC Dr Zamree Md Shah.

Visit from Nanjing Forestry University

A delegation of 10 from Nanjing Forestry University (NJFU), China visited FRIM to explore potential cooperation between both parties. The delegation, led by NJFU President Prof. Dr Yong Qiang, was accompanied by Deloitte Malaysia Senior Advisor Dato' Dr Tan Yew Chong and Dato' Dr Mohd Puat Dahalan.

They were welcomed by FRIM Director General (DG) Dr Ismail Parlan, who also delivered a corporate briefing about FRIM. Also present, FRIM Deputy DG (Research) Dr Norwati Muhammad, FRIM Incorporated Sdn Bhd CEO Wan Jusaini Rizal Wan Nasruddin, Forest Products Director Dr Wan Tarmeze Wan Ariffin, Forestry Biotechnology Director Dr Mohd Zaki Abdullah, Innovation and Commercialisation Director Mahmudin Saleh, Biomolecular Research Laboratory Head Dr Getha Krishnasamy as well as Corporate Communication Head Toh An Nee. The programme concluded with a visit to the Herbal Technology Centre (HTC) greeted by HTC Head Dr Zamree Md Shah.



Dr Zamree (kiri) memberi taklimat kepada delegasi NJFU
Dr Zamree (left) giving briefing to NJFU delegates

Lawatan daripada Penyelidik Jepun

FRIM menerima kunjungan daripada para penyelidik terkemuka Jepun yang berminat untuk mengetahui lebih lanjut tentang aktiviti penyelidikan dan pembangunan (R&D) FRIM pada 30 Ogos 2023. Para penyelidik tersebut yang telah menyampaikan ucpatama di International Environment, Social and Governance Conference (I-ESG 2023 Conference) di Pahang, adalah Prof. Dr Hiroya Ohbayashi, Dekan Fakulti Sains Alam Sekitar Wilayah, Tokyo University of Agriculture (NODAI) dan Prof. Dr Fumio Eguchi, Presiden NODAI. Mereka diiringi oleh Prof. Dr Wan Mohd Nazri Wan Abdul Rahman, Timbalan Rektor (Penyelidikan dan Jaringan Industri) Cawangan UiTM Pahang, Kampus Jengka.

Ketua Pengarah (KP) FRIM, Dr Ismail Parlan, menyambut delegasi tersebut dan memberikan taklimat korporat mengenai FRIM. Kunjungan tersebut diakhiri dengan lawatan pandu ke trek alam untuk mengamati fenomena 'crown shyness'.

Visit from Japan Scientist

FRIM received a visit from esteemed Japanese researchers who were keen on knowing more about the FRIM research and development (R&D) activities on 30 August 2023. The researchers, who had delivered keynote speeches at the International Environment, Social and Governance Conference (I-ESG 2023 Conference) in Pahang, were Prof. Dr Hiroya Ohbayashi, Dean of Faculty of Regional Environment Science, Tokyo University of Agriculture (NODAI) and Prof. Dr Fumio Eguchi, NODAI President. They were accompanied by Prof. Dr Wan Mohd Nazri Wan Abdul Rahman, the UiTM Pahang Branch, Jengka Campus Research & Industrial Linkages (PJI) Deputy Rector.

FRIM Director General (DG) Dr Ismail Parlan welcomed the delegation and delivered a corporate briefing about FRIM. The visit ended with a guided tour of the nature trail to observe 'crown shyness' phenomenon.



Gambar berkumpul bersama delegasi Jepun
Group photo with the Japanese delegates

Lawatan daripada Delegasi China

FRIM menerima lawatan daripada penyelidik-penyelidik dari Taman Botani Tropika Xishuangbanna (XTBG) dan Institut Penyelidikan Biodiversiti Asia Tenggara (SEABRI) yang merupakan sebahagian daripada Akademi Sains China (CAS), pada 11 Mei 2023.

Tujuan lawatan tersebut adalah untuk membina hubungan dan membincangkan kerjasama yang berpotensi antara institut-institut tersebut. XTBG, salah satu taman botani di China, berminat untuk memperkukuhkan hubungan dengan taman botani lain di Asia tropika termasuk FRIM manakala SEABRI merancang untuk membuka pejabat kecil di Malaysia untuk memudahkan aktiviti penyelidikan jangka panjang dan pertukaran pengetahuan di rantau ini dan mahu FRIM menjadi salah satu rakan kongsi utama mereka di negara ini. Delegasi yang terdiri daripada lapan ahli, yang dipimpin oleh Profesor Yang Yongping dari XTBG & SEABRI, disambut oleh Pengarah Biodiversiti Hutan FRIM, Dr Lillian Chua, yang mewakili Ketua Pengarah FRIM.

Visit from China Delegates

FRIM has received a visit from researchers of Xishuangbanna Tropical Botanical Garden (XTBG) and Southeast Asia Biodiversity Research Institute (SEABRI) which are both part of the Chinese Academy of Sciences (CAS), on 11 May 2023.

The aim of the visit was to establish relationship and discuss potential collaboration between the institutes. XTBG, one of the botanical gardens in China, is interested in developing closer ties with other botanical gardens in tropical Asia including FRIM while SEABRI plans to open a small office in Malaysia to facilitate long-term research and knowledge exchange activities across the region and wants FRIM to be one of their key partners in the country. The eight-member delegation, led by XTBG & SEABRI Director Professor Yang Yongping, was greeted by FRIM Forest Biodiversity Director Dr Lillian Chua, who represented the FRIM Director General.



Para delegasi bergambar di hadapan pejabat Jejantas Rimba FRIM
Delegation posing in front of the Forest Skywalk office

Lawatan daripada Delegasi Kota Bukittinggi, Indonesia

FRIM telah menerima lawatan delegasi Kantor Wali Kota Bukittinggi, Sumatera Barat, Indonesia pada 4 Disember lalu bagi perbincangan mengenai potensi kerjasama dalam usaha mempromosikan produk dan kepakaran hasil penyelidikan FRIM. Kantor Wali Kota Bukittinggi diwakili Mihandrik, Kepala Bagian Pemerintahan dan Feri Paripar, Ajudan Wali Kota. Turut hadir, Radzman Omar, Pengarah Korporat International Agroforest Resources Sdn Bhd; Datuk Zainal Abidin Jaffar, Pengerusi Zajas Sdn Bhd serta Yaser Mohd Akhir, Pengasas Cikgu Yaser Consultancy CYC. En Mahmudin Saleh, Pengarah Inovasi dan Komersialisasi FRIM menyambut delegasi tersebut dan memberi taklimat mengenai latar belakang, aktiviti-aktiviti penyelidikan dan pembangunan (R&D) serta perkhidmatan dan kepakaran FRIM.

Visit from Bukittinggi, West Sumatra, Indonesia Delegates

FRIM received a delegation visit from Kantor Wali Kota Bukittinggi, West Sumatra, Indonesia on December 4 for discussions regarding potential collaboration efforts in promoting FRIM research products and expertise. The Mayor's Office of Bukittinggi was represented by Mihandrik, Head of Government Affairs, and Feri Paripar, the Mayor's Aide. Also present were Radzman Omar, Director of Corporate International Agroforest Resources Sdn Bhd; Datuk Zainal Abidin Jaffar, Chairman of Zajas Sdn Bhd; and Yaser Mohd Akhir, Founder of Cikgu Yaser Consultancy CYC. Mr Mahmudin Saleh, FRIM Director of Innovation and Commercialisation, welcomed the delegation and briefed them on FRIM's background, research and development (R&D) activities, as well as services and expertise.



Para delegasi melawat Pusat Teknologi Herba
Delegation visiting Herbal Technology Centre

Lawatan daripada Peserta Bengkel AUFN

Sejumlah 16 peserta 1st Workshop of Asian Urban Forests Network (AUFN) for People & Environment telah melawat FRIM, Kepong pada 11 Januari 2023 sebagai sebahagian daripada program lawatan bagi bengkel tersebut. Dianjurkan secara bersama oleh National Institute of Forest Science (NIFoS), Asia Pacific Association of Forestry Research Institutions (APAFRI) and Northern Research Station, Forest Service, U.S. Department of Agriculture, bengkel tersebut dilancarkan oleh Pengarah Hutan Bandar NIFoS, Dr Im Kyun Lee pada 10 Januari 2023. Turut hadir, Ketua Pengarah FRIM Dr Ismail Parlan yang juga merupakan Pengerusi APAFRI.

Tujuan bengkel yang dihadiri oleh penyelidik daripada Korea Selatan, Malaysia, Indonesia, Jepun, Filipina, Thailand and Vietnam, adalah untuk membincangkan status semasa hutan bandar dan pengenalan terhadap pokok jalan raya dan hutan bandar dalam pelbagai persekitaran bandar di Asia.

Visit from AUFN Workshop Participants

A total of 16 participants of the 1st Workshop of Asian Urban Forests Network (AUFN) for People & Environment visited FRIM, Kepong on 11 January 2023 as part of the excursion programme of the workshop. Jointly organised by National Institute of Forest Science (NIFoS), Asia Pacific Association of Forestry Research Institutions (APAFRI) and Northern Research Station, Forest Service, U.S. Department of Agriculture, the workshop was launched by NIFoS Urban Forests Director Dr Im Kyun Lee on 10 January 2023. Also present, FRIM Director General Dr Ismail Parlan who is the APAFRI Chairman.

The aim of workshop, attended by researchers from South Korea, Malaysia, Indonesia, Japan, Philippines, Thailand and Vietnam, was to discuss the present status of urban forests and cognition of street trees and urban forests in diverse environment of the city in Asia.



Delegasi AUFN melawat Denai Keruing
AUFN delegates visiting Keruing Trail

Lawatan daripada DOST-FPRDI

FRIM telah menerima lawatan daripada delegasi Jabatan Sains dan Teknologi (DOST), Institut Pembangunan Produk Hutan (FPRDI), Filipina pada 12 Mei 2023. Delegasi DOST-FPRDI, yang terdiri daripada empat pelawat, diiringi oleh Penyelaras Penyelidikan DOST-FPRDI, Rebecca B. Lapuz. FPRDI adalah ahli Persatuan Institusi Penyelidikan Hutan Asia Pasifik (APAFRI) yang dipengerusikan oleh Ketua Pengarah FRIM, Dr Ismail Parlan.

Tujuan lawatan ini adalah untuk mendapatkan maklumat dan belajar dari pengalaman FRIM dalam menjalankan aktiviti penyelidikan yang berkaitan dengan produk semula jadi, serta melawat makmal ujian yang berkaitan.

Visit from DOST-FPRDI

FRIM has received a visit from a delegation of the Department of Science and Technology (DOST), Forest Products Development Institute (FPRDI), the Philippines (PH), on 12 May 2023. The DOST-FPRDI delegation, consisting of four individuals, was led by DOST-FPRDI Research Supervisor Rebecca B. Lapuz. FPRDI is a member of the Asia Pacific Association of Forestry Research Institutions (APAFRI) chaired by FRIM Director General Dr Ismail Parlan.

The aim of the visit was to acquire information and learn from FRIM's experience in conducting research activities related to natural products, as well as to visit the relevant testing laboratories.



Gambar berkumpul delegasi DOST dan wakil-wakil FRIM
Group photo of the DOST delegation and FRIM representatives

Lawatan daripada Ahli APFORGEN ke SPF Bidor

Asia Pacific Forest Genetic Resources Programme's (APFORGEN) yang menghadiri Ulangtahun ke-20 serta Mesyuarat Kaji Semula Strategi telah melawat Stesen Penyelidikan FRIM di Bidor (SPF Bidor), Perak pada 16 Mac 2023. Kumpulan yang terdiri daripada 30 koordinator kebangsaan dan wakil-wakil daripada 14 negara ini disambut oleh penyelaras stesen, Dr Ho Wai Mun, yang memberikan taklimat mengenai stesen tersebut.

APFORGEN menyediakan platform unik bagi penyelidik dan pakar hutan serantau untuk membangunkan dan berkongsi amalan terbaik dan keupayaan untuk pemeliharaan dan pengurusan lestari sumber genetik hutan dan pokok. Mesyuarat yang diadakan pada 14-17 Mac 2023 di Kuala Lumpur, dianjurkan bersama oleh APFORGEN, Persekutuan Antarabangsa Biokepelbagaian

Visit from APFORGEN Members to SPF Bidor

Asia Pacific Forest Genetic Resources Programme's (APFORGEN) members attending the 20th Anniversary and Strategy Review Meeting visited FRIM Research Station in Bidor (SPF Bidor), Perak on 16 March 2023. The group consisting of 30 national coordinators and representatives from 14 countries were greeted by the station's coordinator, Dr Ho Wai Mun, who gave a briefing on the station.

APFORGEN provides a unique platform for the region's researchers and forestry experts to develop and share best practices and capacities for the conservation and sustainable management of forest and tree genetic resources. The meeting, held on 14-17 March 2023 in Kuala Lumpur, was jointly organised by APFORGEN, Alliance of Bioversity International

dan CIAT serta Asia Pacific Association of Forestry Research Institutions (APAFRI); dan disokong UK Darwin Initiative, National Institute for Forest Science of the Republic of Korea dan the CGIAR Research Initiative on Nature-Positive Solutions.

and CIAT as well as Asia Pacific Association of Forestry Research Institutions (APAFRI); and supported by UK Darwin Initiative, National Institute for Forest Science of the Republic of Korea and the CGIAR Research Initiative on Nature-Positive Solutions.



Ahli APFORGEN melawat SPF Bidor, Perak
APFORGEN members visiting SPF Bidor, Perak

Lawatan daripada China

FRIM menerima lawatan delegasi Republik Rakyat China (RRC) pada 18 Disember 2023 untuk memahami pembangunan dan pemeliharaan sumber tumbuhan ubatan tradisional di Malaysia sertamenerokakerjasamaberpotensi dalam bidang yang berkaitan. Delegasi tersebut diketuai oleh Naib Pesuruhjaya China National Administration of Traditional Chinese Medicine (NATCAM), Profesor Huang Luqi dan Pengarah Bahagian Perubatan Tradisional dan Komplementari Kementerian Kesihatan Malaysia (BPTK), Dr Goh Cheng Soon.

Delegasi juga melawat Taman Etnobotani FRIM untuk melihat koleksi tumbuhan ubatan. Lawatan ini dijalankan, seiring dengan Mesyuarat Teknikal Bilateral ke-5 Malaysia dan RRC dalam bidang perubatan tradisional dan komplementari pada 18 Disember yang diketuai oleh Timbalan Menteri Kesihatan Malaysia di Putrajaya.

Visit from China

FRIM received a visit from a delegation from the People's Republic of China (PRC) on 18 December to understand the development and preservation of traditional medicinal plant resources in Malaysia as well as to explore potential collaboration in the related field. The delegation was led by China National Administration of Traditional Chinese Medicine (NATCAM) Vice Commissioner Prof. Huang Luqi and the Ministry of Health Traditional and Complementary Medicine Division (BPTK) Director, Dr Goh Cheng Soon.

The delegation also visited FRIM Ethnobotanical Garden to see the medicinal plants collection. This visit was conducted, in conjunction with the 5th Bilateral Technical Meeting of Malaysia and PRC in the field of traditional and complementary medicine on 18 December chaired by the Deputy Minister of Health Malaysia in Putrajaya.



Gambar berkumpul wakil-wakil FRIM dan delegasi RRC
FRIM representatives and RRC delegation posing for a group photo

Lawatan daripada DGIP Indonesia, MyIPO

FRIM telah menerima kunjungan hormat delegasi Direktorat Jenderal Kekayaan Intelektual (DGIP) Indonesia dan Intellectual Property Corporation of Malaysia (MyIPO) pada 1 November 2023 di FRIM, Kepong.

Kunjungan ini bertujuan berkongsi pengalaman dalam pelaksanaan projek pendokumentasian Pengetahuan Tradisi (TK) di Semenanjung Malaysia yang menyumbang kepada Malaysia Traditional Knowledge Digital Library (MyTDKL) bawah kendalian MyIPO. Delegasi tersebut diketuai Suraya Mohamad @ Ahmad, Pengarah Bahagian Sains Paten dan Pengetahuan Tradisional MyIPO.

Visit from DGIP, Indonesia

FRIM received a courtesy visit from the delegation of the Directorate General of Intellectual Property (DGIP) Indonesia and the Intellectual Property Corporation of Malaysia (MyIPO) on 1 November 2023 at FRIM, Kepong.

The purpose of this visit was to share experiences in implementing the Traditional Knowledge (TK) documentation project in Peninsular Malaysia, which contributes to the Malaysian Traditional Knowledge Digital Library (MyTKDL) under the auspices of #MyIPO. The delegation was led by Suraya Mohamad @ Ahmad, Director of the Patent Science and Traditional Knowledge Division of MyIPO.



DGIP, MyIPO diiringi oleh penyelidik FRIM melawat Galeri Herba
DGIP, MyIPO accompanied by FRIM researchers visiting Herbal Galary

Lawatan daripada Pakar Perhutanan UBC

Profesor Dr John Innes daripada Fakulti Perhutanan, yang merupakan Pengerusi Forest Renewal Based Classification (FRBC) of Forest Management University of British Columbia (UBC) di Kanada telah melawat FRIM, Kepong, pada 27 Oktober 2023. Beliau disertai oleh pensyarah Fakulti Perhutanan dan Alam Sekitar, Universiti Putra Malaysia (UPM), Dr Mohamad Nazrin Abd Malik dan Dr Muhammad Syahmi Hishamuddin. Innes dijemput oleh Fakulti Perhutanan dan Alam Sekitar sebagai pakar panel untuk menilai semakan kurikulum program Sarjana Muda Sains Perhutanan.

Para pelawat disambut oleh Dr Mohd Farid Ahmad, Ketua Program Kesihatan dan Pemuliharaan Hutan FRIM, dan Patahayah Mansor, Penyelidik Bahagian Mikologi dan Patologi Tumbuhan (MIKO) FRIM. Mereka juga melawat Makmal MIKO, arboretum, Denai Salleh, dan Denai Keruing. Kemudahan penyelidikan FRIM sering digunakan oleh fakulti untuk latihan praktikal dan industri pelajar-pelajarnya.

Visit from UBC Forestry Expert

Professor Dr John Innes from the Faculty of Forestry, also the Chair of Forest Renewal Based Classification (FRBC) of Forest Management, for the University of British Columbia (UBC) in Canada visited FRIM, Kepong, on 27 October 2023. He was accompanied by Universiti Putra Malaysia's (UPM) Faculty of Forestry and Environment lecturers, Dr Mohamad Nazrin Abd Malik and Dr Muhammad Syahmi Hishamuddin. Innes was invited by the Faculty of Forestry and Environment as a panel expert to evaluate the curriculum revision of the Bachelor of Forestry Science programme.

They were greeted by Dr Mohd Farid Ahmad, FRIM Forest Health and Conservation Programme Head, and Patahayah Mansor, Researcher from the FRIM Mycology and Pathology Branch (MIKO). They also visited the MIKO Laboratory, the arboretum, Denai Salleh and Denai Keruing. FRIM research facilities are often used by the faculty for its students' practical and industrial training.



Dari kiri: Muhammad Syahmi, Patayah, Dr Mohd Farid, Prof John Innes dan Mohamad Nazrin di Makmal MIKO
From left: Muhammad Syahmi, Patayah, Dr Mohd Farid, Prof John Innes dan Mohamad Nazrin at the MIKO lab



Polianthes tuberosa

PENERBITAN RASMI

OFFICIAL PUBLICATIONS

BIL No.	PENERBITAN BERSIRI SERIAL PUBLICATIONS	JUDUL TITLE
1	Journal of Tropical Forest Science (JTFS). Editors: Chee BJ, Vimala S & Sarifah KA	Vol. 35(1), 35(2), 35 (Special Issue), 35(3), 35(4)
2	Timber Technology Bulletin (FTTB). Editors: Dr Latifah J & Dr Ong CB	
	Roszaini K	FTTB 124 Powder Post Beetles Infestation in Wood And Bamboo Structures
	Mohd-Jamil AW	FTTB 125 Common Timber Species In Logged-Over Forests Of Peninsular Malaysia
	Ong CB, Sik HS, Zahidah Z & Che Muhammad Farid CS	FTTB 126 Mechanical Testing of Round and Laminated Bamboo
	Ong Chee Beng, Khairul Awang, Che Muhammad Farid Che Saupi	FTTB 127 Mechanical Properties of Semantan Laminated Bamboo Plank
3	FRIM Technical Information Handbook (FTIHB). Editors: Dr Wan Tarmeze WA	
	Lau Kah Hoo, Muhammad Alif Azyraf Azmi, Siti Fariezza Khairi Thaw, Lilian Chua Swee Lian, Lee Soon Leong, Nurul Farhanah Zakaria, Tnah Lee Hong, Ng Chin Hong, Kevin Ng Kit Siong, Lee Chai Ting	FTIHB 56 Guidelines For The Establishment of Aquilaria malaccensis Arboretum in Peninsular Malaysia
	Siti Effariezza Khairi Thaw, Tan Kok Kiat, Ikman Sabini & Chan Yoke Mui	FTIHB 57 Panduan Pembiakan Begonia spp. Melalui Keratan Daun
	Hamdan Omar & Muhamad Afizzul Misman	FTIHB 59 Manual Kerja Lapangan Survei Karbon Hutan
4	Malayan Forest Records (MFR). Editors: Dr Sam YY	
	GLC Bramley, S Atkins, R Kiew, RCK Chung, YH Cheah & LG Saw	MFR 49-9 Flora of Peninsular Malaysia. Series II: Seed Plants, Volume 9
	R. Kiew, RCK Chung & LG Saw	MFR 49-10 Flora of Peninsular Malaysia
5	FRIM Research Pamphlets (FRP). Editors: Dr Mary KGH & Dr Kevin NKS	
	Ahmad Zuhaidi Yahya, Amir Saaiffudin K, Jeyanny V, Fakhri M	FRP 152 Reforestation Initiatives Establishment of Forest Species Stand, Bamboos and Herbal Garden within an Old Rubber Plantation
	Wan Mohd Shukri Wan Ahmad, Nur Hajar Zamah Shari, Ismail Parlan, Ismail Harun	FRP 154 The Pasoh. 50-Ha Demographic Plot: 25 Years Later

BIL No.	PENERBITAN BERSIRI SERIAL PUBLICATIONS	JUDUL TITLE
6	FRIM Technical Information (FTI). Editors: Dr Lee CT	
	Maryanna Lion, Wan Mohd Shukri Wan Ahmad, Avalinah Julius & Sheriza Mohd Razali	FTI 88 Estimating Sap Flow Rate in <i>Hopea odorata</i> and <i>Khaya ivorensis</i>
	Majalah/Brosur Magazine/Brochure	
	FRIM in Focus (FIF) Editor: Ida Suraini AS & Sarifah KA	FIF March 2023 FIF June 2023 FIF September 2023 FIF December 2023
	Conservation Malaysia Editor: Ong SP	
8	Prosiding/Proceedings (FP)	Judul/Title
	Mohamad Nasir Mat Arip, Asiah Osman, Huda Farhana Mohamad Muslim & Noor Hazmira Merous	FP 26 Proceedings of the FRIM Conference 2022 Unlocking The Value of Ulu Muda Forest Ecosystem Services Towards Sustainable Development Goals
	Mazura Md Pissar, Tan Ai Lee, Mastura Mohtar, Nurshahidah Mohd Rusli	FP27 Prosiding Seminar Pemuliharaan & Pemerkasaan Pengetahuan Tradisi 2022
9	Siri Alam dan Rimba (SAR).	
	MM Huda Farhana, A Norliyana, AK Nik Azyyati, MY Azahari, CL Naimah & M Mohd Parid	SAR 19 Modul Panduan Ranjer Muda
10	Laporan Tahunan FRIM FRIM Annual Report	
	Editor: Asiah O, Mary KGH & Ho WM	Laporan Tahunan FRIM/ FRIM Annual Report 2022
11	Penerbitan lain/Pengarang/Penyunting Other Publications/Author/Editor	
	Nurhanan Murni Yunos, Mastura Mohtar, Mary Khoo Gaik Hong, Mazura Md Pissar	A Laboratory Manual on Methods for Bioprospecting of Natural Products, Volume 1
	Yao Tze leong, Salleh Mat, Musalmah Nasardin, Nurfarah Aqilah Mohd Noh, Nik Faizu Nik Hasan & Wan Mohd Shukri Wan Ahmad	Pasoh Bibliography 1964 – 2021
	Siti Eryani Suterisno	Panduan Pengecaman Spesies Dipterokarpa Terpilih Di Semenanjung Malaysia. Genus Shorea: Siri 1
	Sofiya Zulaikha Ruslan, Muhammad Syaridzwan Baharudin & Mohd Shahfiz Azman	Ecosystem Services Assessment in CFS Corridors Using InVEST
	V Khoo, B Nada, AM Nur Zati, SP Ong & CK Phon	Action Plan on Conserving the Fireflies of Selangor River 2022–2030
	V Khoo, B Nada, AM Nur Zati, SP Ong & CK Phon	Action Plan on Conserving the Fireflies of Selangor River 2022–2030

BIL No.	PENERBITAN BERSIRI SERIAL PUBLICATIONS	JUDUL TITLE
	Jawatankuasa Keselamatan dan Kesihatan Pekerjaan FRIM	Manual Keselamatan dan Kesihatan Pekerjaan (Edisi Keempat)
	Azian M, Mohd Afzanizam M, Nik Norafida NA, Nur maisarah L, Nik Sasha Khatrina K, Elizabeth P, Wan Mohd Shukri WA & Idris AS	The Carbon Stock Assessment of Permanent Peat Swamp Forest in Pekan, Pahang
	Nur Hajar ZS, Norhidayah AR, Mohd Salim A, Abd Ramlizauyahudin M & Shazrul Azman J	Rancangan Pengurusan KORIDOR EKOLOGI CENTRAL FOREST SPINE J-PL2 Hutan Simpan Panti-Hutan Simpan Ulu Sedili, Johor 2022-2030
12	e-Buku/e-Book	
	Muhammad Syaridzwan Baharudin, Noor Faradiana Md Fauzi, Nor Hazwani Ahmad Ruzman, Norleyana Azman	Review on Biodiversity Monitoring Protocol. Improving Connectivity In The Central Forest Spine Landscape (IC-CFS)

Jurnal Journal

BIL No.	JUDUL TITLE
1	ABDUL HAYAT MS, AHMAD NAZARUDIN MR & ROSFARIZAL K. 2023. PiCUS sonic tomograph: a case study of crimson bottlebrush tree (<i>Melaleuca citrina</i> (Curtis) Dum.Cours). <i>Journal of Tropical Plant Physiology</i> . 15 : 46-58 DOI : https://doi.org/10.56999/jtpp.2023.15.1.29
2	AHMAD H, LAILI AA, TUMIRAH K, ZEID AA, WILSON LD & JAWAD AH. 2023. magnetic grafted chitosanâ salicylaldehyde via hydrothermal synthesis for acid red 88 dye removal: a statistical optimization. <i>Biomass Conversion and Biorefinery</i> . 13 (-) DOI : https://doi.org/10.1007/s13399-023-04352-0
3	AHMAD NAZARUDIN MR, ROSFARIZAL K & ALIA SHAZWANI S. 2023. Identification of the phenological growth stages of <i>Rhodomyrtus tomentosa</i> var. <i>tomentosa</i> using the biologische bundesanstalt, bundessortenamt and chemical industry (BBCH) scale. <i>Journal of Tropical Forest Science</i> . 35 (2) : 179-188
4	AINA ELIAH AB, RASIDI O, MASTURA M, NUR HANIE ML, WAN SYIBRAH HANISAH WS, FARAH AYUNI MF & RAZANAH R. 2023. Antimicrobial activities of curcumin extracted from selected zingiberaceae species as potential halal active pharmaceutical ingredient. <i>Journal of Halal Science and Technology</i> . Vol.2 (1): 83-93. https://doi.org/10.59202/jhst.v2i1.671 . 2 : 83-93
5	ALIAA-ATHIRAH AM & ONG PT. 2023. <i>Crepidium oculus-draconis</i> (orchidaceae: malaxidinae), a new species from Peninsular Malaysia & Sumatra. <i>Malesian Orchid Journal</i> . 26 (-): 27-36
6	AMIN-ASYRAF T, SALASIAH M, MOHAMAD-ALIAS S, NURSHAHIDAH MR, NORIHA MA & MUHAMAD-ARIF MJ. 2023. Insights into the diversity of <i>Nepenthes</i> L. (nepenthaceae) across Peninsular Malaysia, including the first sighting of an undescribed taxon with flared peristomes and quadruple-row ventral wings. <i>Journal of Sustainable Natural Resources</i> . 4 (1): 10-36
7	ANWAR UMK, ZHANG JF, FENG X, CHEN Z, LI Z & NORDAHLIA AS. 2023. Effect of tree age on the properties of himalayan birch (<i>Betula alnoides</i> Buch. -H. ex D. Don) wood. <i>Bioresources</i> . 18: 8007-8019 DOI: http://dx.doi.org/10.15376/biores.18.4.8007-8019
8	AZAHANA A, DAHLIA AS, NOOR SYAHEERA M Y, HANISSA J, NOOR HASLINDA NH, OTHMAN HS & SALLEH MS. 2023. Foliar morphological and micromorphological variation of <i>Dioscorea</i> species in Terengganu, Malaysia. <i>Revelation and Science</i> . Special Issue: Plant Science 1: 29-38
9	EZZA IZZATI Z, SALFARINA R, AIDA AZLINA A, RICHARD JJ, IHSAN SAFWAN K & HASSERI HM. 2023. The phytochemical and pharmacological effects of <i>Hibiscus rosa-sinensis</i> : a review. <i>International Journal of Pharmaceutical Investigation</i> . 13 (3): 1-10

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36	CHOOI-KHIM P. 2023. Experiences in maintaining a butterfly collection in FRIM. Paper presented at the Future of Biodiversity Collections in Malaysia 2023 (FBCM 2023) Conference & Workshop, 28 Feb - 2 Mar 2023, Dewan Auditorium Jurutera Radin Umar, UPM
37	DASRUL ISKANDAR D, ROSDI K & AMIR SAAIFFUDIN K. 2023. Potensi spesies – spesies Eucalyptus, Batai dan Laran. Paper presented at the Simposium Perladangan Hutan: Hala Tuju dan Cabaran, 14 September 2023, Bangi Resort Hotel, Bangi, Selangor
38	FADHILAH Z, MAHMUDIN S, MOHD SHAHIDAN MA, KHAIRUL KAMILAH AK, MAHMUD HUSNI AH, MUNIRAH MF, MAZDIANA MZ, NUR HAZIRAH J & NOOR SYAKILAH S. 2023. Teh Anggerik (natural, aromatic and refreshing): for general health benefits. Paper presented at the Sesi Penilaian Akhir Anugerah Tahun Pengkomersialan Malaysia 2022 (MCY 2022), 07/02/2023, Dewan MOSTI Putrajaya
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42	FADZUREENA J, NIK MUSAADAH M, INTAN NURULHANI B, MADIHAH MN, TAN AL, SITI NUR AISYAH MH, FIRDAUS K, ARIF FAHMI AB, FAUZIAH A, SITI SALWANA H, MASTURA M, NURHANAN MY, MARY KGH, SAIDATUL HUSNI S, MAILINA J, MAZURA MP & NORINI H. 2023. Documentation and validation of orang asli traditional knowledge: FRIM experience. Paper presented at the 3rd Virtual International Symposium of Science (VISoS2023), 6 September 2023 online
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45	FARAH FAZWA MA & SYAFIQAH NABILAH SB. 2023. Asas pemilihan dalam pembiakbakaan. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba (Koperasi Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad), 21-22 Jun 2023, Dewan Kuliah SPF Mata Ayer, FRIM
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67	HUDA FARHANA MM. 2023. Sustainable tourism and way forward for rural tourism. Paper presented at the Lecture On the Subject of Planning and Managing Rural Tourism, 5 Januari 2023, Pusat Pengajian Pengurusan Taman dan Ameniti, Kolej Pengajian Alam Bina, UiTM Shah Alam, Selangor
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72	INTAN NURULHANI B, MADIHAH MN, SITI NUR AISYAH H, FADZUREENA J, NIK MUSAADAH M, TAN AL & FIRDAUS K. 2023. Pendokumentasian tumbuhan ubatan berasaskan pengetahuan tradisi orang asli. Paper presented at the Bengkel Kesedaran Pemeliharaan Tk, Kg Embus, Lubuk Paku, Maran, 19 Sept 2023, Maran
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74	JEYANNY V, ROSAZLIN A, MUHAMMAD ZAMIR AR, ALI TKZ, NUR SAADAH AR, BIDASARI B, MUHD ASYRAF K, MASBUDI M, MUHAMMAD IQRAM Z, ALI T, SHAHRIL A & DARSHINI R. 2023. Transformasi pengurusan sisa sungai ke arah kelestarian alam sekitar. Paper presented at the Program Saintis Rakyat Fasa II, 7 Oktober 2023, Santuari Kelip-Kelip Kg. Kuantan
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79	KHAIRUL A & ZAIHAN J. 2023. Perkhidmatan pemesinan, prototaip dan contoh kayu. Paper presented at the Bicara Teknologi Frim 2023, 8/12/2023, Kuala Terengganu
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90	LEE SL, NG KKS, NG CH, TNAH LH, LEE CT, NUR NABILAH A, NORLIA B & HAZWANI HUMAIRA Z. 2023. Application of DNA barcodes for wood industry. Paper presented at the APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources, 03-06 July 2023, Genetics Laboratory, FRIM, Kepong

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112	MOHAMMAD SHAHFIZ A, NOR HAZWANI AR, KAVIARASU M, MUHAMMAD SYARIDZWAN B & NOOR FARADIANA MF. 2023. Monitoring selected vertebrates in the central forest spine landscape. Paper presented at the Regional Conference IC-CFS: Forest Connectivity & Biodiversity Conservation, 21 - 22 November 2023, Setia City Convention Centre
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120	MOHD FARID A. 2023. What do you do when your plant is sick? Paper presented at the Ceramah awam sempena International Forest Day, Theme: Forest and Health, 25 March 2023, Galeri Penyelidikan FRIM, Kepong, Selangor

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125	MOHD SHAHIDAN MA, ZAMREE MS, PIN KY, MUNIRAH MF, KHAIRUL KAMILAH AK, NURUL NAZIFA MZ & NOOR SYAKILAH S. 2023. Permata hijau di bumi bencah terengganu. Paper presented at the Program Campers Getway Lata Kolam Deru Eko Park, Terengganu, 25 Ogos 2023, Lata Kolam Deru Eko Park, Terengganu
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127	MUKRIMAH A, MOHD PARID M, MOHD RUSLI Y, TUAN MARINA TI & FATEN NASEHA TH. 2023. Biodiversity conservation from economics perspective. Paper presented at the International Biodiversity Symposium 2023 (IBDS2023), 10-12 September 2023, UMT, Terengganu
128	MUKRIMAH A, MOHD PARID M, SITI SUHAILA AR, FATEN NASEHA TH & NIK AZYYATI AK. 2023. Penilaian ekonomi pemuliharaan sumber taman awam di kuala krai, kelantan. Paper presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandar Untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat, 21 November 2023, Dewan Sri Guchil, Kuala Krai, Kelantan
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130	MUSALMAH N & NURFARAH AQILAH MN. 2023. Struktur dirian dan komposisi spesies pokok dalam plot 102, Hutan Simpan Sungai Menyala. Paper presented at the Seminar Ekspedisi Saintifik Kepelbagaian Biologi Hutan, Hutan Simpan Sungai Menyala, Port Dickson, Negeri Sembilan, 23 & 24 Ogos 2023, Port Dickson, Negeri Sembilan
131	MUSALMAH N., RUSOO SE & DAVIES SJ. 2023. What explains the increasing tree mortality in Pasoh FR over 30 years? Paper presented at the 2023 ForestGEO Analytical Workshop, 20 Julai - 3 Ogos 2023, Gamboa Rainforest Reserve Hotel, Panama
132	NADA B. 2023. Citizen scientist role in biodiversity conservation: a story of the Bukit Kiara fireflies and the local community. Paper presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, FRIM
133	NADA B. 2023. Fireflies of Malaysia: What do we know about them. Paper presented at the FRIM 2023 Sharing Session- Fireflies: Know Them, See Them, Love Them, 15 Jul 2023, FRIM
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135	NADA B. 2023. Introduction to fireflies of Malaysia. Paper presented at the Mutiara Hills-Introductory Session on Firefly by FRIM, 8 Sep 2023, Boustead Properties Berhad
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138	NAZIRAH A, NOR HASNIDA H, NUR SYAHIRA MK, TENGKU NURUL MUNIRAH TAR, MOHAMAD MURSHEID MY & HARRAZ WAFIQ A. 2023. Penghasilan anak pokok <i>Begonia herveyana</i> dan <i>Begonia tampinica</i> melalui teknologi kultur tisu. Paper presented at the Seminar Hasil Kajian Pemeliharaan <i>Begonia herveyana</i> dan <i>Begonia tampinica</i> , 24 Nov 2023, FRIM
139	NG CH, NG KS, LEE SL, LEE CT, TNAH LH, NUR NABILAH A, HAZWANI H & NORLIA B. 2023. Application of DNA profiles for plant origin verification 1. Paper presented at the APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources, 03-06 July 2023, Genetics Laboratory, FRIM, Kepong
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144	NG YF, AIN N, RATFI NS & LAU KH. 2023. Population dynamics of flowers associated thrips (Thysanoptera) in the canopy of dipterocarp forest. Paper presented at the International Symposium on Insects 2023 (ISol2023), 11-13 September 2023, Pullman Kuching, Sarawak
145	NIK MUSAADAH M & NUR FARAHIN M. 2023. Malaysia's ABS Act: regulating bioprospecting, promoting benefit sharing. Paper presented at the 1st Asian Academic ABS Forum, 24-25 Oktober 2023, Tokyo, Japan
146	NIK MUSAADAH M, FADZUREENA J, INTAN NURULHANI B, MADIHAH MN, NURSHAHIDAH MR, NORBAIAH MY, DIONYSIA M, ABDUL HAYAT MS, TAN AL, FIRDAUS K, SITI NUR AISYAH MH, SITI SALWANA H, ARIF FAHMI AB, MAZURA MP, SAIDATUL HUSNI S, MAILINA J, FAUZIAH A, NORINI H, LING SK & NORWATI M. 2023. FRIM's experience in documenting traditional knowledge of medicinal plants. Paper presented at the FRIM-USM Joint Webinar 2023, 25 July 2023, online
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148	NOOR FARADIANA MF, MOHAMMAD SHAHFIZ A, NOR HAZWANI AR & MUHAMMAD SYARIDZWAN B. 2023. Rodents at central forest spine (CFS). Paper presented at the Biji-biji Initiative: Talk on Sustainable Initiatives, 15 Februari 2023, Publika Shopping Gallery
149	NOOR RASYILA MN, SAIDATUL HUSNI S, NORULAIMAN Y, WAN MOHD SYAFIK WM & MUHAMMAD FARHAD MS. 2023. Inovasi rasa: formulasi minuman jeruju berperisa pic dan yuzu. Paper presented at the Program Pemindahan Teknologi Pembangunan Produk Air Minuman Jeruju, 20 Disember 2023, Sg. Acheh, Pulau Pinang
150	NOR DATIAKMA MA, NORALIZA A, NURHANAN MURNI MY, NORHAYATI I, NORJANNAH S & RUZANA R. 2023. Introduction on 2-DE sample preparation. Paper presented at the Post-Conference Symposium Gel-Based Proteomics and Biochemical Pathway Mapping Via Ingenuity Pathway Analysis (IPA), 8 December 2023, FRIM, Kepong
151	NOR DATIAKMA MA. 2023. Anti-angiogenesis evaluations of 9-methoxycanthin-6-one via in vitro model(S) and proteomics approach. Paper presented at the Analytical Biochemistry Research Centre (ABRC) Postgraduate Seminar, 9 Oct 2023, online

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158	NORALIZA A. 2023. Teknologi bola benih (seed ball). Paper presented at the Program Agri Fun for Kids, 19 Januari 2023, SK Bukit Kuda, Klang
159	NORDAHLIA AS, ANWAR UMK, TUMIRAH K, ASNIZA M & ALIA SYAHIRAH Y. 2023. Sifat-sifat buluh komersial di Malaysia. Paper presented at the Kursus Rawatan & Pengawetan Buluh - Clarity Crest Sdn. Bhd, 25-26 July 2023, Unit Buluh & Rotan, FRIM
160	NORDAHLIA AS. 2023. Asas penyediaan slaid mikroskopik kayu, dibentangkan di Kursus Asas penyediaan slaid mikroskopik kayu. Paper presented at the Kursus Asas penyediaan slaid mikroskopik kayu, 21-23 Jun 2023, BM Bambusa, FRIM Kepong
161	NORDAHLIA AS. 2023. Perkhidmatan teknikal pengecaman kayu. Paper presented at the Bicara Teknologi FRIM 2023, di Terengganu, 8 November 2023, Terengganu.
162	NORLIYANA A, MOHD PARID M, SITI AISAH S, BAKTI HB, HAMDAN O, MUKRIMAH A, TUAN MARINA TI & FATEN NASEHA TH. 2023. ecosystem services valuation of Kedah Permanent Reserved Forest. Paper presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, Kuala Lumpur
163	NORSHAM SY. 2023. Yes. You can be a scientist, too! Paper presented at the International Symposium on Citizen Science 2023, 2-3 Oktober, Online
164	NORULAIMAN Y, NURHAZWANI MH, AMIRA RINA NURDIANA MS, SAIDATUL HUSNI S & NOOR RASYILA MN. 2023. Pengendalian pemprosesan produk air minuman yang bersih: pencemaran mikroorganisma. Paper presented at the Program Pemindahan Teknologi Pembangunan Air Minuman Jeruju, 20 Dis 2023, PIFWA, Sg. Aceh P. Pinang
165	NUR AQILAH MB, THI BK, ALIA SHAFINI A, AHMAD FITRI Z, MOHAMMAD KHAIRUL FZ & NIZAM MS. 2023. Records of macrofungi diversity at Sungai Menyala Forest Reserve, Port Dickson, Negeri Sembilan. Paper presented at the Seminar Ekspedisi Saintifik Kepelbagaian Biologi Hutan, Hutan Simpan Sungai Menyala, Port Dickson, Negeri Sembilan, 23-24 Ogos 2023, Hotel Corus Paradise Resort Port Dickson
166	NUR AREISMAN S, LATIFAH J & RAFIDAH J. 2023. An introduction to electrospinning and nanofibre. Paper presented at the MARDI-NNLN Workshop 2023: Electrospinning and Agri-Bio Nanomaterial, 23/10/2023, MARDI, Serdang
167	NUR HAJAR ZS & NORHIDAYAH AR. 2023. Rancangan pengurusan koridor ekologi Central Forest Spine J-PL2 Hutan Simpan Panti - Hutan Simpan Ulu Sedili, Johor 2022 - 2030. Paper presented at the Program Showcase Projek UNDP/GEF/GOM: Improving Connectivity in the Central Forest Spine Landscape (IC-CFS) Peringkat Negeri Johor, 16 Oktober 2023, Johor Bharu, Johor

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169	NUR HAJAR ZS, WAN MOHD SHUKRI WA, SAMSUDIN M, HARFENDY O & MOHAMAD DANIAL MS. 2023. Silvicultural tree selection system; option for sustainable forest management and utilization. Paper presented at the The First Pu'er Forum on Asia Pacific Forests, 23 - 27 October 2023, Pu'er City, Yunnan Province, China
170	NUR NABILAH A, KEVIN NKS, LEE SL, NG CH, LEE CT, TNAH LH, HAZWANI HUMAIRA Z & NORLIA B. 2023. Application of DNA profiles for germplasm evaluation. Paper presented at the APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources, 03-06 July 2023, Genetics Laboratory, FRIM, Kepong
171	NURHANAN MURNI Y, NOOR RASYILA MN, NOR DATIAKMA MA & NOR JANNAH S. 2023. S30: A premix health drink based on Seel30. Paper presented at the Bengkel Pemerkasaan Aktiviti Komersialisasi Produk Dan Teknologi Berasaskan Herba/ Tumbuhan Ubatan, 24-27 Oktober 2023, Travelodge Ipoh, Perak
172	NURHANAN MY, ASIAH O, NOR DATIAKMA MA & NORALIZA A. 2023. FRIM's experience in proteomics research. Paper presented at the Post-Conference International Conference on Drug Discovery and Translational Medicine 2023 (ICDDTM'23) Symposium, 8 December 2023, FRIM
173	NURHANAN MY, NOR DATIAKMA MA, NOR JANNAH S & NOR HASNIDA H. 2023. Modes of action of the antiproliferative effects of 9-Methoxycanthin-6-One from <i>Eurycoma longifolia</i> via proteomics and in silico analysis. Paper Presented at the International Conference On Natural Products (ICNP 2023) , 11-13 September 2023, A-Loft Hotel, Kuala Lumpur
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176	ONG CB. 2023. Pengujian kekuatan kayu makmal kejuruteraan kayu. Paper Presented at The Bicara Teknologi Frim, 8 November 2023, Kuala Terengganu
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180	PATAHAYAH M, AZRAI S, SHAHLINEY L, MUHAMMAD AZHARI M, MOHD FARID A & AHMAD SYAZWAN S. 2023. A Preliminary checklist of macrofungi from Panti Forest Reserve. Paper presented at the Seminar Ekspedisi Saintifik Kepelbagaian Biologi Hutan, Hutan Simpan Panti, Kota Tinggi, Johor, 8-11 Mei 2023, Johor Bahru, Johor
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182	PHON CK & KIRTON LG. 2023. Butterfly monitoring in Peninsular Malaysia: experiences, challenges and the way forward. Paper presented at the Symposium "Butterfly monitoring, trends and indicators: towards a global network" under "Conference of Biology of Butterflies 2023", 10-13 July 2023, Prague, Czech Republic
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184	PRAVEENA BK & SREETHERAN M. 2023. Urban green space as a health & well-being resource: a cross-sectional study among school children in Klang Valley, Malaysia. Paper presented at the The 16th Putrajaya International Conference On Children, Women, Elderly and Persons with Disabilities 2023: Online Conference, 18 Mac 2023
185	PUAD E, RAFIDAH J, MAHANIM S, TUMIRAH K & SHAHARUDDIN H. 2023. Sustainability of Sarawak biomass for renewable energy: current scenario, opportunity and implementation challenges. Paper presented at the PUSAKA Chair Seminar in Conjunction with the 5th Anniversary of the Establishment of Kursi Pusaka, 23-24 Ogos 2023, Raia Hotel & Convention Centre, Kuching Sarawak
186	RAFIDAH AR. 2023. Biological diversity of limestone ecosystem in Peninsular Malaysia: flora as an example. Paper presented at the 2023 Biodiversity Science Forum, 10-11 Oktober 2023, Bangkok, Thailand
187	RAFIDAH AR. 2023. Kepelbagaian flora batu kapur di Kelantan. Paper presented at the Webinar Perkongsian Pakar 3.0: Biodiversiti di Kelantan, 7 Jun 2023, Webinar
188	RAFIDAH J, MAHANIM S, TUMIRAH K, PUAD E & SHAHARUDDIN H. 2023. Physio-chemical and energy properties of bioenergy products derived from Sarawak biomass: a potential exploration. Paper presented at the PUSAKA Chair Seminar in Conjunction with the 5th Anniversary of the Establishment of Kursi Pusaka, 23-24 Ogos 2023, Raia Hotel & Convention Centre, Kuching Sarawak
189	RAFIDAH J, NUR AREISMAN MS & LATIFAH J. 2023. Bamboo as a sustainable packaging alternative: Enhancing strength through pulping and beating processes. Paper presented at the National Seminar on Bamboo in Conjunction with "World Bamboo Day 2023, 20-21 September 2023, FRIM Kepong
190	RAFIDAH J, TUMIRAH K, LATIFAH J, MAHANIM S, RAFEADAH R, SHARMIZA A, SHAHARUDDIN H & NUR ARIESMAN MS. 2023. Nanocellulose from oil palm biomass as smart materials. Paper presented at the MPOB International Palm Oil Congress and Exhibition 2023 (PIPOC 2023), 7-9 November 2023, Kuala Lumpur Convention Centre (KLCC)
191	ROHANA AR, ARIFF FAHMI AB, NOOR HAZMIRA M, HUDA FARHANA MM, MOHD PARID M, NORLIYANA A, MUKRIMAH A, INTAN NURULHANI B, MADIHAH MN, HAMDAN O, WAN MOHD SHUKRI WA, BAKTI HB, MOHAMAD SHAHFIZ A, MOHD AZAHARI F, KAVIARASU M, NUR HAJAR ZS, AMIR SAAIFFUDIN K, DASRUL ISKANDAR D, AHMAD AZARUDDIN MN, SAM YY, NOR ATIQA MF, FATEN NASEHA TH, TUAN MARINA TI & MOHD FAHIMEE J. 2023. Ulu Muda Forest Reserve's wealth: assessing ecosystems, community's dependence, and downstream industries. Paper presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17 - 18 Oktober 2023, FRIM
192	ROHANA AR, ARIFF FAHMI AB, NOR ATIQA MF, MOHD SHAHIDAN A, ZAHARI O, FADZUREENA J, NUR ATHIRAH F, INTAN FARAH WK & ALLIESYA SHAMELIA SA. 2023. Merapatkan jurang pemain industri herba ke arah pertumbuhan ekonomi negara. Paper presented at the Siri Jelajah HerbaXpress, 21 November 2023, Pusat Latihan Pertanian Lekir, Sitiawan, Perak
193	ROHANA AR, ZAHARI O, NOOR HAZMIRA M, ARIFF FAHMI AB, DASRUL ISKANDAR D, AMIR SAAIFFUDIN K, ALIA SYAHIRAH Y, ASNIZA M, MOHD KHAIRUN ANWAR U, INTAN FARAH WAHIDA K, NORUL MASLISSA A & NAZATUL NAJLAA H. 2023. Charting growth: a comprehensive database approach to empower the Malaysian bamboo industry. Paper presented at the National Seminar on Bamboo, 20-21 September 2023, FRIM
194	ROHANA AR. 2023. Environmental, social and governance (ESG) overview. Paper presented at the BIOePOD Webinar Kick off your ESG Journey, 7 February 2023, online (Bioeconomy Corporation)
195	ROSDI K, DASRUL ISKANDAR D, HO W M & MOHAMAD FAKHRI I. 2023. Forest plantation: from R&D perspectives. Paper Presented at the Seminar On Aggressive Industrial Forest Research & Plantation (AIFRP), 23 Oct 2023, Kuching, Sarawak
196	ROSDI K, DASRUL ISKANDAR D, MOHAMMAD FAKHRI I, JEYANNY V & MOHD ASRI L. 2023. Amalan silvikultur ladang hutan: perspektif R&D. Paper presented at the Kursus Kepentingan Tanah Dalam Perladangan Hutan Siri 1, 21 Nov 2023, FRIM Kepong
197	ROSDI K, FARAH SHAHANIM MM, NORALIZA A, MOHAMAD FAKHRI I, PATAHAYAH M, HO WM, FARAH FAZWA MA, MOHD ZAKI A, WAN MOHD SHUKRI WA & NORWATI M. 2023. Restorasi & rehabilitasi hutan dan tanah terosot di Semenanjung Malaysia: R&D – isu serta cabaran. Paper presented at the Webinar Program Penghijauan Malaysia Kempen Penanaman 100 Juta Pokok Siri 4: Restorasi Dan Rehabilitasi Hutan Ke Arah Pencapaian Penanaman 100 Juta Pokok: Isu Dan Cabaran, 4 Ogos 2023, Zoom/FB Live

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199	ROSDI K, HO WM, MOHAMAD FAKHRI I, PATAHAYAH M, NUR SARAH NABILA AA & DASRUL ISKANDAR D. 2023. The potential of <i>Macaranga tanarius</i> , a pioneer species, for forest restoration. Paper presented at the International Conference of Ecosystem Restoration 2023 (ICER2023), 31/10-1/11 2023, Bangi Resort Hotel
200	ROSDI K, HO WM, PATAHAYAH M & MOHAMAD FAKHRI I. 2023. The potential of pioneer species to the restoration programme on degraded forest. Paper presented at the International Workshop: Enhancing Ecosystem Services by Improving Forest Quality and Productivity, and SLEM Knowledge Dissemination, 22-24 March 2023, Dehradun, India
201	ROSDI K, NOOR ISMAWATY N, MOHD RANI A, ZAMREE MD S, MOHD FARID A, NOR HASNIDA H, MOHD NAZRUL HS & MOHD LIP J. 2023. Biomass production and allocation of tongkat ali (<i>Eurycoma longifolia</i>) from various ages in selected tongkat ali plantation in Peninsular Malaysia. Paper presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17-18 October 2023, FRIM
202	ROSDI K, NUR SARAH NABILA AA, PATAHAYAH M, MOHAMMAD FAKHRI I, FARIDAH AA, DASRUL ISKANDAR D & AMIR SAIFUDDIN K. 2023. Aplikasi rawatan silvikultur untuk rejim silvikultur di kawasan ladang hutan. Paper presented at the Bengkel Kesihatan Ladang Hutan 2023, 5-6 September 2023, Le' Venue Hotel, Bangi, Selangor
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204	ROSDI K, NUR SARAH NABILAH AA, NORALIZA A & FARIDAH AA. 2023. Rumusan bengkel rejim silvikultur. Paper presented at the Bengkel Regim Silvikultur Hutan Terosot, 10-11 Oktober 2023, Klana Resort Seremban
205	ROS LI NA, THI BK, HAJA MAIDEEN KM, AHMAD FITRI Z, NIZAM MS & NUR AQILAH MB. 2023. Corak kepelbagaian dan komuniti mikoriza arbuskular pada spesies pteridofit terrestrial terpilih di Fraser's Hill, Pahang. Paper presented at the National Biology Symposium 2023, in conjunction with the 4th Joint Symposium on Plant Science & Products 2023., 6 - 7 Disember 2023, National University of Malaysia, UKM, Bangi, Selangor
206	ROSZAINI K. 2023. Perkhidmatan ujian ketahanan kayu terhadap anai-anai dan serangga perosak kayu. Paper presented at the Bicara Teknologi FRIM, 8 November 2023, Kuala Terengganu, Terengganu
207	SAIDATUL HUSNIS, NOOR RASYILA MN, MAILINA J, MOHAMMAD FARIDZ ZP & NURSYAFINATUL NADHIRAH MA. 2023. Kajian pembangunan produk bersama komuniti. Paper presented at the Bengkel Pemindahan Teknologi: Penyulingan Minyak Pati Dan Penyediaan Sabun Mandi Daripada ABP016, 30-31 Mei 2023, RPS Air Banun, Grik, Perak
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209	SAIFUL AZMI J, MASTURA M, MAZURAH MI & HANNAN AW. 2023. Ulat sutera sebagai haiwan makmal 3M (Mudah, Murah & Menjimatkan Masa). Paper presented at the Hari Inovasi FRIM (HIF 2023), 3 October 2023, FRIM
210	SAIFUL AZMI J, MASTURA M, MOHD FAZLI M, AZMAN M, MOHD KAMAL NH, MOHAMAD JEMAIN MR & SHARIFAH AMINAH SM. 2023. Novel plant-based gamma-lactam compounds as potential anti-MRSA agents. Paper presented at the 11th International Drug Discovery Conference, 9-12 Mac 2023, Mirage Park Resort, Antalya, Turkey
211	SALWA AS, NUR DIYANA R, GUNASHILA P, INTAN NUR AINNI MA, GETHA K, NUR HAJAR ZS & SHAMALA S. 2023. Bioprospecting of potassium solubilizing bacteria (KSB) from forest soil. Paper presented at the 2nd Asian PGPR Indonesia Chapter International Conference On Innovative Microbiome Engineering for Regenerative and Climate-Resilient Sustainable Agriculture, 12-14 Oktober 2023, Universitas Padjadjaran, Bandung, Indonesia
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213	SAM YY. 2023. Kunming-Montreal Global Biodiversity Framework – paving the path to harmonious coexistence with nature. Paper presented at the Sarawak Energy Biodiversity Awareness Talk Programme, 28 Jun 2023, Webinar
214	SHAHFIZ MA, NOR-HAZWANI AR, ASYRAFF MA, MANOSHINI A & ANIS ZB. 2023. OECM & KBA: the need for conservation in Malaysia. Paper presented at the Webinar MYBIS Siri 1/2023: A Key Biodiversity Area (KBA) From Fauna Perspective, 4 Julai 2023, online
215	SHARMIZA A, HASHIM WS & NOR HALIYAN TS. 2023. Enhancing Malaysia timber through quality and reliability – product testing and certifications'. Paper presented at the Chat with MTC Webinar, 31 Mei 2023, online
216	SHARMIZA A, HASHIM WS & NOR HALIYAN TS. 2023. FRIM's green furniture certification. Paper presented at the Symposium Perabot Hijau Kebangsaan 2023, 21-22 November 2023, Putrajaya
217	SHARMIZA A, HASHIM WS & NOR HALIYAN TS. 2023. Green product certification services. Paper presented at the Hari Inovasi FRIM 2023, 5-6 Oktober 2023, FRIM, Kepong
218	SHARMIZA A, MAIZATULNAJWA M, HASHIM WS, NOR HALIYAN TS, KHAIRUL M, KHAIRUL AZMI J, YANTI AK & NOR AZRIEDA AR. 2023. Product certification schemes by fRIM. Paper presented at the Malaysian International Furniture Fair 2023, 2 Mac 2023, MITEC, Kuala Lumpur
219	SHARMIZA A, NOR HALIYAN TS, MAIZATULNAJWA M, NUR ELYSA SO, NURFAIZATUL ASHIKIN M & NUR SYAZANA YS. 2023. Taklimat pensijilan perabot hijau & status semasa pensijilan FRIM. Paper presented at the Taklimat Kesedaran Pensijilan Hijau Kepada Pengusaha Perabot, 26 Mei 2023, Rumah Arboreta, FRIM, Kepong
220	SIK HS. 2023. Teknologi FRIM meningkatkan hayat dan kadar kebolegunaan kayu: teknologi pengeringan kayu. Paper presented at the Bicara Teknologi FRIM 2023, 7-8 Disember 2023, Hotel Grand Continental, Kuala Terengganu
221	SITI AISAH S, MARRYANNA L, MOHD AZAHARI F, SHAHZERUL HISAM K, RASHIDAH H, MOHD MUFLIF MR & HAFIZI MJ. 2023. Sumber air (luahan sungai) dari kawasan tadahan hutan. Paper presented at the Kursus Penilaian Kuantifikasi dan Pemantauan Kualiti Air Sungai Jabatan Perhutanan Semenanjung Malaysia, 12-15 Mac 2023, Hotel Park Avenue, Sungai Petani, Kedah
222	SITI AISAH S, MOHD AZAHARI F & HAFIZI MJ. 2023. Kajian luahan tadahan Sungai Kuncha di Hutan Simpan Piah, Kuala Kangsar Perak. Paper presented at the Bengkel Pengurusan Hutan Tadahan Air di Dalam Hutan Simpanan Kekal (HSK) Jabatan Perhutanan Semenanjung Malaysia, 14 - 17 Ogos 2023, The Grand Renai Hotel, Kota Bharu Kelantan
223	SITI AISAH S, MOHD AZAHARI F, SHAHZERUL HISAM K & HAFIZI MJ. 2023. Pengaruh hutan terhadap regim hidrologi. Paper presented at the Program Pemantapan dan Kesedaran Berkaitan Pemeliharaan Hutan Tadahan Air di Dalam Hutan Simpanan Kekal (HSK), 28 - 30 Ogos 2023, Hotel M Roof, Ipoh Perak
224	SITI AISAH S, MOHD AZAHARI F, SHAHZERUL HISAM K & HAFIZI MJ. 2023. Sumber air dari kawasan tadahan hutan. Paper presented at the Program Pemantapan dan Kesedaran Berkaitan Pemeliharaan Hutan Tadahan Air di dalam Hutan Simpanan Kekal (HSK), 28 - 30 Ogos 2023, Hotel M Roof, Ipoh Perak
225	SITI AISAH S, MOHD AZAHARI F, SHAHZERUL HISAM K, MOHD MUFLIF MR, & HAFIZI MJ. 2023. Kajian nilai tahap ambang (threshold value) enapan air sungai kesan daripada aktiviti pengusahasilan hutan dalam hutan simpanan kekal (HSK) di Semenanjung Malaysia. Paper presented at the Kursus Penilaian Kuantifikasi dan Pemantauan Kualiti Air Sungai, Jabatan Perhutanan Semenanjung Malaysia, 13-15 Mac 2023, Hotel Park Avenue, Sungai Petani, Kedah
226	SITI MUNIRAH MY & LING CY. 2023. Distribution of Thismia species (Thismiaceae) mycoheterotrophic herbs in sarawak with a new record species from Long Mekaba. Paper presented at the Seminar Heart of Borneo (HoB) Seminar: Gerenai Long Mekaba Scientific Expedition 2022, 12-13 October 2023, Kuching, Sarawak
227	SITI SALWANA H, ABDUL RAZAK S, MOHD ZAKI A, & NORWATI M. 2023. Effect of container type and potting mixture on root systems of three forest tree species for high-quality seedling production. Paper presented at the International Conference of Ecosystem Restoration 2023, 30 Okt-1 Nov 2023, Bangi Resort Hotel
228	SITI SALWANA H, NIK MUSAADAH M, FADZUREENA J, ARIFF FAHMI AB, INTAN NURULHANI B, MADIHAH M, DASRUL ISKANDAR D, FIRDAUS K, SITI NUR AISYAH H, TAN AL, SAIDATUL HUSNI S, MAILINA J, MAZURA MP, ABDUL RRAZAK S, LING SK, MOHD ZAKI A & NORWATI M. 2023. Sinergi FRIM dan komuniti orang asli dalam melestarikan pengetahuan tradisi berkaitan tumbuhan ubatan. Paper presented at the Persidangan Kepelbagaian Biologi Kebangsaan 2023, 23 - 25 Okt 2023, PICC

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229	SITI SUHAILA AR, MOHD SYAHIRAN S, FATIN NURINA MF, MOHAMAD FITRI O, NORMAH BASIR & NOOR RATUL MALEKA S. 2023. Pengendalian - teknik asas kultur tisú tumbuhan. Paper presented at the Bengkel Teknik Asas Kultur Tisu Tumbuhan, 5-6 Sept 2023, Pusat Biosahawan Bioteknologi, Bahagian Bioteknologi Perhutanan, FRIM
230	SITI SUHAILA AR, MOHD SYAHIRAN S, FATIN NURINA MF, MOHAMAD FITRI O, NORMAH BASIR & NOOR RATUL MALEKA S. 2023. Teknik asas kultur tisú tumbuhan. Paper presented at the Bengkel Teknik Asas Kultur Tisu Tumbuhan, 24-25 Oktober 2023, Pusat Biosahawan Bioteknologi, Bahagian Bioteknologi Perhutanan, FRIM
231	SUFFIAN M, RAFEADAH R & SHARMIZA A. 2023. Quality and properties of wood based panels. Paper presented at the Lecture on the bject of Piawaian Produk Hutan, Program Teknologi Sumber Hutan, Universiti Malaysia Kelantan, 12 Jun 2023, UMK, Online
232	SYAFIQA NABILAH SB & FARAH FAZWA MA. 2023. Kaedah penuaian. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba, 30 Januari - 3 Februari 2023, Kolej FELCRA Seberang Perak
233	SYAFIQA NABILAH SB & FARAH FAZWA MA. 2023. Kaedah penuaian. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba (Koperasi Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad), 21-22 Jun 2023, Dewan Kuliah SPF Mata Ayer, FRIM
234	SYAFIQA NABILAH SB & FARAH FAZWA MA. 2023. Pengenalan dan identifikasi spesies herba. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba (Koperasi Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad), 21-22 Jun 2023, Dewan Kuliah SPF Mata Ayer, FRIM
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236	SYAFIQA NABILAH SB & FARAH FAZWA MA. 2023. Penubuhan rumah keratan, sistem renjisan dan rumah teduhan untuk penempatan anak pokok. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba di Kolej FELCRA Seberang Perak, 30 Januari hingga 3 Februari 2023, Kolej FELCRA Seberang Perak
237	SYAFIQA NABILAH SB & FARAH FAZWA MA. 2023. Penubuhan rumah keratan, sistem renjisan dan rumah teduhan untuk penempatan anak pokok. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba (Koperasi Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad), 21-22 Jun 2023, Dewan Kuliah SPF Mata Ayer, FRIM
238	SYAFIQA NABILAH SB, FARAH FAZWA MA, & NORHAYATI S & MASITAH MT. 2023. Soil properties, plant growth and yield of Labisia pumila elite clone at two commercial plantations. Paper presented at the 33rd Malaysian Society of Plant Physiology Conference (MSPPC 2023), 18-20 September 2023, The Waterfront Hotel, Kuching, Sarawak
239	SYAFIQA NABILAH SB, FARAH FAZWA MA, NORHAYATI S, MASITAH MT, SAMSURI TH, ROHAIDAH N, MOHD ZAINI Z, HALIM M, AMRAN H & NORIZATY ATIKAH JS. 2023. Rak tanaman bertingkat. Paper presented at the Hari Inovasi FRIM 2023, 5-6 Oktober 2023., FRIM-MTDC, Kepong, Selangor
240	SYAFIQA NABILAH SB. 2023. Kaedah pembiakan bahan tanaman terpilih dan fasiliti ladang. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba, 9 - 10 Ogos 2023., FELCRA Nasaruddin Belia, Perak
241	SYAFIQA NABILAH SB. 2023. Pengenalan dan identifikasi spesies herba. Paper presented at the Bengkel Pemindahan Teknologi (ToT) kepada peserta projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba, 9 - 10 Ogos 2023., FELCRA Nasaruddin Belia, Perak
242	SYAHIDA EMIZA S, ALIAA ATHIRAH AM, MOHD AIDIL N & IMIN K. 2023. Botanical exploration of Gunung Tebu, Terengganu. Paper presented at the International Biodiversity Symposium 2023, 10-12 September 2023, Universiti Malaysia Terengganu
243	TAN AL & UMMU HANI B. 2023. Autentikasi herba: makroskopi. Paper presented at the Bengkel Pemprosesan Herba Yang Mematuhi Keperluan GMP, 21-22 Jun 2023, FRIM, Kepong, Selangor

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244	TAN AL, FIRDAUS K, MOHAMAD FAIZAL S & MUSA A. 2023. Medicinal plants in Panti Forest Reserve, Kota Tinggi, Johor: diversity of the species utilised by the orang Kanaq Community. Paper presented at the Seminar Ekspedisi Saintifik Kepelbagaian Biologi Hutan, Hutan Simpan Panti, Kota Tinggi, Johor, 9-11 Mei 2023, KSL Hotel & Resort, Johor Bahru
245	TAN AL, MADIHAH MN, FADZUREENA J & INTAN NURULHANI B. 2023. Pendokumentasian pengetahuan tradisi berkaitan tumbuhan ubatan bagi suku kaum Semai Di Cameron Highlands. Paper presented at the Bengkel Kesedaran Pemeliharaan Pengetahuan Tradisi Suku Kaum Semai, 20-22 Jun, Kg Sg. Relong, Ringlelet, Cameron Highlands, Pahang
246	TAN AL, MADIHAH MN, INTAN NURULHANI B & NURSHAHIDAH MR. 2023. Pendokumentasian pengetahuan tradisi berkaitan tumbuhan ubatan bagi suku kaum Semoq Beri (Temoq) Di Maran. Paper presented at the Bengkel Kesedaran Pemeliharaan Pengetahuan Tradisi Suku Kaum Semoq Beri (Temoq), 19-21 September 2023, Kg Embus, Maran, Pahang
247	TAN KK. 2023. Pengenalan kepada Begonia dan hasil kajian <i>Begonia herveyana</i> dan <i>Begonia tampinica</i> melalui keratan daun. Paper presented at the Seminar Hasil Pemiakan <i>Begonia herveyana</i> dan <i>Begonia tampinica</i> melalui keratan daun dan kultur tisu, 24 November 2023, FRIM
248	TARIQ MUBARAK H, MOHDRIZUWAN M & HYRUL IZWAN MH. 2023. Research and development (R&D) in wetlands using nature based solutions approaches. Paper presented at the 'Nature-based Solutions (NbS): Bridging the Knowledge Gap' Workshop, 24-25 July 2023, Redac, Engineering Campus, Universiti Sains Malaysi and Bukit Jawi Golf Resort
249	TARIQ MUBARAK H, WAN MOHD SHUKRI WA, MOHD RIZUWAN M, MOHD JAMIL AW, HYRUL IZWAN MH, SYAIERAH A, NUR AINAA NABILAH MB, WAN ADANAN WI, ZAMRI MZ, HAMIDUL MUHSI MS, ADIB MUSTAQIM A, MUHAMMAD NUR IMAN AA, RASHIDAH H, MUHAMAD SAIFUL AZHAR N, ABDUL RAZAK AR & MOHD SHAHRUL AMIN MS. 2023. Mangrove for mangrove "using mangrove pole for mangrove restoration". Paper presented at the Hari Inovasi FRIM 2023: Inovasi Memacu Kelestarian Ekonomi, 3 Oktober, FRIM
250	TENGKU KAMILAH TN, NURUL IMAN A, NURASYIKIN H, MAZURA MP & SITI NUR AISYAH MH. 2023. Design and synthesis of xanthorrhizol derivatives using in silico fragment-based drug design (FBDD) approach as hyaluronidase inhibitor. Paper presented at the International Conference on Natural Products (INCP), 11-13 September 2023, Aloft, Kuala Lumpur
251	THI BK. 2023. Introduction to FRIM research, development & commercialisation (R, D & C) and opportunity for cooperation. Paper presented at the Sino-ASEAN Network of Forestry Research Institutes (SANFRI): The Third Early Career Academics Forum, 18-21 September 2023, Hanoi, Vietnam
252	TNAH LH, LEE CT, NG KKS, NG CH, NURUL FARHANAH Z & LEE SL. 2023. Tracing the geographic origin of planted tropical timber <i>Neobalanocarpus heimii</i> (chengal) with DNA approach. Paper presented at the APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources, 03-06 July 2023, Genetics Laboratory, FRIM, Kepong
253	TNAH LH, LEE SL, TAN AL, LEE CT, NG KKS & NG CH. 2023. Intraspecific classification of <i>Ficus deltoidea</i> Jack subsp. <i>deltoidea</i> (Moraceae) in Peninsular Malaysia based on morphological and molecular variations. Paper presented at the APAFRI Scientific Attachment Programme: DNA Profiling and DNA Barcoding for the Management and Utilisation of Forest Resources, 03-06 July 2023, Genetics Laboratory, FRIM, Kepong
254	TUMIRAH K, ANWAR UMK, ASNIZA M, ALIA SYAHIRAH Y & NORDAHLIA AS. 2023. Pengawetan buluh & kawalan kualiti buluh yang telah diawet. Paper presented at the Kursus Rawatan & Pengawetan Buluh, 25 Julai 2023, Unit Buluh dan Rotan, FRIM
255	TUMIRAH K. 2023. Atomic absorption spectroscopy (AAS): Application in Forest-based industries. Paper presented at the Industrial Lecture Programme for MSc. Candidate (MSc. in Instrumental Analytical Chemistry) Faculty of Science, Universiti Malaya (UM) , 8 Disember 2023, Dewan Kuliah, Fakulti Sains University Malaya
256	UMMU HANI B & NUR MUNIRAH S. 2023. Autentikasi bahan mentah herba (mikroskop)_ kajian kes: <i>Mitragyna speciosa</i> . Paper presented at the Bengkel Pemprosesan Herba yang Mematuhi Keperluan GMP, 21-22 Jun 2023, FRIM, Kepong
257	UMMU HANI B, TAN AL, NURSHAHIDAH MR, NUR MUNIRAH S & HANI IDAYU B. 2023. Authentication of <i>Kaempferia parviflora</i> Wall. Ex Baker and <i>Curcuma caesia</i> Roxb. (Zingiberaceae) rhizomes by histochemical analysis. Paper presented at the The International Symposium on Essential Oils, Plants, Cosmetic and Health 2023 (ISEPCoH 2023), 11-13 September 2023, Zoom Online

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258	UMMU HANI B, ZUNOLIZA A, LING SK, MAZURA MP, TAN AL, NOR AZLIANIE A, MOHD HAFIDZ HADI A, NUR MUNIRAH S & HANI IDAYU B. 2023. Monograf Herba Malaysia: asam jawa leaves. Paper presented at the Bengkel Penyemakan Draf Penulisan Monograf Herba Malaysia (MHM) Bersama Pihak Industri 01/2023, 17 Julai 2023, NIH, Setia Alam, Selangor
259	UMMU HANI B, ZUNOLIZA A, LING SK, TAN AL, MAZURA MP, NOR AZLIANIE AA, MOHD HAFIDZ HADI A, NUR MUNIRAH S & HANI IDAYU B. 2023. Monograf Herba Malaysia: pokok melaka leaves (<i>Phyllanthus emblica</i> L.), Phyllanthaceae. Paper presented at the Bengkel Penyemakan Draf Penulisan Monograf Herba Malaysia (MHM) Bersama Pihak Industri 02/2023, 6 Dis 2023, IMR, NIH Setia Alam, Selangor
260	WAN ALYA WD, NORSHAM Y & AHMAD KHUSAINI KS. 2023. Inventori kepelbagaian fauna di taman awam terpilih di Daerah Kuala Krai, Kelantan. Paper presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandaran Untuk Pengurusan Bersepadu Ke Arah Kesejahteraan Masyarakat, 21-22 November 2023, Dewan Sri Guchil, Kuala Krai, Kelantan
261	WAN ALYA WD, NORSHAM Y & AHMAD KHUSAINI KS. 2023. Inventori kepelbagaian fauna di Taman Perbandaran Tengku Anis, Kota Bharu, Kelantan. Paper presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandaran Untuk Pengurusan Bersepadu Ke Arah Kesejahteraan Masyarakat, 14-15 November 2023, Hotel Crown Garden, Kota Bharu, Kelantan
262	WAN MOHD NAFIZUL HAL-ALIM WA & RAFIDAH AR. 2023. Pengurusan had daya tampung & adaptasi landskap hutan di Geotapak. Paper presented at the Sesi Libat Urus Cadangan Pembangunan Geotapak dan Geotrail Gunung Keriang antara JMG bersama Agensi Kerajaan Negeri Kedah Darul Aman, 14 Mei 2023, Hotel Raia, Alor Setar
263	WAN MOHD NAFIZUL HAL-ALIM WA, AHMAD AZARUDDIN MN, WAN MOHD SHUKRI WA, LIZA I, NOORSYAHIRAH Z, NORSHAM SUHAINA, Y, MOHD NAZRIN A, SHARIFUDEEN S, AINA ZAYANI MA, YAZID N, MOD SEIFUL S & AHMAD ARIF AUDI M. 2023. Tree protection system. Paper presented at the 34th International Invention, Innovation & Technology Exhibition (ITEX) Malaysia 2023, 11-12 Mei 2023, KLCC
264	YONG WSY. 2023. Pemuliharaan <i>Rubroshorea teysmanniana</i> (meranti bunga) . Paper presented at the Kursus Pengenalan dan Pengurusan Spesies Dipterokarpa Terancam (ERT) kepada Pihak Berkepentingan Jabatan Perhutanan Semenanjung Malaysia Tahun 2023 bagi Zon Tengah, 1 November 2023, Unit Latihan Perhutanan Kepong
265	YONG WSY. 2023. Pengenalan kepada senarai merah IUCN (IUCN red list of threatened species). Paper presented at the Kursus Pengenalan dan Pengurusan Spesies Dipterokarpa Terancam (ERT) kepada Pihak Berkepentingan Jabatan Perhutanan Semenanjung Malaysia Tahun 2023 bagi Zon Tengah, 1 November 2023, Unit Latihan Perhutanan Kepong
266	YONG WSY. 2023. Red alert: plant conservation. Paper presented at the Red Alert: Plant Conservation, 20 Mei 2023, Galeri FRIM
267	YONG WSY. 2023. Senarai merah Malaysia. Paper presented at the Kursus Pengenalan dan Pengurusan Spesies Dipterokarpa Terancam (ERT) kepada Pihak Berkepentingan Jabatan Perhutanan Semenanjung Malaysia Tahun 2023 bagi Zon Tengah, 1 November 2023, Unit Latihan Perhutanan Kepong
268	ZAHARIO. 2023. Pembentangan sistem maklumat inventori flora dan fauna. Paper presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandar Untuk Pengurusan Bersepadu Ke Arah Kesejahteraan Masyarakat, 22 November 2023, Dewan Sri Guchil, Kuala Krai, Kelantan
269	ZAHARIO. 2023. Pembentangan sistem maklumat inventori flora dan fauna. Paper presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandar Untuk Pengurusan Bersepadu Ke Arah Kesejahteraan Masyarakat di Majlis Perbandaran Kota Bharu, Kelantan, 15 November 2023, Crown Garden Hotel, Kota Bharu, Kelantan
270	ZAHIDAH Z, SIK HS, ONG CB, ZAIRUL AMIN R & ADLIN SABRINA MR. 2023. Potential utilisation of solar-assisted kiln dryer in bamboo drying. Paper presented at the Wood and Biofiber International Conference (WOBIC), 23-25 Nov 2023, Hotel Adya, Langkawi, Kedah
271	ZUNOLIZA A, LING SK, FAUZIAH A, NORAZLIANIE A.A, SALBIAH M & HAFIDZ HADI A. 2023. Chromatographic profiling for quality control of herbal materials using HPLC. Paper presented at the Latihan Industri: Ke Arah Pelaksanaan Pengujian Kawalan Kualiti Ke Atas Bahan Mentah Herba Bagi Pengilang Produk Semulajadi, 3-4 Oktober 2023, National Institute Malaysia
272	ZUNOLIZA A, LING SK, FAUZIAH A, NORAZLIANIE AA, SALBIAH M & HAFIDZ HADI A. 2023. Phytochemical analysis for authentication of herbal raw materials. Paper presented at the Industry in the Classroom, Universiti Malaysia Terengganu, 16 Jun 2023, Online
273	ZUNOLIZA A, NIK MUSAADAH M, LING SK, FIRDAUS K, MAZURA MP & MOHD HAFIDZ HADI A. 2023. Biological and phytochemical profiling of a traditional herbal preparation for quality control and standardisation. Paper presented at the International Conference on Natural Products 2023, 11-13 September, Aloft Kuala Lumpur Sentral

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274	ZUNOLIZA A, NOR AZLIANIE AA, NURHANAN MY, NUR JANNAH S, MOHD HAFIDZ HA, NUR VICKY B & LING SK. 2023. Bioassay guided isolation of cytotoxic compounds from the leaves of <i>Tectona grandis</i> . Paper presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023. Bridging Science and Forestry for a Sustainable Future., 17-18 Oktober 2023, FRIM

POSTER

BIL No.	JUDUL TITLE
1	ABD-MAJID J, SAHRIM L, MAILINA J, SAIDATUL HUSNI S, THERESA LULI AR & MOHAMMAD FARIDZ Z. 2023. Early growth performances of planted <i>Aquilaria</i> sp. Poster presented at the Seminar & Exhibition on Herbs for Health and Healing 2023, 11 Julai 2023, Universiti Putra Malaysia
2	ABDUL HAYAT MS, AHMAD NAZARUDIN MR, MOHD AMRIL RAMZI MR, ALIA SHAZWANI S, NOOR SYAZWANI SZ, ROSFARIZAL K & AFIQ M. 2023. Effectiveness of selected tree architectures filtering solar radiation. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference (MSPPC 2023), 18-20 September, The Waterfront Hotel, Kuching, Sarawak
3	ABDUL HAYAT MS, NAZIMATUL AZMA N, AHMAD AZARUDDIN MN, SITI NOORHIDAYAH A & MUHAMMAD AMMAR Z. 2023. Kaedah inventori pokok di kawasan hijau bandar. Poster presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandar untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat, 21-22 November 2023, Dewan Sri Guchil, Kuala Krai, Kelantan
4	ABDUL RRAZAK S, SITI SALWANA H, MOHD ZAKI A & NORWATI M. 2023. Selection of proper container type and potting mixture for improving the growth performance of 3 dipterocarp seedlings under nursery condition. Poster presented at the International Conference On Ecosystem Restoration 2023 (Icer2023), 30 Okt-1 Nov 2023, Bangi Resort Hotel
5	AHMAD NAZARUDIN MR, ABDUL HAYAT MS, MOHD AMRIL RAMZI MR, ROSFARIZAL K, ALIA SHAZWANI S & NOOR SYAZWANI SZ. 2023. <i>Casuarina equisetifolia</i> as a wind buffer for coastal area: a preliminary study at Pantai Kemasin Bachok, Kelantan. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference, 18-20 September 2023, the Waterfront Hotel, Kuching, Sarawak
6	ALIA SHAZWANI S, MOHD AMRIL RAMZI MR, ABDUL HAYAT MS, ROSFARIZAL K, NOOR SYAZWANI SZ, AFIQ M, MOHAMAD HAZZARUL HAFIZ Z & AHMAD NAZARUDIN MR. 2023. Pengaruh pokok terhadap iklim mikro di Taman Perbandaran Tengku Anis, Kota Bharu Kelantan. Poster presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandar untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat, 14-15 November 2023, Crown Garden Hotel, Kota Bharu, Kelantan
7	ALIA SYAHIRAH Y, ANWAR UMK, ASNIZA M & MOHD FAIZUL MS. 2023. The effect of bamboo/OPT configurations on bonding properties of laminated hybrid composites. Poster presented at the National Seminar on Bamboo in Conjunction with World Bamboo Day, 20-21 September 2023, FRIM
8	ALIA SYAHIRAH Y, ASNIZA M, MOHD FAIZUL MS & ANWAR UMK. 2023. Bonding properties of laminated hybrid composites from different bamboo/OPT configurations. Poster presented at the Mini International Bamboo & Food Festival 2023, 24-26 November 2023, Tadom Hill Resort Bangi
9	ALIA SYAHIRAH Y, ASNIZA M, MOHD FAIZUL MS & ANWAR UMK. 2023. Weathering and bamboo; After 6-years of exposure. Poster presented at the Mini International Bamboo & Food Festival 2023, 24-26 November 2023, Tadom Hill Resort Bangi
10	AMIR SAAIFFUDIN K & DASRUL ISKANDAR D. 2023. Perladangan buluh-ciri dan pertimbangan. Poster presented at the Hari Lanskap Negara, 10-12 Mac 2023, Ipoh Perak
11	AREISMAN S, LATIFAH J, RAFIDAH J & SYAMIMI S. 2023. Enhancing paper mechanical properties through nanofibrillated cellulose from <i>Gigantochloa levis</i> : a sustainable approach to strengthening and value-added production. Poster presented at the National Seminar on Bamboo in Conjunction with World Bamboo Day 2023, 18 September 2023, FRIM
12	ARIFF FAHMI AB, ROHANA AR, ZAHARI O, NOOR AINI Z & NUR FAZREEN Z. 2023. Centralizing forest ecosystem services values information: developing a database and website for Malaysia's conservation efforts. Poster presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023: Bridging Science and Forestry for A Sustainable Future, 17-18 October 2023, Forest Research Institute Malaysia (FRIM), Kepong

BIL No.	JUDUL TITLE
13	ASNIZA M, AMANDAN SM, SYAZA SYAQQIRA AM & NUR IZZAATIS. 2023. Bamboo nanocellulose as filler in nanocomposite. Poster presented at the Mini International Bamboo & Festival 2023 (MiniBoo Fest '23), 24 - 26 Nov 2023, Tadom Hill Resort, Banting, Selangor
14	ASNIZA M, MOHD FAHMI A, GEETHA R & ANWAR UMK. 2023. Nanoselulosa buluh sebagai elemen pengisi komposit. Poster presented at the Hari Landskap Negara 2023, 10 - 12 Mac 2023, Taman Dr Seenivasagam, Ipoh, Perak
15	AZIAN M, NURUL AIN AM, NIK NORAFIDA NA & WAN MOHD SHUKRI WA. 2023. Portable CLTM sensor. Poster presented at the Malaysia Technology Expo 2023 (MTE 2023), 16 - 18 Mac 2023, WTC Kuala Lumpur
16	AZIZI MA, MOHD FADLEE AR, ADUWATI S, SYAMSIAH M, WAN MOHD SHUKRI WA, HYRUL IZWAN MH & FARAH SHAHANIM MM. 2023. Smart forest monitoring system (SFOMOS) for peatland restoration in Raja Musa Forest Reserved. Poster presented at the International Conference on Ecosystem Restoration 2023 (ICER2023), 31 Oktober - 1 November 2023, Bangi Hotel Resort, Selangor
17	AZRENA AK, SITI RAFEDAH AK & YANTI AK. 2023. Wood products: a sustainable solution for carbon storage. Poster Presented at The Simposium Perabot Hijau Kebangsaan, 21-22 November, Everly Hotel, Putrajaya
18	DASRUL ISKANDAR D, AMIR SAAIFFUDIN K & ROSDI K. 2023. Penanaman buluh untuk pengukuhan tebing di Ban Laut 9 Tasik Chini Pahang. Poster presented at the Hari Landskap Negara 2023, 10 - 12 Mac 2023, Laman Sejahtera, Taman Dr. Seenivasagam, Ipoh Perak
19	DASRUL ISKANDAR D, ROSDI K, AMIR SAIFFUDIN K & FARIDAH AA. 2023. Rehabilitation of degraded forest with the planting of Eucalyptus hybrid. Poster presented at the Bengkel Kesihatan Ladang Hutan 2023, 5- 6 September 2023, Hotel le'venue, Bangi
20	FADHILAH Z, MAHMUDIN S, MOHD SHAHIDAN MA, MOHAMMAD AMIRUL AIMAN MN, MUHAMMAD FAIZ MF, MOHD ZAKI HA, FARAH FAZWA MA, KHAIRUL A, ZAIHAN J, KHAIRUL KAMILAH AK, MUNIRAH MF, MAZDIANA MZ, MOHD PARID M, PIN KY, SURES KUMAR M, NOR FADHILAH W, ZAIRUL AMIN R, NOOR SYAKILAH MS, NUR AMALINA R, RABIATUN ADAWIYAH AB, ZAINOL A, AINI IZZATI AS, NURUL NAZIFA MF, NUR HAZIRAH J, ROHANA AR, MUHAMMAD HAFIZUDIN I & ISMAIL P. 2023. Penghasilan produk kraftangan dan hiasan dalam bernilai tinggi hasil daripada penjarangan ladang jati. Poster presented at the Simposium Perabot Hijau Kebangsaan, 21-22 November 2023, The Everly, Putrajaya
21	FADZUREENA J, SITI NUR AISYAH MH, ZUNOLIZA A, FADHILAH Z, KHAIROL IRUWAN A, SAIDATUL HUSNI S, KHAIRUL KAMILAH AK, MOHD SHAHIDAN MA, MUNIRAH MF & FARAH FAZWA MA. 2023. GOUTree: aspiring a new anti-gout botanical drug. Poster presented at the Seoul International Invention Fair 2023, 1-4 November 2023, Seoul, Republik Korea Selatan, South Korea
22	FARAH FAZWA MA, NORHAYATI S, SYAFIQAH NABILAH SB, SURES KM, MASITAH MT & JULIZA M. 2023. Comparison of plant growth, biomass, total phenolic content TPC, and DPPH free radical scavenging activity of <i>Maratodes pumilum</i> at different age of maturity and growing location. Poster presented at the 26th Project Evaluation & Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, FRIM.
23	FARIDAH AA, ROSDI K, DASRUL ISKANDAR D & MOHAMAD FAKHRI I. 2023. Potensi spesies eksotik dan spesies tempatan untuk ladang hutan di Semenanjung Malaysia. Poster presented at the Bengkel Kesihatan Ladang Hutan 2023, 5-6 September 2023, Le' Venue, Bangi
24	FARIDAH AA, ROSDI K & MOHAMAD FAKHRI I. 2023. Preliminary assessment of different planting density on growth performance of <i>Shorea roxburghii</i> G. Don plantation in Segamat, FRIM Research Station, Johor, Malaysia. Poster presented at the The 3rd International Plantation Conference (IPC2023), 21-22 Disember 2023, Grand Swiss-Belhotel, Melaka
25	FIRDAUS K, MASTURA M, ZUNOLIZA A, NIK MUSAADAH M, UMMU HANI B, SHALINI M, ABD RASHID L & LING SK. 2023. In vitro α -amylase and α -glucosidase inhibitory activities of <i>Abelmoschus esculentus</i> fruits. Poster presented at the International Conference on Natural Products 2023, 11-13 September 2023, Aloft Kuala Lumpur Sentral
26	GEETHA R, ASNIZA M, SUFFIAN M, PUTERI FARAHIN SHAMEERA BH, KHAIRUL IZZUDDIN H & ONG CB. 2023. Carbon estimation in harvested wood products in Malaysia. Poster presented at the 6th Wood & Biofibre International Conference (WOBIC 2023), 23 - 25 November 2023, Langkawi, Kedah
27	GETHA K, SAIDATUL HUSNI S, MUHAMMAD SYAMIL A, SHARIFFAH NURHIDAYAH SAR & NURSYAFINATUL NADHIRAH MA. 2023. NambiSin®: narrow-spectrum bactericidal API from Malaysian biodiversity to combat MRSA & treat wound infections. Poster presented at the Hari Inovasi Frim 2023 (HIF 2023), 5-6 Oktober 2023, Frim, Kepong

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28	GETHA K, SAIDATUL HUSNI S, MUHAMMAD SYAMIL A, SHARIFFAH NURHIDAYAH SAR & WAN MUHAMMAD SYAFIQ WM. 2023. NambiSin® to combat MRSA & treat wound infections. Poster presented at the 4th Selangor R&D and Innovation Expo 2023 (SRIE 2023), 19-22 Oktober 2023, Kuala Lumpur Convention Centre
29	HANANI YUHANIZ AS, SITI RAFEDAH AK, SUHAIMI M, YANTI AK & AZRENA AK. 2023. Development of ergonomic school chair in Peninsular Malaysia based on anthropometric data. Poster presented at the Symposium Perabot Hijau Kebangsaan 2023, 21-22 November, Everly Hotel, Putrajaya
30	HAZWANI HUMAIRA Z, NURUL FARHANAH Z, LEE CT, NG KKS, NUR NABILAH A, LEE SL, NG CH & TNAH LH. 2023. Development of simple sequence repeat (SSR) markers in <i>Rubroshorea lepidota</i> , an important light red meranti timber. Poster presented at the International Meeting - 47th Annual Conference of the Malaysian Society for Biochemistry and Molecular Biology (IM-MSBMB47), 23-24 August 2023, Hotel Avante, Bandar Utama, Petaling Jaya
31	HEMA TG, GETHA K, LILI SAHIRA H, MUHAMMMAD SYAMIL A, SHARIFFAH NURHIDAYAH SAR & DANIEL AIMAN J. 2023. Evaluation of natural rubber-degrading activity in soil actinomycetes. Poster presented at the 35th Symposium of the Malaysian Society for Microbiology (MSM), 22 - 23 November 2023, Hotel Bangi Resort
32	HEMA TG, GETHA K, NURHANAN MY, MUHAMMMAD SYAMIL A, NOR JANNAH S & LILI SAHIRA H. 2023. In vitro antimicrobial and anticancer activities, and identification of rare actinomycete strains isolated from soil. Poster presented at the International Conference on Drug Discovery and Translational Medicine (ICDDMT) 2023, 5-6 December 2023, Mines Beach Resort, Seri Kembangan
33	HO WM, FATIN NADIAH S, DASRUL ISKANDAR D, ROSDI K & MOHD ZAKI A. 2023. Comparing traits and chlorophyll fluorescence in sun and shade leaves of <i>Eucalyptus</i> hybrid. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference, 18-20 September 2023, Kuching
34	HO WM, MOHAMAD FAKHRI I & FARIDAH AA. 2023. Physiological traits of <i>Rubroshorea leprosula</i> under sun and shade. Poster presented at the International Conference of Ecosystem Restoration 2023, 31 Oct - 1 Nov 2023, Bangi
35	HO WM, MOHD FARID A, ROSDI K, AHMAD SYAZWAN S, SIK HS & HAMDAN O. 2023. Kajian awalan isipadu <i>Eucalyptus</i> hibrid di hutan ladang. Poster presented at the Bengkel Kesihatan Ladang Hutan 2023, 5-6 September 2023, Bangi
36	HUDA FARHANA MM & MOHD PARID M. 2023. Forests and people's livelihood: contribution of forest use to local's socio-economics in Ulu Muda Forest Reserve. Poster presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, FRIM
37	HYRUL IZWAN MH, FARAH SHAHANIM MM, NURCAHAYA KHAIRANY MA, ZAHIRAH MT, ILY AIMI HANIM MH & WAN MOHD SHUKRI WA. 2023. Peat pod: kelebihan & kelemahan. Poster presented at the Hari Inovasi FRIM 2023, 5-6 Oktober 2023, FRIM
38	JEYANNY V, ISMAIL P & SOON TK. 2023. Shifting the global climate change mitigation paradigm: Malaysia's tropical forest in the limelight. Poster presented at the 2nd Commonwealth Chemistry Congress, 23-25 May, St. Augustine, Trinidad and Tobago
39	JEYANNY V, ROZITA A, FARAH FAZWA MA, MOHAMAD FAKHRI I, SITI SALWANA H, AMIR SAAIFFUDDIN K, PUAD E, MUHAMMAD ASRI L & LAI YF. 2023. Preliminary results on the use of bamboo biochar on <i>Moringa oleifera</i> plant growth in the nursery. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference (MSPPC 2023), 18-20 September 2023, The Waterfront Hotel, Kuching, Sarawak
40	KHAIRUL A, WAN TARMEZE WA, MOHD KHAIRUN ANWAR U, MOHD FAHMI J & SITI ZALEHA A. 2023. In service performance of school furniture made of bamboo and wood. Poster presented at the National Seminar On Bamboo in Conjunction With World Bamboo Day, 18-19 September 2023, FRIM
41	KHAIRUL A, WAN TARMEZE WA, ZAIHAN J, MOHD KHAIRUN ANWAR U, MOHD FAHMI A & SITI ZALIHA A. 2023. The process of making hybrid school furniture. Poster presented at the Mini International Bamboo & Festival 2023 (MiniBoo Fest '23), 24-26 Nov 2023, Tadam Hill Sepang
42	KHAIRUL A, WAN TARMEZE WA, ZAIHAN J, MUHAMMAD ADZAM A & ROSLEE AR. 2023. Perabot dari kayu lupus; produk mesra ekonomi kitaran. Poster presented at the Hari Inovasi FRIM 2023, 5-6/10/2023, MTDC FRIM
43	KHAIRUL A, WAN TARMZE WA, NIK ADLIN NMS, ROSZAINI A, ZAIHAN J & MOHD FAHMI A. 2023. Mekanisma pembuatan pondok buluh: satu pengalaman penyelidikan. Poster presented at the Hari Landskap Negara 2023, 10-12 Mac 2023, Ipoh Perak

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44	KHAIRUL KAMILAH AK, THARANI S, RUSYDATUL NABILA MR, YOKE KEONG Y, SITI HADIZAH, FEZAH O, NURUL HUSNA S, MOHD SHAHIDAN MA, FADHILAH ZAINUDIN & HASNAH B. 2023. Chemoprotective effect of <i>Andrographis paniculata</i> extract on 1,2-dimethylhydrazine induced colon carcinogenesis in Sprague Dawley rats fed with high fat diet. Poster presented at the 36th Scientific Meeting of the Malaysian Society Pharmacology and Physiology, 7-8 Ogos 2023, Bangi Resort Hotel
45	KHOO V & NADA B. 2023. Findings made by frim in the congregating firefly habitat along Sungai Sepetang, Taiping between 2019-2022. Poster presented at the 26th Project Evaluation and Monitoring Seminar (PEM) 2023, 17-18 Oktober 2023, FRIM
46	LILI SAHIRA H, GETHA K, HEMA TG, ZAWAWI I, SHARIFFAH NURHIDAYAH SAR, DANIEL AIMAN J & MUHAMMAD SYAMIL A. 2023. Evaluation of selected cellulolytic actinomycetes for utilisation of oil palm empty fruit bunch. Poster presented at the 36th Symposium of the Malaysian Society for Microbiology 2023. Building Resilience Microbial Solutions for Global Challenge, 22-23 November 2023, Bangi Resort Hotel
47	MAHANIM S, SHAHARUDDIN H, PUAD E, AHMAD SHARAFI O, SHAMSURI MS & SITI NUR RIDHWAH MR. 2023. Potential of bioenergy and value-added products from bamboo conversion process and its applications. Poster presented at the National Seminar On Bamboo in Conjunction with World Bamboo Day, 20-21 September 2023, FRIM Kepong
48	MAHANIM SMA, SHAHARUDDIN H, NUR YUSRA MY, SITI NUR RIDHWAH MR, AHMAD SHARAFI O, SHAMSURI MS. 2023. Renewable energy: bamboo bioproducts. Poster presented at the Mini International Bamboo & Food Festival 2023, 24-26 November 2023, Tadam Hill Resort, Banting Selangor
49	MAILINA J, SAIDATUL HUSNI S, MOHAMMAD FARIDZ ZP, MUHAMMAD ASNAWI MR, SAHRIM L, ABD MAJID J & THERESA LULI R. 2023. Penyelidikan minyak pati daripada tumbuhan beraroma. Poster presented at the Festival Setiu Wetlands, 21-23 September 2023, Setiu Wetlands, Terengganu
50	MASTURA M, MOHD RAMDAN P, WAN SABARIAH S, SAIFUL AZMI J, MAZURAH MI & HANNAN AW. 2023. Ciera® nature inspired eco-friendly handwash. Poster presented at the Malaysia Technology Exhibition (MTE) 2023, 16-18 March 2023, Kuala Lumpur
51	MASTURA M, MOHD RAMDAN P, WAN SABARIAH S, SAIFUL AZMI J, MAZURAH MI, HANNAN AW. 2023. Ciera® nature inspired antimicrobial liquid spray. Poster presented at the Hari Inovasi FRIM. 4-6 Oktober 2023, FMTC, FRIM Kepong
52	MASTURA M, MOHD RAMDAN P, WAN SABARIAH S, SAIFUL AZMI J, MAZURAH MI, HANNAN AW. 2023. Nature Inspired Ciera® multi actions insects repellent spray. Poster presented at the 4th Selangor R&D & Innovation Expo, 9-12 Okt 2023, KL Convention Centre
53	MOHAMAD FAKHRI I, ROSDI K, HO WM, MUHAMMAD ASRI L, ROZITA A, NORALIZA A & MOHD ZAKI A. 2023. Growth performance of selected indigenous tree species planted on Kelantan river plain. Poster presented at the International Conference of Ecosystem Restoration 2023, 31 Oct – 1 Nov 2023, Bangi Resort Hotel
54	MOHD FAHMI A, ASNIZA M & ANWAR UMK. 2023. Quality assessment of acid-catalyst based laquer on beting by respond surface methodology approach. Poster presented at the Seminar Buluh Kebangsaan 2023, 20 - 21 Sept 2023, FRIM
55	MOHD FAHMI A, ASNIZA M, ANWAR UMK & ALIA SYAHIRAH Y. 2023. Swelling behavior of semantan bamboo in various aprotic and protic solvents. Poster presented at the Mini International Food & Bamboo Festival (Mini Boo Fest '23), 24-26 November 2023, Tadam Hill Resort, Banting
56	MOHD FAHMI A, ASNIZA M, TUMIRAH K, NORDAHLIA AS, KHAIRUL A, ALIA SYAHIRAH Y, MOHD JAMIL AW, GEETHA R, HASHIM WS, WAN TARMEZE WA & ANWAR UMK. 2023. Kualiti kemasiapan bermangkin asid ke atas buluh beting. Poster presented at the Hari Landskap Negara 2023, 10/03/2023, Taman Dr Seenivasagam, Ipoh
57	MOHD FARID A, AHMAD SYAZWAN S, SYAHMI H, PATAHAYAH M, AZRAI S, ONG SP, ROSDI K, MOHD FAKHRI I & AZLAN A. 2023. Threat and possible fungicide candidates for the control of Chrysoporthe stem canker in <i>Eucalyptus</i> plantations. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference (MSPPC 2023) Plant Biodiversity: Conservation, Physiology, and Sustainable Production, 18-20 September 2023, The Waterfront Hotel, Kuching, Sarawak
58	MOHD KAMAL NH, ABD RASHID L, CHEE BJ, FAUZIAH A, RADZI A, MUHAMMAD KHAIR MA, AZMAN M, HAFIZI R & MOHAMAD NAZRIN CS. 2023. In vitro and in vivo anti-allergic study of kratom leaf extract. Poster presented at the 26th Project Evaluation & Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, FRIM

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59	MOHD KAMAL NH, AZMAN M, ZARIDAH MZ & MUHAMMAD ALIF HA. 2023. Fraksi kaya fenolik dari daun limau purut sebagai penyembuh luka. Poster presented at the Hari Inovasi FRIM 2023 (HIF 2023), 5 Oktober 2023, MTDC, FRIM
60	MOHD KAMAL NH, ZARIDAH MZ, AZMAN M & NURUL UMIRA H. 2023. The effect of temperature and extraction time on antioxidant activity in the preparation of <i>Salvia officinalis</i> L. extract. Poster presented at the International Conference on drug discovery and translational medicine 2023, 5 - 6 December 2023, The Mines Beach Resort, Seri Kembangan, Selangor
61	MOHD RIZUWAN M, MARRYANNA L, WAN MOHD SHUKRI WA, SITI AISAH S, MOHD AZAHARI F, ABDUL RAZAK AR, RASHIDAH H, NURUL FAHIRA K, MOHD HAHAZEMI TAHAR, AZAM SHAH MR, KHAIRUL ANUAR M, WAN ADANAN WAN I, ZAMRI MZ & HAMIDUL MUHSI MS. 2023. Floating Lotus. Poster presented at the Malaysia Technology Expo 2023 (MTE 2023), 16-18 March 2023, World Trade Centre, Kuala Lumpur
62	MOHD RIZUWAN M, MARRYANNA L, WAN MOHD SHUKRI WA, SITI AISAH S, MOHD AZAHARI F, ABDUL RAZAK AR, RASHIDAH H, NURUL FAHIRA K, MOHD HAHAZEMI TAHAR, AZAM SHAH MR, KHAIRUL ANUAR M, WAN ADANAN WAN I, ZAMRI MZ, HAMIDUL MUHSI MS & MOHD SHAHRUL AMIN MS. 2023. Floating Lotus. Poster presented at the 34th International Invention, Innovation & Technology Exhibition (ITEX 2023), 11-12 May 2023, Kuala Lumpur Convention Centre
63	MUHAMAD AFIZZUL M, HAMDAN O, NURUL AMALINA AA & SOFIYA ZULAIKHA R. 2023. Distribution and status of Melaleuca forest in Sabah and Sarawak. Poster presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17 - 18 Oct 2023, FRIM
64	MUHAMMAD DANIA CR, SYNTYCHE SLS, CHENG PH, ANITA ZARA W, MAHATHIR MU, HUSSIN M, ZAKIRAH ZA, MOHD KAMAL NH & JUWITA J. 2023. NEVGRO FORTE®an alternative for anxiety and depression. Poster presented at the Seoul International Invention Fair, 1-4 November 2023, COEX Seoul South Korea
65	MUKRIMAH A, MOHD PARID M, TARIQ MUBARAK H, HAMDAN O, SITI AISAH S, MOHAMMAD SHAHFIZ A & VERONICA K. 2023. Sungai Kuantan mangrove forest: a jewel of Kuantan City, Pahang. Poster presented at the 26th Project Evaluation & Monitoring (PEM) Seminar 2023, 17-18 Okt 2023, FRIM
66	MUSALMAH N, NURFARAH AQILAH MN, SALLEH M, NIK FAIZU NH & WAN MOHD SHUKRI WA. 2023. Long-term dynamics of trees in Sungai Menyala coastal lowland dipterocarp forest over 74 years. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference, 18-20 Ogos 2023, Kuching, Sarawak
67	NADA B & KHOO V. 2023. The continuation of firefly and snail population monitoring and survey of nypa sites in the firefly habitat of Selangor River (June 2022-May 2023). Poster presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, FRIM
68	NASHATUL ZAIMAH NA, AHMAD FATHUL ILMI AZ, NADIAH SALMI N, NURUL FARHANAH Z, NOR RASHIDAH M & FADZLINAH Z. 2023. Evaluation of germination performance of <i>Anthoshorea roxburghii</i> seeds collected from selected mother trees. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference (MSPPC 2023), 18-20 September 2023, Waterfront Hotel, Kuching, Sarawak
69	NAZIMATUL AZMA N, ABDUL HAYAT MS, AHMAD AZARUDDIN MN, SITI NOORHIDAYAH A & MUHAMMAD AMMAR Z. 2023. Inventori pokok: kaedah pengukuran parameter asas pokok di Taman Perbandaran Tengku Anis, Kota Bharu. Poster presented at the Bengkel Penilaian Kawasan Hijau Bandar untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat, 14-15 November 2023, Hotel Crown Garden, Kota Bharu, Kelantan
70	NIK ADLIN NMS & WAN TARMEZE WA. 2023. Keperluan perlindungan pokok dalam projek pembinaan. Poster presented at the Hari Landskap Negara 2023, 10-12 Mac 2023, Ipoh, Perak
71	NIK ADLIN NMS, TARIQ MUBARAK H, WAN TARMEZE WA & SYAIERAH A. 2023. Market acceptance survey of furniture made from a mangrove timber (<i>Rhizophora</i> spp.). Poster presented at the Program Sambutan World Wetlands Day 2023, Setiu, Terengganu, 4 Feb 2023, Setiu, Terengganu
72	NIK ADLIN NMS, WAN TARMEZE WA & KHAIRUL A. 2023. BambooNxtor for use in the construction of geodesic dome – a conceptual statement of the method. Poster presented at the National Seminar on Bamboo in Conjunction with the World Bamboo Day 2023, 20-21 Sept 2023, FRIM
73	NIK ADLIN NMS, WAN TARMEZE WA & KHAIRUL A. 2023. BambooNxtor: makes it easier to construct bamboo geodesic dome. Poster presented at the Mini International Bamboo & Food Festival (MiniBoo Fest 23), 24-26 Sept 2023, Tadom Hill Resort, Banting

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74	NIK ADLIN NMS, WAN TARMEZE WA & KHAIRUL A. 2023. BambooNxtor: Penyambung versatil untuk binaan dari buluh. Poster presented at the Hari Landskap Negara 2023, 10-12 Mac 2023, Ipoh, Perak
75	NIK ADLIN NMS, WAN TARMEZE WA, TARIQ MUBARAK H, SYAIERAH A & KHAIRUL M. 2023. Aplikasi konsep modular produk beranda dari kayu bakau (<i>Rhizophora</i> spp). Poster presented at the Program Mangrove Run 2023 di Tanjung Piai, Johor, 2 Februari 2023, Johor
76	NOOR HAZMIRA M, ROHANA AR, & NOR ATIQA MF. 2023. Ulu Muda Forest Reserve's contribution to local economy: an ecosystem value chain perspective. Poster presented at the 26th Project Evaluation & Monitoring (PEM) Seminar 2023, 17 - 18 Oktober 2023, FRIM
77	NOOR HIDAYAH P, MOHD FAZLI M, AIMI SUHAILY S, SAIFUL AZMI J, M SHUAIB MS, MOHAMAD ZAKI A, SHARUL NIZAM MS & MUHAMAD HAZRI O. 2023. Development of anti methicillin-resistant <i>Staphylococcus Aureus</i> (MRSA) and human coronavirus 229E (HCoV-2299E) biodegradable nanofiber for air filtration application. Poster presented at the Invention, Innovation & Design Exposition (IIDEX 2024), 12-14 Disember 2024, Dewan Berlian, UiTM Puncak Alam, Selangor
78	NOOR RASYILA MN, SAIDATUL HUSNI S, NURHAZWANI MH, NORULAIMAN Y, MAZURA P, FAUZIAH A, MARY KGH, MOHD SHAFIK YT, NURSYAFINATUL NADHIRAH MA & TARIQ MUBARAK H. 2023. Discovering the potential of <i>Acanthus ilicifolius</i> (jeruju putih) as herbal drink. Poster presented at the Seminar and Exhibition on Herbs for Health and Healing, 11 July 2023, UPM, Serdang
79	NOOR SYAZWANI SZ, MOHD AMRIL RAMZI MR, ABDUL HAYAT MS, ROSFARIZAL K, ALIA SHAZWANI S, AFIQ M, MOHAMMAD HAZZARUL HAFIZ Z & AHMAD NAZARUDIN MR. 2023. Pengaruh silara pokok kepada iklim mikro di kawasan hijau bandar. Poster presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandar untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat, 21-22 November 2023, Dewan Sri Guchil, Kuala Krai, Kelantan
80	NOOR SYAZWANI SZ, MOHD AMRIL RAMZI MR, ABDUL HAYAT MS, ROSFARIZAL K, ALIA SHAZWANI S, AFIQ M, MOHAMMAD HAZZARUL HAFIZ Z & AHMAD NAZARUDIN MR. 2023. Enam langkah mudah menanam pokok. Poster presented at the Bengkel Kajian Penilaian Kawasan Hijau Bandar untuk Pengurusan Bersepadu ke Arah Kesejahteraan Masyarakat, 21-22 November 2023, Dewan Sri Guchil, Kuala Krai, Kelantan
81	NOR DATIAKMA MA, NURHANAN MY, NORJANNAH S, MOHD AFIQ HH & MOHD NAZRI I. 2023. Protein profiling of AIC250 treated on endothelial cell line EA.hy926 for antiangiogenesis assessment . Poster presented at the International Conference on Drug Discovery and Translational Medicine (ICDDTM 23), 5-6 December 2023, Mines Resort City, Seri Kembangan, Selangor
82	NOR FADILAH W, MOHD ZAKI A, FARAH FAZWA MA, AMRAN H, HALIM M, YAHAYA H, WAN MOHAMAD SYAFIQ WP & MOHD ZAINI Z. 2023. Establishment of the multilocal progeny trial of <i>Shorea parvifolia</i> (meranti sarang punai) for the production of genetically improved planting materials. Poster presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, Auditorium, FRIM
83	NOR HASNIDA H, NAZIRAH A, MOHD SAIFULDULLAH AW, MUHAMMAD FUAD Y, HALIZA I, NUR SYAHIRA MK, ROZIDAH K, ROHANI A, SABARIAH R, TENGKU NURUL MUNIRAH TAR, MOHAMAD FAIZAL S, MUHAMMAD MURSHEID MY & HARRAZ WAFIQ A. 2023. Penghasilan anak pokok kultur tisu buluh betong (<i>Dendrocalamus asper</i>). Poster presented at the Hari Landskap Negara, 10-12 Mac 2023, Ipoh
84	NOR HASNIDA H, NUR SYAHIRA MK, NAZIRAH A, HALIZA I, ROZIDAH K, ROHANI A & TENGKU NURUL MUNIRAH TAR. 2023. Establishment of tissue culture protocol for <i>Dendrocalamus asper</i> (buluh betong). Poster presented at the Seminar Buluh Kebangsaan, 20-21 September 2023, Kepong, Kuala Lumpur
85	NOR JANNAH S, NURHANAN MY, FADZUREENA J, ARIFF FAHMI AB, NIK MUSAADAH M & FAUZIAH A. 2023. In vitro anticancer activity of <i>Derris microphylla</i> on selected cancer cell lines. Poster presented at the International Conference on Drug Discovery and Translational Medicine 2023 (ICDDTM 23), 5-6 December 2023, The Mines Beach Resort
86	NOR RASHIDAH M, NASHATUL ZAIMAH NA, NADIAH SALMI N, NURUL FARHANAH Z, FADZLINAH Z & AHMAD FATHUL ILMI AZ. 2023. The effect of different pre-treatments to improve the seed germination of urban landscape tree species. Poster Presented at The 12th Kuala Lumpur International Agriculture, Forestry & Plantation Conference, 8-9 Mei 2023, Hotel Noble Resort, Melaka
87	NORALIZA A, MOHD AFENDI H, ABDUL HAYAT MS, TARIQ MUBARAK H, MARZALINA M, AZHAR A, ARIF HADI JA, SYAEIRAH A, ABDUL AIZUDDEN AA, MUHAMMAD ALIF DANIEL MS & NUR AINAA NABILAH MB. 2023. <i>Cultivation of Mucuna</i> bracteata in degraded forest land. Poster presented at the International Conference on Ecosystem Restoration 2023, 31 Oktober - 1 November 2023, Hotel Bangi Resort, Bandar Baru Bangi

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88	NORATIKAH MZ, SITI SALWANA H, ABDUL RRAZAK S, MOHD ZAKI A & NORWATI M. 2023. Assessing The impact of container type and potting media on the physical growth of <i>Hopea helferi</i> seedlings at the nursery stage. Poster presented at The International Conference On Ecosystem Restoration 2023 (ICER2023), 30 Okt-1 Nov 2023, Bangi Resort Hotel
89	NORDAHLIA AS & ANWAR UMK. 2023. Anatomical structures in the culm of selected malaysian bamboo. Poster presented at the National Seminar on Bamboo in Conjunction with World Bamboo Day, 20-21 September 2023, FRIM
90	NORHAYATI A, SAIDATUL HUSNI S, ROSZAINI K, TUMIRAH K, ZARIDAH MZ, AZILA AA, ABDUL JABIR J, ROHIMAH AM & KAHVIYAAH L. 2023. Azenano. Poster presented at the Hari Inovasi FRIM 2023, 5-6 Oktober 2023, FRIM
91	NORHAYATI I, ASIAH O, ZUNOLIZA A, NURHANAN MURNI Y, MASTURA M, MUHAMMAD HAFIZ J & MOHD HAFIDZ HADI A. 2023. In vitro neuroprotective effects of <i>Centella asiatica</i> . Poster presented at the The International Conference on Drug Discovery and Translational Medicine 2023 (ICDDTM 23), 5-6 Disember 2023, Mines Beach Resort, Seri Kembangan Selangor
92	NORHAYATI S, FARAH FAZWA MA & SYAFIQAH NABILAH SB. 2023. Pengeluaran bahan tanaman elit kacip fatimah (FAFA01) untuk kelestarian bahan mentah negara. Poster presented at the Seminar & Exhibition on Herbs for Health and Healing 2023, 11 Julai 2023, UPM
93	NORHAZAEDAWATI B, LEE SH, ANWAR UMK & PARIDAH MT. 2023. The impact of boron-based treatment on mechanical characteristics of <i>Gigantochloa scortechinii</i> . Poster presented at the National Seminar on Bamboo in Conjunction with World Bamboo Day, 20-21 September 2023, FRIM
94	NORLIA B, AJOM GW, NORWATI A, NUR AINI MK, LEE SL & NORWATI M. 2023. Screening of living modified organism - brinjal in Malaysia. Poster presented at the The 15th Malaysia International Genetic Congress 2023 (MiGC15), 7-9 Mac 2023, Bangi, Selangor
95	NORLIA B, NUR AINI MK, NORWATI A, AJOM GW, LEE SL & NORWATI M. 2023. Eucalyptus diubahsuai secara genetic dan kaedah pengesanan. Poster presented at the Bengkel Kesihatan Ladang Hutan 2023 (BLKH2023), 5-6 September 2023, Hotel Le'Venue, Bangi, Selangor
96	NORLIYANA A & MOHD PARID M. 2023. Forest for domestic water catchment of Kedah Permanent Forest Reserves. Poster presented at the 5th International Conference on Tropical Resources and Sustainable Sciences (CTReSS 5.0), 7 Ogos 2023, Kelantan
97	NORULAIMAN Y, SAIDATUL HUSNI S, MAILINA J, NURSYAFINATUL NADHIRAH MA, AMIRA RINA NURDIANA MS & NURHAZWANI MH. 2023. Development of hand sanitiser from citronella essential oils (<i>Cymbopogon nardus</i>) fulfilling SIRIM 42:2020 Standard. Poster presented at the Seminar and Exhibition on Herbs for Health and Healing 2023, 11 Julai 2023, Universiti Putra Malaysia
98	NUR IYLIA Y, LEE CT, NG CH, TNAH LH, SHARIFAH T, MOHAMAD IZHAM MA, AHMAD FARHAN NURI R, NG KKS & LEE SL. 2023. Measuring leaf area of <i>Shorea leprosula</i> using Adobe Photoshop. Poster presented at the 15th Malaysia International Genetics Congress (MiGC15), 7-9 March 2023, Bangi Resort Hotel, Selangor
99	NUR NABILAH A, HAZWANI HUMAIRA Z, TNAH LH, KEVIN NG KS, NG CH, LEE CT, KHAIRUNNISA MM, SITI MARWIYAH AB, MOHD RAHIM R & LEE SL. 2023. Utilisation of DNA barcoding in assessing the phylogenetic relationships of <i>Diospyros</i> Spp. (Ebenaceae). Poster presented at the International Meeting - 47th Annual Conference of the Malaysian Society for Biochemistry and Molecular Biology, 23-24 Ogos 2023, Bandar Utama, Petaling Jaya
100	NUR SYAFIKA AINA MB, FAUZIAH A, NURHANAN MY, MAZURA MP, KHADIJAH NABILAH MZ, SITI NUR AISYAH MH & SITI NASUHA Z. 2023. Anti-inflammatory potential of rutin isolated from <i>Physalis angulata</i> : a promising source for therapeutic intervention. Poster presented at the International Conference on Drug Discovery and Translational Medicine 2023 (ICDDTM'23), 5-6 December 2023, Mines Beach Resort, Mines Wellness City, Seri Kembangan, Selangor
101	NURFARAH AQILAH MN, MUSALMAH N, SALLEH M, NIK FAIZU NH, MOHAMAD DANIAL MS & WAN MOHD SHUKRI WA. 2023. Assessing stand structure and species diversity of the 50-ha plot in Pasoh Forest Reserve, Negeri Sembilan, Malaysia. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference 2023, 18 -20 September 2023, The Waterfront Hotel Kuching, Sarawak
102	NURHANAN MY, NORDATIAKMA MA, NOR JANNAHS & NOR HASNIDA H. 2023. EL50 as potential anti-cancer agent from <i>Eurycoma longifolia</i> towards development as phytomedicine. Poster presented at the Hari Inovasi FRIM 2023, 5-6 Oktober 2023, MTDC, FRIM
103	NURNADIAH R, NORWATI M, SITI SUHAILA AR & MUHAMMAD DANIAL LUQMAN K. 2023. Comparative analysis of cost-effective tissue culture plantlets production of <i>L. pumila</i> in different nutrient media. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference (MSPPC 2023), 18-20 Sept 2023, The Waterfront Hotel, Kuching, Sarawak

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104	NURSHAHIDAH MR, NIK MUSAADAH M, NORBAIAH MY, DIONYSIA M, ABDUL HAYAT MS, TAN AL & MADIAH MN. 2023. Respiratory disorders: usage and potentials of <i>Allium sativum</i> L. (Amaryllidaceae), <i>Phyllanthus amarus</i> Schumach. & Thonn. (Phyllanthaceae), and <i>Piper betle</i> L. (Piperaceae). Poster presented at the Seminar and Exhibition On Herbs for Health and Healing 2023, 11 Julai 2023, Universiti Putra Malaysia
105	NURSHAHIDAH MR, UMMU HANI B, TAN AL, NUR MUNIRAH S & HANI IDAYU B. 2023. Anatomical studies of <i>Kaempferia parviflora</i> Wall. Ex Baker and <i>Curcuma caesia</i> Roxb. (Zingiberaceae) from Peninsular Malaysia. Poster presented at The 1st International Symposium on Essential Oils, Plants, Cosmetic and Health 2023 (ISEPCOH 2023), 11-13 September 2023, USM Kubang Kerian, Kelantan online
106	ONG CB & NUR SYAHINA Y. 2023. Mechanical properties of beting bamboo. Poster Presented at The Mini International Bamboo & Food Festival 2023, 24-26 November 2023, Tadam Hill Resort, Banting Selangor
107	ONG CB, SIK HS & ZAHIDAH Z. 2023. Mechanical properties of semantan bamboo. Poster presented at the National Seminar On Bamboo in Conjunction with World Bamboo Day 2023, 20 - 21 September 2023, FRIM
108	PATAHAYAH M, AZRAI S, SHALINEY L, MUAMMAD AZHARI M, MOHD FARID A & AHMAD SYAZWAN S. 2023. Diversity of putative ectomycorrhizal fungi in Pantii Forest Reserve. Poster presented at the Seminar Ekspedisi Saintifik Kepelbagaian Biologi Hutan, Hutan Simpan Pantii, Kota Tinggi, Johor, 8-11 Mei 2023, Johor Bahru, Johor
109	PRAVEENA BK & SREETHERAN M. 2023. Urban green space as a health & well-being resource: a cross-sectional study. Poster presented at the 3rd Borneo Quality of Life Conference, 24-26 Mei 2023 online
110	RAFIDAH J, AREISMAN S & LATIFAH J. 2023. From bamboo to biomaterials: sustainable innovations in paper production. Poster presented at the Mini International Bamboo and Food Festival (MiniBoo Fest'23), 24-26 November 2023, Tadam Hill Resort, Banting Selangor
111	RAFIDAH J, LATIFAH J, NUR AREISMAN MS & SITI HAWA B. 2023. Comparative analysis of paper properties from beting bamboo and semantan bamboo. Poster presented at the National Seminar on Bamboo in Conjunction with World Bamboo Day 2023, 20-21 September 2023, FRIM Kepong
112	ROHIMAH AM, NOR HAYATI A, TUMIRAH K, SAIDATUL HUSNI S, MAZURA MP & AZILA AA. 2023. Synthesis and optimisation of <i>Azadirachta excelsa</i> extract loaded chitosan nanoparticles. Poster presented at the international conference on Natural product 2023, 11-13 September 2023, ALOFT Kuala Lumpur Central
113	SAIDATUL HUSNI S, MAILINA J, NOOR RASYILA MN, NURSYAFINATUL NADHIRAH MA & WAN MOHD SYAFIQ WM. 2023. Pembangunan produk penjagaan diri. Poster presented at the Mini Karnival FRIM 2023 @ Festival Setiu Wetlands 2023, 21-23 September 2023, Setiu Wetlands
114	SITI SUHAILA AR, NORWATI M, MOHD ZAKI A, NORMAH B & NOOR RATUL MALEKA S. 2023. Phenotypic consequences of aneuploidy in Malaysia indigenous karas, <i>Aquilaria malaccensis</i> . Poster presented at the 3rd International Scientific Symposium on Agarwood (ISSA2023), 17-18 Oktober 2023, Le Meridien, Putrajaya
115	TARIQ MUBARAK H, FARAH SHAHANIM MM & NURCAHAYA KHAIRANY MA. 2023. The mangrove germplasm heritage of Bagan Datuk. Poster presented at the 26th Project Evaluation and Monitoring (PEM) Seminar 2023, 17-18 Oktober 2023, FRIM
116	TARIQ MUBARAK H, NORALIZA A, MOHD AFENDI H, SYAIERAH A, NUR AINAA NABILAH MB & ABDUL AIZUDDEN AA. 2023. Effect of different fertilizer treatment on <i>Magnolia champaca</i> and <i>Hopea odorata</i> . Poster presented at the International Conference of Ecosystem Restoration 2023, 31 Oct - 1 Nov 2023, Bangi Resort Hotel
117	TARIQ MUBARAK H, NUR AINAA NABILAH MB & SYAIERAH A. 2023. Virgin, production and converted mangrove soil carbon in Matang, Malaysia. Poster presented at the 33rd Malaysian Society of Plant Physiology Conference (MSPPC 2023) Plant Biodiversity: Conservation, Physiology, and Sustainable Production, 18-20 September 2023, The Waterfront Hotel, Kuching, Sarawak, Malaysia
118	THERESA LULI AR, ABD-MAJID J, SAHRIM L, MAILINA J, SAIDATUL-HUSNI S & MOHAMMAD FARIDZ ZP. 2023. Agarwood extractive content for aromatherapy application. Poster presented at the Seminar & Exhibition on Herbs for Health and Healing 2023, 11 July 2023, UPM Serdang

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119	TUMIRAH K & ANWAR UMK. 2023. Bamboo preservation for sustainable building materials. Poster presented at the Mini International Bamboo & Food Festival, 24-26 November 2023, Tadam Hill Resort Banting
120	TUMIRAH K, ANWAR UMK, NUR ANISA Y & MUHAMMAD IRFAN R. 2023. Leaching characteristic of copper chromium boron (CCB) from treated semantan bamboo. Poster presented at the National Seminar on Bamboo, 20-21 Sept. 2023, FRIM
121	TUMIRAH K, ANWAR UMK, ZAIHAN J & NORDAHLIA AS. 2023. Retention and distribution of alkaline copper quaternary (ACQ) along the longitudinal axis of round bamboo. Poster presented at the National Seminar on Bamboo, 20-21 Sept. 2023, FRIM
122	TUMIRAH K, PRITHIKAH DEVI S, NUR ARIESMAN MS, MOHD FAKHRI I, RAFIDAH J & MAHANIM SARIF. 2023. Bamboo nanocellulose/mengkuang leaf extract composite as adsorbent of heavy metals. Poster presented at the Mini International Bamboo & Food Festival, 24-26 November 2023, Tadam Hill Resort Banting
123	TUMIRAH K, ZAIHAN J & ANWAR UMK. 2023. Pengawetan buluh menggunakan kaedah tekanan Bethel. Poster presented at the Hari Landskap Negara 2023, 10 Mac 2023, Taman Dr. Seenivasagam Ipoh
124	WAN ALYA WD & NORSHAM Y. 2023. Dirt matters: soil insights for sustainable urban tree care at FRIM. Poster presented at the 26th Project Evaluation & Monitoring (PEM) Seminar 2023: Bridging Science and Forestry for A Sustainable Future, 17-18 October 2023, FRIM
125	WAN ALYA WD, NORSHAM Y & AHMAD KHUSAINI KS. 2023. Inventori kepelbagaian fauna di taman awam terpilih di Daerah Kuala Krai, Kelantan. Poster presented at The Bengkel Kajian Penilaian Kawasan Hijau Bandaran Untuk Pengurusan Bersepadu Ke Arah Kesejahteraan Masyarakat, 21-22 November 2023, Dewan Sri Guchil, Kuala Krai, Kelantan
126	WAN MOHD NAFIZUL HAL-ALIM WA, AHMAD AZARUDDIN MN, LIZA I, WAN MOHD SHUKRI WA, MOHD NAZRIN A, AINA ZAYANI MA, AHMAD ARID AUDI M & NOORSYAHIRAH Z. 2023. Tree guardian: lightning arrester. Poster presented at the 4th Selangor R&D & Innovation Expo SRIE 2023, 19-22 Oktober 2023, Kuala Lumpur City Centre (KLCC)
127	WAN TARMEZE WA, NIK ADLIM MMS & KHAIRUL A. 2023. Bahan dan teknologi lestari untuk pembinaan perabot landskap. Poster presented at the Hari Landskap Negara 2023, 10-12 Mac 2023, Ipoh, Perak
128	WAN TARMEZE WA, NIK ADLIN NMS & KHAIRUL A. 2023. BambooNxtor - versatile connectors for bamboo construction. Poster presented at the International Invention, Innovation & Technology Exhibition (ITEX) 2023, 11-12 May 2023, KLCC
129	WAN TARMEZE WA, NIK ADLIN NMS & KHAIRUL A. 2023. BambooNxtor: bamboo construction versatile connector. Poster presented at the Mini International Bamboo & Food Festival (MiniBoo Fest 23), 24-26 Sept 2023, Tadam Hill Resort, Banting
130	YANTI AK, HASHIM WS, SITI ZALIHA A, NOOR AZRIEDA AR, KHAIRUL M, KHAIRUL AZMI J, MARIAM MR & NURNAZIEHA N. 2023. Kajian simulasi banjir ke atas perabot kayu sekolah. Poster presented at The Symposium Perabot Hijau Kebangsaan 2023, 21-22 November, Everly Hotel, Putrajaya
131	YANTI AK, NOOR AZRIEDA AR, HASHIM WS, KHAIRUL M & SITI ZALIHA A. 2023. Assessment of semantan bamboo board for product development. Poster presented at the Mini International Bamboo & Food Festival 2023, 23-26 November 2023, Tadam Hill Resort, Banting Selangor
132	YANTI AK, NOOR AZRIEDA, HASHIM WS, KHAIRUL M & SITI ZALIHA ALI. 2023. Properties assessment of semantan bamboo board for product development. Poster presented at The National Bamboo Seminar 2023, 21-22 November, FRIM
133	YAP JX, BAKAR BFA, ANWAR UMK, ALIA SYAHIRA Y, R HALIS & OTHMAN NA. 2023. Evaluation of semantan bamboo crush mat and oil palm trunks veneer as furniture materials. Poster presented at the National Seminar on Bamboo in Conjunction with World Bamboo Day, 20-21 September 2023, FRIM
134	ZAHAIDA Z, SIH HS, TANJONG A & RAMZUL IKLAS AL. 2023. Sifat pengeringan buluh beting pada ketinggian berbeza. Poster presented at the Hari Landskap Negara 2023, 10-12 March 2023, Ipoh, Perak
135	ZAIRUL AMIN R, ZAHAIDA Z, ADLIN SABRINA MR, SIK HS & MOHD JAMIL AW. 2023. Assessment on variation of geometrical properties of round bamboo along the culm 136height for structural application. Poster presented at the Wood and Biofiber Inte137rnational Conference (WOBIC), 23-25 Nov 2023, Hotel Adya, Langkawi, Kedah

FRIM INCORPORATED SDN BHD



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LAPORAN TAHUNAN

ANNUAL REPORT

FRIM Incorporated Sdn Bhd atau FRIM Inc. merupakan anak syarikat milikan penuh FRIM dan telah ditubuhkan pada 4 Ogos 2017 dan mula beroperasi pada 1 September 2017. Penubuhan FRIM Inc. adalah untuk menjalankan aktiviti perniagaan dengan mempromosikan dapatan dan teknologi yang terhasil daripada penyelidikan dan pembangunan, serta menyediakan khidmat nasihat teknikal, perundingan dan perkhidmatan lain berhubung dengan sektor perhutanan.

FRIM Incorporated Sdn Bhd or FRIM Inc. is a wholly owned company of FRIM and was established on 4 August 2017 and start operate on 1 September 2017. Establishment of FRIM Inc. is to carry out business activities by promoting findings and technologies resulting from research and development, as well as providing technical advice, consultancy and other services in relation to the forestry sector.

AHLI LEMBAGA PENGARAH BOARD OF DIRECTORS



Ts. Noor Azmi Mat Said
Pengerusi/[Chairman](#)



YBrs. Dr Ismail Parlan
Ahli Lembaga Pengarah
[Board of Directors](#)



Tuan Hj. Hanafee Yusoff
Ahli Lembaga Pengarah
[Board of Directors](#)

SUMBER MANUSIA

HUMAN RESOURCE

Ketua Pegawai Eksekutif

Chief Executive Officer

Wan Jusaini Rizal Wan Nasruddin

Ketua Pegawai Operasi

Chief Operating Officer

Mazdiana Mohd Zain

Ketua Pegawai Kewangan

Chief Finance Officer

Izan Nor Farahni Ahmad

Ketua Pengurusan Perkhidmatan Perundingan

Lead Management of Consultancy Services

Wan Nur Aisyah Wan Zahari

Ketua Perkhidmatan Latihan

Lead Technical Training

Misha Atiqah Shahiran

Ketua Tapak Semaian (CCN)

Lead Commercial & Centralised Nursery (CCN)

Mohd Ramly Mohd Saleh

Pegawai Khas Kepada Ketua Pegawai Eksekutif

Special Officer to Chief Executive Officer (CEO)

Kasthure Selvakumar

Penolong Ketua Pegawai Kewangan

Lead Finance

Siti Nur Kamaliah Hussin

Penolong Ketua Perkhidmatan Latihan

Assistant Lead Technical Training

Ili Aiman Rosly

Penolong Ketua Tapak Semaian (CCN)

Assistant Lead Commercial & Centralised Nursery (CCN)

Mohd Fahmi Ramli

Senarai Projek Yang Diperolehi

Pada tahun 2023, sebanyak 67 projek telah diperolehi oleh FRIM Incorporated Sdn Bhd dengan nilai keseluruhan sebanyak RM3.46 juta. Projek-projek ini terdiri daripada khidmat perundingan, khidmat latihan dan pengurusan projek.

List of Acquired Projects

In year 2023, a total of 67 projects were acquired by FRIM Incorporated Sdn Bhd with a total value of RM3.46 million. These projects consist of consultancy services, training services and project management.

BIL NO.	TAJUK PROJEK PROJECT TITLE	BIDANG KEPAKARAN AREAS OF EXPERTISE
1	Projek Kajian Penyediaan Pelan Induk Pembangunan Taman Eko Rimba Kuala Lumpur	Kajian Bersepadu
2	Menganalisa Perubahan Guna Tanah (LUCA) – Kuala Lumpur Kepong Berhad (KLK): KLK Sawit Nusantara (Sandakan and Sugut Region, Sandakan dan Beluran District, Sabah State, Malaysia)	Mensurasi dan Geoinformasi
3	Menganalisa Perubahan Guna Tanah (LUCA) – Kuala Lumpur Kepong Berhad (KLK): PT Karya Bakti Sejahtera Agrotama - Kebun Inti (Kabupaten Kutai Timur, Provinsi Kalimantan Timur)	Mensurasi dan Geoinformasi
4	Menganalisa Perubahan Guna Tanah (LUCA) – Kuala Lumpur Kepong Berhad (KLK): PT Sinergi Agro Industri - Kebun Inti (Kabupaten Kutai Timur, Provinsi Kalimantan Timur)	Mensurasi dan Geoinformasi
5	Provision of Carbon Count Services in Relation to Taman Tugu Carbon Countpark (Transaction)	Flora, Perubahan Iklim, Geoinformasi
6	Kerja-kkerja Perkhidmatan Perundingan Berkenaan dengan Ketahanan Kayu Jati Terhadap Anai-anai di Institut Kefahaman Islam Malaysia (IKIM)	Perlindungan Kayu dan Bukan Kayu
7	Provide Advisory Services on the Resistance of the Company's Products Against Wood Borers	Perlindungan Kayu dan Bukan Kayu
8	Cadangan Pembangunan Pelan Induk Landskap Lake Side City @ Taman Pinggiran Prima, Puchong, Selangor Darul Ehsan bagi Fasa 1: Kerja-kkerja Penanaman di Jalan Pinggiran Prima 2	Landskap
9	Perkhidmatan Pensampelan, Analisis dan Interpretasi Data Sampel Tanah dan Foliar Projek Perintis Pengurusan Tanah Gambut Secara Lestari	Tanah-tanah
10	Forest Carbon Stock Assessment (CSA) Study in a 100-Ha Conservation Forest at Compartment 194, Piah Forest Reserve, Perak	Flora, Perubahan Iklim, Geoinformasi
11	Consultation on Product Registration of Janna Black Ginger Extract 250mg Capsule	Teknologi Herba
12	Memperkasa Produk PRO MAG sebagai Unsur Penting Kesihatan Pokok Melalui Penyelidikan Sainifik	Flora, Fauna, Tanah-tanah
13	Faunal Biodiversity Assessment in Gamuda Gardens	Fauna
14	Konsultan Penanaman Buluh 2023	Silvikultur Ladang
15	The Consulting Consultant for Endangered Tree Planting Species at Wetland Park Iringan Bayu	Landskap
16	Pelaksanaan Kajian Analisis Kos Dan Faedah (CBA) & (RPLH) Di Hutan Simpan Bukit Ibam, Mukim Keratong, Rompin & Hutan Simpan Lepar, Mukim Ulu Lepar, Kuantan Pahang	Kajian Bersepadu

BIL NO.	TAJUK PROJEK PROJECT TITLE	BIDANG KEPAKARAN AREAS OF EXPERTISE
17	Menganalisa Perubahan Guna Tanah (LUCA) Clarification KLK – PT Sinergi Agro Industri (INTI) & KLK – PT Karya Bakti Sejahtera Agrotama & KLK Sawit Nusantara (Sabah)	Mensurasi dan Geoinformasi
18	To Supply 10 Litres of Oil Palm Trunk (OPT) Sap to Euglena Malaysia Sdn. Bhd. (Expert Services)	Biojisim
19	Rancangan Pengurusan Kawasan HCVF di Hutan Simpan Gunung Tampin khususnya bagi pengurusan dan pemantauan spesies Begonia tampinica	Flora
20	Forest Carbon Stock Assessment (CSA) Study for Baseline Scenario Development at Kuala Lumpur East Park (21.5 ha/~53 acres)	Flora, Perubahan Iklim, Geoinformasi
21	Durability Test Against Mold and Subterranean Termites (Expert Services)	Perlindungan Kayu dan Bukan Kayu
22	Projek Rintis (Pilot Project) bagi Pelaksanaan Bayaran Perkhidmatan Ekosistem Hutan di Negeri Pahang di bawah Projek UNDP/GEF/GOM: Improving Connectivity in the Central Forest Spine Landscape (IC-CFS)	Kajian Bersepadu
23	Jururunding/Mentor bagi Program Pembangunan Ladang Hutan (PPLH) melibatkan Koperasi Mantee-Koperasi Kariah Masjid Kundur Ulu Rembau Berhad	Silvikultur Ladang
24	Consultant on Biopotential of Bamboo Shoot and Leaves as an Active Ingredient in the Development of High Quality Products	Hasilan semulajadi
25	Bamboo Treatment Advisor for Commercial Market	Proses Primer Kayu dan Bukan Kayu
26	Consultation Service for Product Registration of Cheong Hoong Black Tumeric Capsule	Teknologi Herba
27	Consultation Service for Product Registration of Cheong Hoong Tumeric Capsule	Teknologi Herba
28	Consultation on Production of Mytragyna Speciosa Extract from Lab to Pilot Scale Complying with Industrial Standards	Teknologi Herba
29	Kerja-Kerja Penilaian Visual Pokok (VTA-Visual Tree Assessment)- Lima (5) Batang Pokok Terpilih, Pinggiran Sungai Pekan, Pekan, Pahang DM	Flora, Landskap
30	Penglibatan sebagai Pakar Rujuk bagi Membantu dalam Menyediakan Bahan-Bahan Pemasaran dan Promosi untuk Tujuan Pengkomersialan Produk "Curatap"	Hasilan semulajadi
31	Survei dan Pengecaman Flora Fauna di Parcel A dan B, Kuala Lumpur Golf and Country Club (KLGCC) Resort, Bukit Kiara untuk Sime Darby Property (Golfhome) Sdn. Bhd.	Flora, Fauna
32	Kajian Penyediaan Rancangan Pengurusan Hutan Tadahan Air (RPHTA) Negeri Selangor 2023 - 2032	Hidrologi, Fauna, Ekonomi & Sosial, Silvikultur & Pengurusan Hutan
33	Penanaman Pokok Bakau di Sg. Hj. Dorani, Selangor Menggunakan Comp Pillow dan Konvensional	Silvikultur Hutan

BIL NO.	TAJUK PROJEK PROJECT TITLE	BIDANG KEPAKARAN AREAS OF EXPERTISE
34	Provide advisory services on the resistance of the anti-termites sheet based on Mitsui Chemicals Tochello, Inc. Method – Laboratory test	Perlindungan Kayu dan Bukan Kayu
35	Tree Assessment Services at Legoland Malaysia 2023	Landskap
36	Pelaksanaan Kajian Analisis Kos dan Faedah (CBA) Projek Perladangan Hutan dan Penyediaan Rancangan Pengurusan Ladang Hutan (RPLH) di Hutan Simpan Berkelah, Mukim Luit, Daerah Hutan Kuantan, Pahang."	Kajian Bersepadu
37	The Production of betung bamboo and Acacia Mangium Pellet for Industrial Applications	Biojisim
38	Production and Characterization of Black Pellets from Empty Fruit Bunches (EFB)	Biojisim
39	Kajian Hydrodynamic Modelling Kawasan Pesisir Pantai Hutan Paya Laut Negeri Pulau Pinang di bawah PSR Ecology Offset Masterplan (POEM)	Silvikultur Hutan
40	Menganalisa Perubahan Guna Tanah LUCA Assignment of Cukra Development Corporation, Compania Industrial Aceitera Coto Cincuenta y Cuatro S.A. Currently	Mensurasi dan Geoinformasi
41	Provide Advisory Services on the Resistance of the Company's Products Against Termites Based on AWP A E1-17 and TNB Protocol	Perlindungan Kayu dan Bukan Kayu
42	Menganalisa Perubahan Guna Tanah - Palmeras Oleaginosas Del Sur S.A. De C.V. - Bertollini, Compania Industrial Aceitera Coto Cincuenta Y Cuatro S. A.	Mensurasi dan Geoinformasi
43	Development of the Sustainability Profile of Extract According to Market Standards	Teknologi Herba
44	Study, Sampling, Analysis and Reporting on Suitability of Water Treatment Plant Residual as Potential Soil Amendment for Forest and Landscape Seeding	Tanah-tanah, Tapak Semaian
45	Khidmat Nasihat dan Laporan Penjenisan Kod Tarif HS untuk Surfactor Asia Pacific Sdn Bhd	Sains Bahan
46	Tree Risk Assessment in Four Seasons Resort, Langkawi	Landskap
47	Inventori, Penentuan Lokasi dan Pemeriksaan Struktur Serta Kesihatan Pokok-pokok Teduhan di Kompleks Angkasapuri, Kuala Lumpur	Landskap
48	Advisory Service and Rental of Testing Equipment to SI Acoustic Sdn. Bhd.	Proses Primer Kayu dan Bukan Kayu
49	Passive Water Treatment Study by the Utilization of Biochar and Native Species as a Bioremediation Technique for Removal of Arsenic and Heavy Metals	Soil Dynamic
50	Stability Study of CCA Wood Preservative Products	Proses Primer Kayu dan Bukan Kayu
51	Nature Trail Development at Universiti Teknologi PETRONAS	Ekopelancongan
52	Bengkel TOT Pembangunan & Pemerkasan Produk Ekopelancongan Sumber Asli	Ekopelancongan

BIL NO.	TAJUK PROJEK PROJECT TITLE	BIDANG KEPAKARAN AREAS OF EXPERTISE
53	Kursus Penyelenggaraan Pokok Teduhan Siri 1/2023	Landskap
54	Termites Associated with structures and trees workshop	Fauna
55	Technical Training on Termite Biology, Ecology and Management for Syngenta Malaysia	Fauna, Bioteknologi
56	Kursus Asas Landskap Untuk Perbadanan Labuan (13-15 Jun 2023)	Landskap
57	Kursus Asas Arborikultur Untuk Perbadanan Labuan (3-6 Julai 2023)	Landskap dan Arborikultur
58	Kursus Asas Penyediaan Slaid Mikroskopik Kayu pada 21-23/6/2023	Anatomi Kayu
59	Bengkel Teknik Asas Kultur Tisu Tumbuhan	Bioteknologi
60	Menyediakan Pakej Perkhidmatan bagi Kursus Pengurusan Orkid dan Pengurusan Spesimen di FRIM, Kepong pada 4-7 September 2023	Flora
61	Kursus Kepentingan Tanah dalam Perladangan Hutan	Tanah-tanah dan Silvikultur ladang
62	Tissue Culture - An Advance Technology in Plant Production pada 24-25 Oktober 2023	Bioteknologi
63	Kursus Asas Landskap dan Penyelenggaraan Pokok untuk kakitangan Majlis Daerah Tangkak	Landskap
64	Technical Training on Wood and Wood-Based Products for Industrial Application	Proses Primer kayu dan Bukan Kayu
65	One-day training package under programme 'Opportunities for carbon offset and achieving net-zero targets through nature-based solution approach' on 23rd november 2023 at FRIM	Perubahan Iklim, Geoinformasi dan Kejuruteraan Hutan
66	Basic Bark and Ambrosia Beetle Diagnostic Workshop	Fauna
67	Bengkel Penyediaan dan Penyelenggaraan Tanaman Karas	Hasil Semula jadi, Silvikultur Hutan dan Flora

AKTIVITI ACTIVITIES

FRIM Inc. telah melaksanakan aktiviti promosi dan pemasaran dalam tahun 2023 dengan menyertai aktiviti pameran, sesi pra-perbincangan projek, lawatan kerja dan program komersialisasi dengan industri yang berpotensi untuk pengkomersilan teknologi FRIM. Antara aktiviti yang telah dijayakan adalah seperti berikut:

FRIM Inc. has conducted promotional and marketing activities in 2023 by involving exhibitions, pre project discussion sessions, work visits and commercialization program with industries potentially interested in commercializing FRIM technology. Among the activities that have been successful are as follows:

a. Pengurusan Penjualan Anak Pokok FRIM

Pada 1 April 2023, FRIM Inc. telah menandatangani perjanjian Pengurusan Penjualan Anak Pokok FRIM dan Pelesenan Sistem Inventori dengan pihak FRIM. Melalui perjanjian ini, FRIM Inc. telah mengambil alih sebahagian besar urusan jualan anak pokok di Tapak Semaian Utama FRIM. Selain itu, anak-anak pokok yang dijual oleh FRIM Inc. kini memiliki sijil pendaftaran masing-masing melalui proses verifikasi dan direkod menggunakan sistem inventori yang dibangunkan oleh FRIM.

a. FRIM Saplings Sales Management

On 1st of April 2023, FRIM Inc. signed an agreement for Saplings Sales Management and Inventory System Licensing with FRIM. Through this agreement, FRIM Inc. has taken over a significant portion of the sapling sales operation of FRIM's Central Nursery. Additionally, now the saplings sold by FRIM Inc. will be having their respective registration certificates obtained through a verification process and recorded using the inventory system developed by FRIM.

BERMULA PADA 1 APRIL 2023
Pengurusan penjualan anak pokok di Tapak Semaian Utama (TSU) FRIM telah diambil alih oleh FRIM Incorporated Sdn. Bhd.

COMMERCIAL & CENTRALISED NURSERY (CCN), FRIM INCORPORATED SDN. BHD.
Jualan pelbagai spesies anak pokok :

- Pokok hutan
- Buluh
- Pokok buah nadi
- Tumbuhan herba
- Tumbuhan hiasan/landskap

Pembelian disertakan bersama Sijil Pendaftaran Anak Pokok

Untuk maklumat & pertanyaan, sila hubungi :

- Fahmi — 012 870 9105
- Ramli — 019 498 9179
- Pejabat FI — 011 1096 2871
- general@frim-inc.com.my

Hubungi kami di aplikasi WhatsApp

FRIM Incorporated Sdn Bhd | <https://frim-inc.com.my>

b. Majlis Menandatangani Perjanjian Sub-Pelelesen Teknologi Kacip Fatimah bersama Koperasi Peserta-Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad

FRIM Inc. dan Koperasi Peserta-Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad telah menandatangani perjanjian sub-pelesenan teknologi Kacip Fatimah pada 23 Jun 2023. Teknologi yang dipindah kepada mereka adalah klon kacip fatimah hasil R&D, teknik pembiakan kacip fatimah dan teknik penjagaan dan penyelenggaraan kacip fatimah. Ini adalah satu usaha dalam membantu meningkatkan pendapatan kumpulan B40 ahli-ahli koperasi tersebut.

b. Signing Ceremony Sub-Licensing Technology Agreement of Kacip Fatimah with Koperasi Peserta - Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad

FRIM Inc. and Koperasi Peserta - Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad has signed for Sub-Licensing Technology Agreement of Kacip Fatimah on 23 June 2023. The technology transferred to them is kacip fatimah clones as a result of R&D, kacip fatimah breeding techniques and kacip fatimah care and maintenance techniques. This is an effort to help increase the income of the B40 group of the cooperative members.



Majlis menandatangani perjanjian sub-pelesenan teknologi kacip fatimah bersama Koperasi Peserta-Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad
Signing of Sub-Licensing Technology Agreement of kacip fatimah with Koperasi Peserta- Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad

c. Program Bicara Teknologi FRIM 2023 dan Pelancaran Produk CurAtap

FRIM Inc. telah menghadiri Program Bicara Teknologi FRIM 2023 yang telah diadakan di Kuala Terengganu pada 8 November 2023 yang bertujuan untuk mempromosi dapatan dan teknologi yang terhasil daripada penyelidikan dan pembangunan, serta menyediakan khidmat nasihat teknikal, perundingan dan perkhidmatan lain berhubung dengan sektor perhutanan. Di dalam program tersebut juga, produk CurAtap telah dilancarkan. CurAtap adalah produk yang dihasilkan oleh Asbaf Legacy iaitu syarikat yang telah menandatangani perjanjian sub-pelesenan teknologi cucur atap dengan FRIM Inc.

c. FRIM Technology Talk Program 2023 and Launch of Product CurAtap

FRIM Inc. attended the FRIM 2023 Technology Talk Program which was held in Kuala Terengganu on 8 November 2023 which aims to promote findings and technology resulting from research and development, as well as provide technical advice, consultancy and other services in relation to the forestry sector. In the program as well, the CurAtap product was launched. CurAtap is a product produced by Asbaf Legacy which is a company that has signed a sub-licensing agreement for cucur atap technology with FRIM Inc.



Pelancaran produk CurAtap hasil sub-pelesenan teknologi FRIM pada program Bicara Teknologi FRIM 2023
The launching of CurAtap, a product from sub-licensing of FRIM technology at the FRIM Technology Talk 2023

d. Program Penanaman Pokok Oleh Malaysian Institute of Accountants (MIA)

Malaysian Institute of Accountants (MIA) dengan kerjasama FRIM Incorporated Sdn Bhd dan FRIM telah menganjurkan aktiviti penanaman pokok bertempat di sekitar kawasan Forest Skywalk, FRIM pada 7 September 2023. Program tersebut melibatkan 10 orang kakitangan MIA dan sejumlah 71 pokok spesies hutan dan buah-buahan nadi telah ditanam.

d. Tree Planting Program by Malaysian Institute of Accountants (MIA)

The Malaysian Institute of Accountants (MIA) in collaboration with FRIM Incorporated Sdn Bhd and FRIM has organized tree planting activities at Forest Skywalk area, FRIM on 7 September 2023. The program involved 10 MIA staff and a total of 71 forest species and fruit trees nadi has been planted.



Program penanaman pokok oleh Malaysian Institute of Accountants (MIA)
Tree planting programme by the Malaysian Institute of Accountants (MIA)

Aktiviti Yang Dilaksanakan oleh FRIM Incorporated Sdn Bhd Tahun 2023 Activities Carried Out by FRIM Incorporated Sdn Bhd in 2023

BIL NO.	AKTIVITI ACTIVITIES	TARIKH DATE
1	Bengkel Pemindahan Teknologi Projek Keusahawanan Komuniti Peserta Berasaskan Herba Koperasi Peserta Rancangan Felcra Seberang Perak Berhad (KPRFSPB) Di Bawah Khidmat Perundingan "Perkhidmatan Pelaksanaan Projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba" Workshop on Technology Transfer for Community Entrepreneurship Project Participants Based on Herbs Involved By Koperasi Peserta Rancangan Felcra Seberang Perak Berhad (KPRFSPB) Under Consultancy Service 'Entrepreneurship Project Implementation Services of Herbal Plant Based Participants Community'	31/1-2/2/2023
2	Perbincangan Awalan Bersama MM Global Sdn. Bhd. Bagi Khidmat Perundingan "Memperkasa Produk Pro Mag Sebagai Unsur Penting Kesihatan Pokok Melalui Penyelidikan Saintifik" Preliminary Discussion with MM Global Sdn. Bhd. for Consultancy Service Empowering Pro Mag Product as A Vital Element for Plant Health Through Scientific Research"	13/2/2023
3	Pameran Teknologi Malaysia (MTE) Malaysia Technology Expo (MTE)	16/3/2023
4	Pameran Hari Terbuka Parlimen Parlimen Open Day Expo	5-6/5/2023
5	Lawatan Tapak dan Kerja Pengukuran Kawasan Bagi Khidmat Perundingan "Jururunding/Mentor Bagi Program Pembangunan Ladang Hutan (PPLH) Melibatkan Koperasi Mantee-Koperasi Kariah Masjid Kundur Ulu Rembau Berhad" Site Visit and Area Measurement Work for Consultation Services as A Consultant/Mentor for The Forest Plantation Development Program (PPLH) Involving Koperasi Mantee-Koperasi Kariah Masjid Kundur Ulu Rembau Berhad"	19/5/2023

BIL NO.	AKTIVITI ACTIVITIES	TARIKH DATE
6	Bengkel Pemindahan Teknologi Projek Keusahawanan Komuniti Peserta Berasaskan Herba Koperasi Peserta-Peserta Rancangan FELCRA Lubuk Sireh Perlis Berhad Di Bawah Khidmat Perundingan "Perkhidmatan Pelaksanaan Projek Keusahawanan Komuniti Peserta Berasaskan Tanaman Herba" Workshop on Technology Transfer for Community Entrepreneurship Project Participants Based on Herbs Involved by Koperasi Peserta-Peserta Rancangan FELCRA Lubuk Sireh Under Consultancy Service 'Entrepreneurship Project Implementation Services of Herbal Plant Based Participants Community.	22/6/2023
7	Perbincangan Awalan dan Lawatan Tapak Bagi 'Afforestation of Iron Ore Mining Areas, MAM Minerals Sdn Bhd, Raub Pahang' Preliminary Discussion and Site Visit for Afforestation of Iron Ore Mining Areas, MAM Minerals Sdn Bhd, Raub Pahang'	14/7/2023
8	Perbincangan Awalan dan Lawatan Tapak Bagi Visual Tree Assessment Bersama Badan Pengurusan Bangsar Peak Condominium Preliminary Discussion and Site Visit for Visual Tree Assessment with The Management Body of Bangsar Peak Condominium	5/9/2023
9	Perbincangan Awalan dan Lawatan Tapak Ke Darulaman Sanctuary, Lubuk Semilang, Langkawi Berkenaan Khidmat Perundingan 'Lubuk Semilang Green Development Blueprint (Carbon Management Masterplan) Preliminary Discussion and Site Visit at Darulaman Sanctuary, Lubuk Semilang, Langkawi Regarding on Consultancy Service 'Lubuk Semilang Green Development Blueprint (Carbon Management Masterplan)'	11/9/2023
10	Perasmian 'Roots to Trails: From Planting to Pathways' Di Bawah Khidmat Perundingan 'Pembangunan Denai Alam Di Universiti Teknologi Petronas (UTP) Launching Programme of 'Roots to Trails: From Planting to Pathways' Under the Consultancy of Nature Trail Development at Universiti Teknologi Petronas (UTP)'	29/10/2023
11	Perbincangan Bersama Syarikat Nextgreen Global Berhad Berkenaan Pelesenan Teknologi Tongkat Ali Discussion With Potential Collaborator, Nextgreen Global Berhad on Technology Licensing of Tongkat Ali	21/11/2023

PRESTASI KEWANGAN

FINANCIAL PERFORMANCE



Bagi tahun kewangan berakhir **31 Disember 2023, FRIM Inc. peningkatan dalam pendapatan sebanyak 47% kepada RM3.261 juta** manakala **perbelanjaan** pula peningkatan **sebanyak 36% kepada RM3.465 juta.**

For the financial year ending **31 December 2023, FRIM Inc. shows an increase in income of 47%, RM3.261 million**, while expenses it shows an increase of **36%, RM3.465 million.**

Jadual 1 seperti di bawah, menunjukkan prestasi kewangan FRIM Inc. dari tahun 2019 sehingga 2023. Pada tahun 2023, FRIM Inc. memperoleh pendapatan daripada aktiviti perkhidmatan perundingan, perkhidmatan latihan, pengurusan projek dan jualan anak pokok dan jualan produk.

Bagi tahun kewangan berakhir 31 Disember 2023, FRIM Inc. menunjukkan peningkatan dalam pendapatan sebanyak 47% iaitu daripada RM2.212 juta pada tahun 2022 kepada RM3.261 juta pada tahun 2023. Bagi perbelanjaan pula menunjukkan peningkatan sebanyak 36% iaitu daripada RM2.549 juta pada tahun 2022 kepada RM3.465 juta pada tahun 2023. Untung bersih menunjukkan peningkatan sebanyak 9% iaitu daripada -RM0.337 juta pada tahun 2022 kepada -RM0.204 juta pada tahun 2023. Jumlah keseluruhan aset FRIM Inc. pada 31 Disember 2023 adalah sebanyak RM1.769 juta. Sebanyak RM0.086 juta adalah aset bukan semasa, sebanyak RM1.682 juta adalah aset semasa dan aset bersih adalah RM0.137 juta.

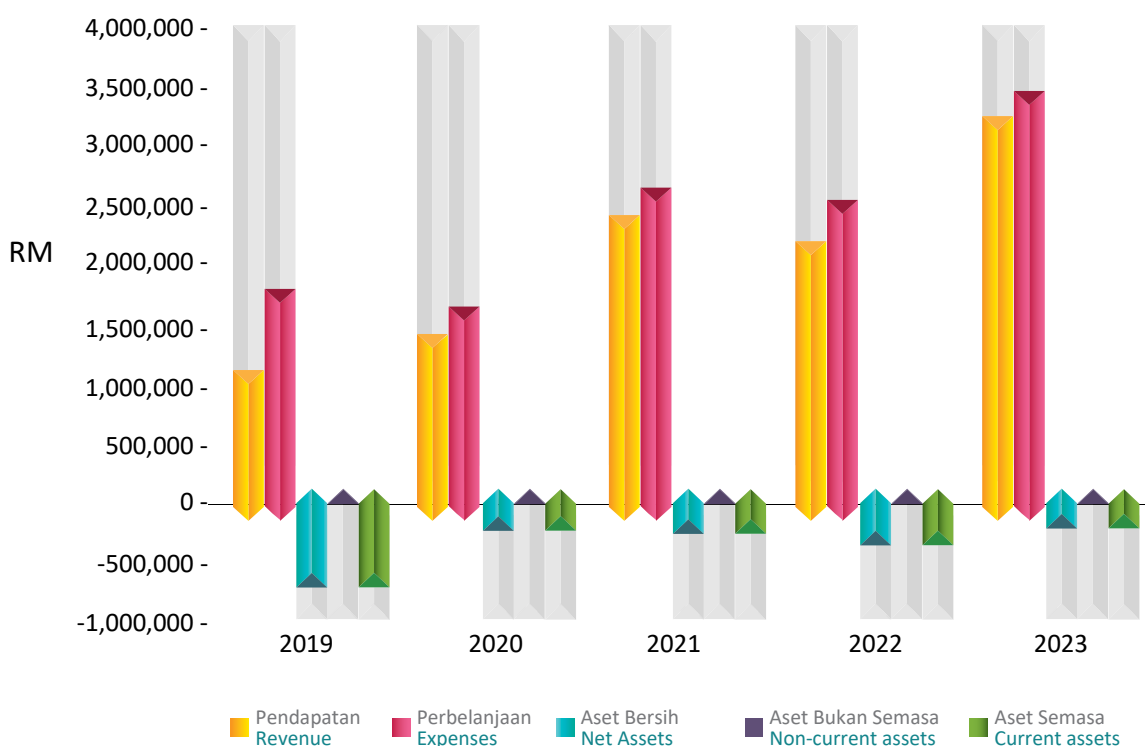
Table 1 below, shows the financial performance of FRIM Inc. from year 2019 to 2023. In 2023, FRIM Inc. earn income from consultancy services activities, training services, project management and sales of saplings and sales of products.

For the financial year ending 31 December 2023, FRIM Inc. shows an increase in income of 47%, which is from RM2.212 million in 2022 to RM3.261 million in 2023. As for expenses, it shows an increase of 36%, which is from RM2.549 million in 2022 to RM3.465 million in 2023. Net profit shows an increase of 9% which is from -RM0.337 million in 2022 to -RM0.204 million in 2023. Total assets of FRIM Inc. on 31 December 2023 is RM1.769 million. A total of RM0.086 million are non-current assets, a total of RM1.682 million are current assets and net assets are RM0.137 million.

Jadual 1 Prestasi Kewangan FRIM Incorporated Sdn Bhd dari tahun 2019 hingga 2023
Table 1 FRIM Incorporated Sdn Bhd Financial Performance from 2019 to 2023

Butiran Items	2019 (RM)	2020 (RM)	2021 (RM)	2022 (RM)	2023 (RM)
Pendapatan Revenue	1,112,860	1,436,523	2,422,293	2,211,916	3,261,704
Perbelanjaan Expenses	1,807,402	1,668,709	2,656,546	2,549,396	3,465,282
Untung /(Rugi) Sebelum Cukai Profit Before Tax	(694,542)	(232,186)	(234,253)	(337,480)	(203,578)
Cukai Pendapatan Tax Expense	-	-	-	-	-
Untung /(Rugi) Selepas Cukai Profit After Tax	(694,542)	(232,186)	(234,253)	(337,480)	(203,578)

**Laporan Kewangan FRIM Incorporated Sdn Bhd
2019-2023**



LAPORAN & PENYATA KEWANGAN

FINANCIAL REPORTS & STATEMENT
(BELUM DIAUDIT/UNAUDITED)



Garcinia atroviridis

LAPORAN TAHUNAN

ANNUAL REPORT

LAPORAN & PENYATA KEWANGAN (KUMPULAN)

FINANCIAL REPORTS & STATEMENT (GROUP)

LAPORAN KEWANGAN BAGI TAHUN BERAKHIR 31 DISEMBER 2023

Laporan ini bertujuan untuk memaklumkan kedudukan dan prestasi kewangan Institut Penyelidikan Perhutanan Malaysia (FRIM) sebagaimana penyata kewangan bagi tahun 2023. Penyata kewangan ini telah disediakan mengikut Akta Institut Penyelidikan Perhutanan Malaysia 2016 [Akta 782] dan selaras dengan Piawaian Perakaunan Sektor Awam Malaysia (MPSAS) yang diterbitkan oleh Jabatan Akauntan Negara Malaysia.

Secara keseluruhannya kedudukan dan prestasi kewangan Institut bagi tahun berakhir 31 Disember 2023 adalah baik dan terkawal. FRIM masih bergantung kepada Geran Kerajaan persekutuan bagi menampung perbelanjaan operasi dan menjalankan aktiviti R&D untuk pembangunan berterusan industri perhutanan dan pemuliharaan alam sekitar. FRIM turut menjana pendapatannya sendiri dan peningkatan hasil berbanding tahun sebelumnya disebabkan pembukaan kampus FRIM secara berperingkat.

PRESTASI KEWANGAN

Bagi tahun kewangan berakhir 31 Disember 2023, FRIM mencatatkan jumlah pendapatan sebanyak RM116.01 juta. Manakala perbelanjaan pula sebanyak RM123.49 juta, menjadikan perbelanjaan telah melebihi pendapatan sebanyak RM7.48 juta. Perkara ini adalah disebabkan peruntukan susut nilai atas hartanah, loji dan peralatan (item bukan tunai) yang dikenakan berjumlah RM24.39 juta. Akibat daripada penilaian semula hartanah FRIM pada 2016, nilai ekuiti FRIM telah meningkat dengan ketara menyebabkan perbelanjaan susut nilai yang tinggi dan memberi kesan kepada prestasi kewangan semasa FRIM.

Anak syarikat Institut Penyelidikan Perhutanan Malaysia (FRIM) iaitu FRIM Incorporated Sdn. Bhd (FRIM Inc.) mencatatkan jumlah kurangan selepas cukai sebanyak RM203,578. FRIM Inc. telah menunjukkan kenaikan pendapatan dengan jumlah pendapatan sebanyak RM3.26

FINANCIAL REPORT FOR YEAR ENDED 31 DECEMBER 2023

The purpose of this report was to inform the position and financial performance of the Forest Research Institute Malaysia (FRIM) as the financial statements for the year 2023. The financial statements were prepared with Research Institute Malaysia Act 2016 [Act 782] and in accordance with Malaysian Public Sector Accounting Standards (MPSAS) issued by the Accountant General's Department of Malaysia.

In summary, the financial position and performance of the Institute for the year ended 31 December 2023 are good and manageable. FRIM has still dependent on Federal Government Grants to cover operating expenses and carry out R&D activities for the continued development of the forestry industry and environmental conservation. FRIM has also generated its own revenue; and there is an increase compared to the previous year due to the gradual opening of the FRIM campus.

FINANCIAL PERFORMANCE

For the financial year ending 31 December 2023, FRIM had recorded a total revenue of RM116.01 million. Meanwhile, total expenditure was RM123.49 million, resulting in total expenditure exceeded revenue by RM7.48 million. This is mainly due to the provision for depreciation (non-cash items) allocated for the year amounting to RM24.39 million. As a result of FRIM's real estate revaluation in 2016, FRIM's equity value has increased significantly resulting in high depreciation expenses and impacting FRIM's current financial performance.

A subsidiary of the Forestry Research Institute of Malaysia (FRIM) namely FRIM Incorporated Sdn. Bhd (FRIM Inc.) recorded a total loss after tax of RM203,578. FRIM Inc. has shown a increase in revenue with a total income of RM3.26 million compared to 2022 with a total revenue of RM2.21 million and this has had an impact on

juta berbanding tahun 2022 dengan jumlah pendapatan sebanyak RM2.21 juta dan ini telah memberi kesan kepada kedudukan kewangan FRIM. Prestasi kewangan kumpulan bagi tahun kewangan 2019 sehingga 2023 adalah seperti Jadual 1 dan Rajah 1.

FRIM's financial position. The Group's financial performance for the financial year 2019 to 2023 is as shown in Table 1 and Figure 1.

Jadual 1 Prestasi Kewangan FRIM dari tahun 2019 hingga 2023

Table 1 FRIM Financial Performance from 2019 to 2023

Butiran Items	Tahun/Year (RM Juta / Million)				
	2019	2020	2021	2022	2023
Pendapatan/ Revenue	107.83	107.82	106.47	117.44	116.01
Perbelanjaan/ Expenditure	119.31	119.44	117.70	125.35	123.49
Lebihan/ (Kurangan) Pendapatan sebelum cukai/ Income Surplus/ (Deficit) before tax	(11.47)	(11.62)	(11.23)	(7.92)	(7.48)
Cukai Pendapatan/ Income Tax	0.79	0.61	0.52	0.53	0.89
Lebihan/ (Kurangan) Pendapatan selepas cukai/ Income Surplus/ (Deficit) after tax	(12.26)	(12.23)	(11.75)	(8.45)	(8.36)



Rajah 1 Prestasi Kewangan FRIM
Figure 1 FRIM Financial Performance

PENDAPATAN

FRIM masih bergantung pada Geran Kerajaan Persekutuan bagi membiayai aktiviti-aktiviti penyelidikan dan perbelanjaan harian yang perlu ditanggung. Penyaluran geran kerajaan kepada FRIM bagi tempoh lima tahun dari tahun 2019 hingga 2023 adalah seperti Jadual 2.

REVENUE

FRIM is still dependent on Federal Government Grant to finance its research activities and day-to-day operation expenses. The distribution of government grants to FRIM for a period of five years from 2019 to 2023 is shown in Table 2.

Jadual 2 Penyaluran Geran Kerajaan
Table 2 Distribution of Government Grant

Butiran Items	Tahun/Year (RM Juta / Million)				
	2019	2020	2021	2022	2023
Geran Mengurus Kerajaan/ Government Operation Grant	59.04	59.06	61.19	61.38	62.23
Geran RMKe12Kerajaan/ Government RMKe12 Grant	30.3	27.42	25.59	26.60	25.27
Geran-geran lain Kerajaan/ Other Government Grants	9.62	5.35	5.58	3.36	4.97

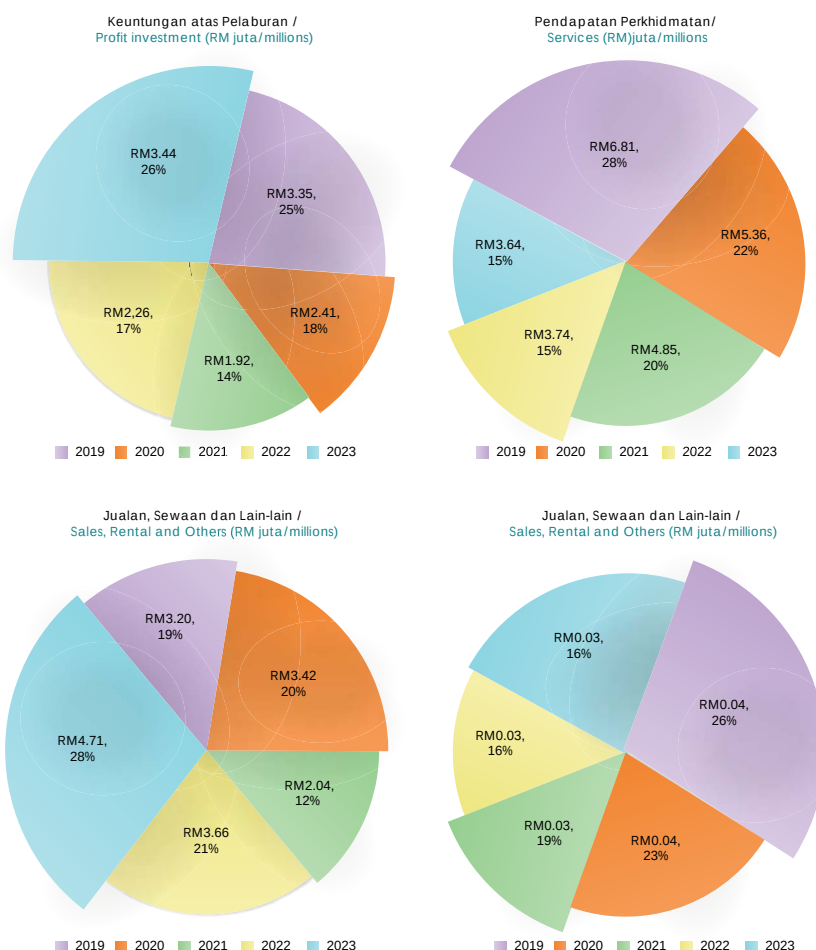


Jumlah ini menunjukkan peningkatan sebanyak **RM2.17 juta (22.44%)** berbanding dengan tahun **2022 (RM9.69 juta)**.

This figure shows an increase of **RM2.17 million (22.44%)** compared to **2022 (RM9.69 million)**

FRIM turut memperoleh pendapatan daripada urusniaga pertukaran dalam aktiviti perkhidmatan, jualan, sewaan, keuntungan daripada simpanan tetap dan pinjaman kakitangan serta lain-lain pendapatan berjumlah RM11.82 juta. Jumlah ini menunjukkan peningkatan sebanyak RM2.13 juta (21.93%) berbanding dengan tahun 2022 (RM9.69 juta). Peningkatan ini antaranya disumbangkan oleh perkhidmatan ujian dan saintifik, penggunaan kemudahan eko pelancongan dan penganjuran kursus/seminar. Prestasi pendapatan daripada urusniaga pertukaran bagi tempoh lima tahun dari tahun 2019 hingga 2023 adalah seperti Rajah 2.

FRIM also received revenue from exchange transactions in service activities, sales, rentals, profits on fixed deposits and investments, profit on staff loans and other income amounting to RM11.82 million. This figure shows an increase of RM2.13 million (21.93%) compared to 2022 (RM9.69 million). This increase was contributed by testing and scientific services, the use of eco-tourism facilities and the organization of courses/seminars. The income performance from exchange transactions for the five-year period from 2019 to 2023 is as shown in Figure 2.



Rajah 2 Prestasi pendapatan daripada urus niaga pertukaran
Figure 2 Performance of income from exchange transactions

PERBELANJAAN

Prestasi perbelanjaan FRIM adalah konsisten bagi tahun 2019 hingga 2023 seperti ditunjukkan pada Jadual 3. Perbelanjaan susutnilai telah meningkat dengan ketara bermula pada tahun kewangan 2017 disebabkan oleh penilaian semula aset bagi permulaan penguatkuasaan Akta 782. Pada tahun 2023, FRIM mencatatkan jumlah perbelanjaan sebanyak RM123.49 juta. Perbelanjaan emolumen menyumbang sebanyak RM48.85 juta (39.56%), manakala perkhidmatan dan bekalan RM39.38 juta (31.89%), dan perbelanjaan– perbelanjaan lain sebanyak RM35.26 juta (28.55%) daripada jumlah keseluruhan perbelanjaan.

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 dan hartanah pelaburan dengan jumlah susut nilai dikenakan pada tahun semasa sebanyak RM24.39 juta.

EXPENDITURE

Expenditure performance is consistent for 2019 to 2023 as shown in Table 3. Depreciation expense has increased significantly beginning in the financial year 2017 due to the revaluation of assets for the commencement of Act 782. In the year 2023, FRIM recorded a total expenditure of RM123.49 million. Salaries, allowances, and other staff financial benefits contributed RM48.85 million (39.56%), meanwhile, supplies and services contributed RM39.38 million (31.89%), and other expenditures constitute RM35.26 million (28.55%) of the total amount.

The cost of supplies and services includes the cost to maintain machinery, vehicles, buildings, cleaning services, security services, utility cost, transportation, and travelling cost, medical for staff, raw materials, researchers, and other costs. Depreciation includes depreciation for fixed asset and most significant is the depreciation of it property asset and investment property with the depreciation amount charged of RM24.39 million.

Jadual 3 Pecahan perbelanjaan dari 2018 hingga 2023
Table 3 Breakdown of expenditure from 2018 to 2023

Butiran Items	Tahun/Year (RM Juta / Million)				
	2019	2020	2021	2022	2023
Emolumen / Emolument	54.98	53.94	48.74	47.70	48.85
Perkhidmatan dan bekalan Services and supplies	34.06	27.37	31.19	41.04	39.38
Manfaat Kakitangan/ Employee benefits	6.86	7.26	8.05	6.89	6.66
Susutnilai Aset / Depreciation	21.25	24.24	24.49	24.10	24.39
Perbelanjaan lain / Other expenditures	2.16	6.63	5.24	5.61	4.21
Jumlah / Total	119.31	119.44	117.70	125.35	123.49

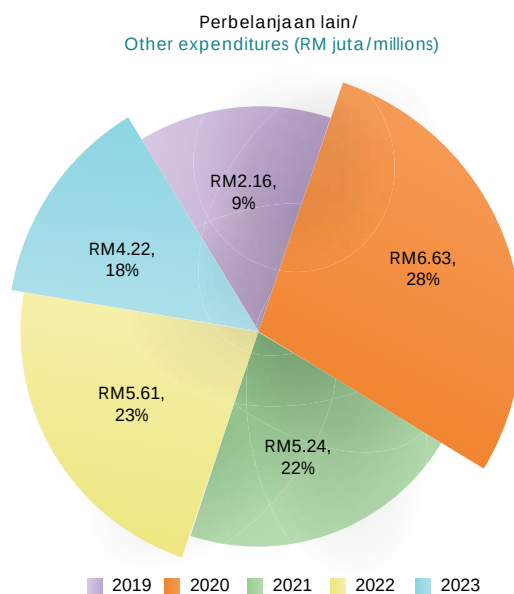
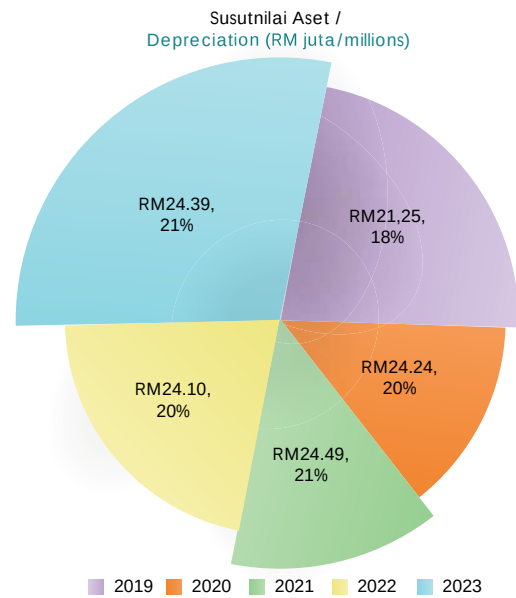
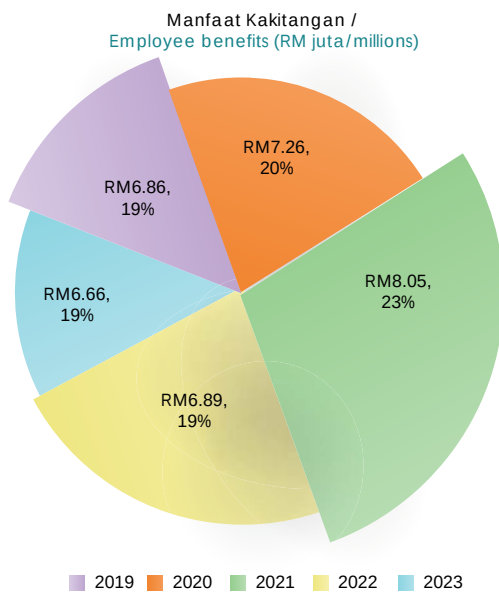
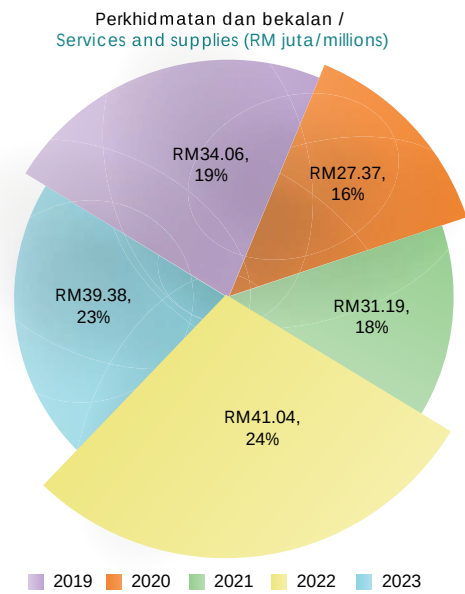
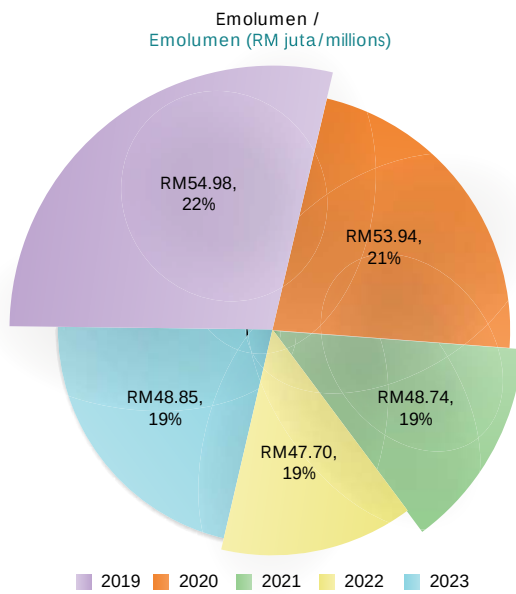


FRIM telah membelanjakan sebanyak **RM48.85** juta bagi emolumen dan **RM6.66** juta bagi manfaat pekerja berbanding tahun 2022 dengan jumlah perbelanjaan sebanyak **RM47.70** juta bagi emolumen dan **RM6.89** juta bagi manfaat pekerja

FRIM has spent a total of **RM48.85 million** for emoluments and **RM6.66 million** for employee benefits compared to 2022 with a total expenditure of **RM47.70 million** for emoluments and **RM6.89 million** for employee benefits.

Antara komponen perbelanjaan FRIM yang terbesar adalah perbelanjaan bagi emolumen, pensen dan ganjaran yang mewakili lebih 40% daripada keseluruhan perbelanjaan Institut. Perbelanjaan lain bagi pekerja adalah manfaat kakitangan seperti caruman pensen dan gratuiti. Bagi tahun kewangan 2023, FRIM telah membelanjakan sebanyak RM48.85 juta bagi emolumen dan RM6.66 juta bagi manfaat pekerja berbanding tahun 2022 dengan jumlah perbelanjaan sebanyak RM47.70 juta bagi emolumen dan RM6.89 juta bagi manfaat pekerja. Ringkasan perbelanjaan keseluruhan bagi tempoh lima tahun dari tahun 2019 hingga 2023 adalah seperti Rajah 3.

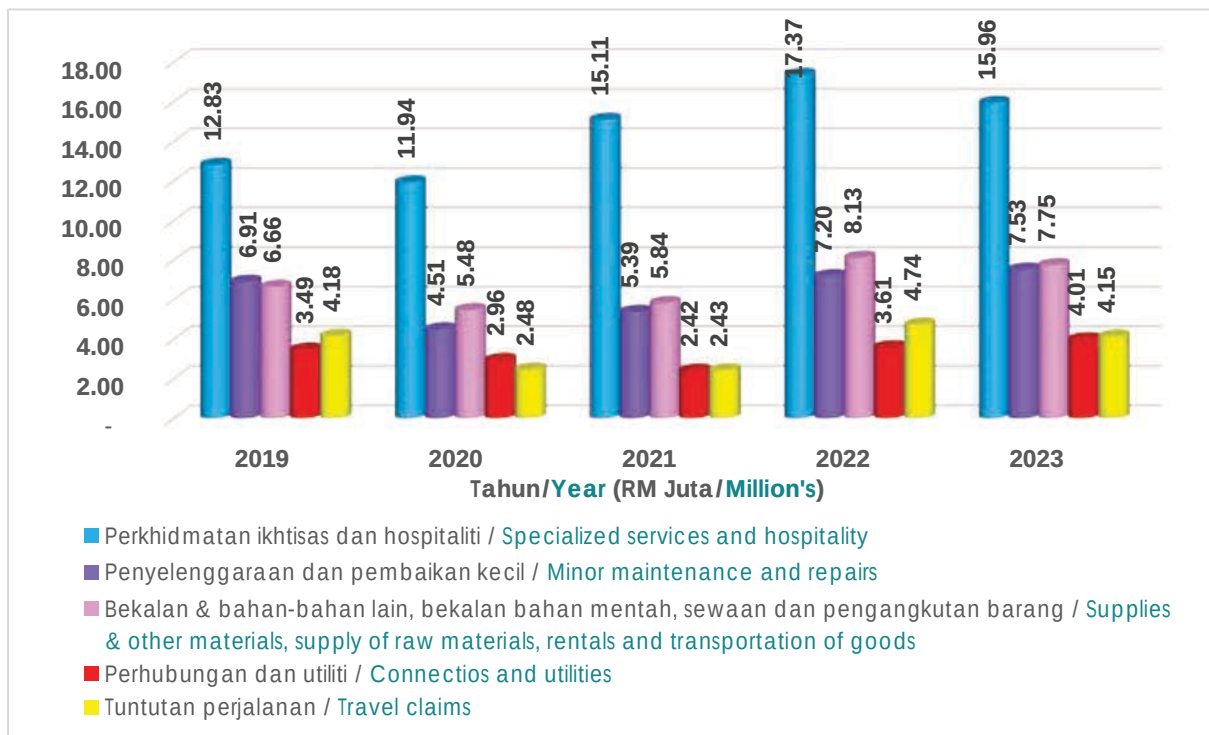
Among the largest components of FRIM's expenditure is expenditure on emolument, pensions and rewards which represent more than 40% of the Institute's total expenditure. Other expenditures are expenses for employee benefits such as pension contributions and gratuities. For the financial year 2023, FRIM has spent a total of RM48.85 million for emoluments and RM6.66 million for employee benefits compared to 2022 with a total expenditure of RM47.70 million for emoluments and RM6.89 million for employee benefits. Summary of the overall expenditure for the five-year period from 2019 to 2023 is as shown in Figure 3.



Rajah 3 Ringkasan perbelanjaan keseluruhan
Figure 3 Summary of overall expenses

Perbelanjaan bagi perkhidmatan dan bekalan adalah perbelanjaan kedua tertinggi selepas emolumen. Secara purata sebanyak RM34.61 juta dibelanjakan bagi tempoh dari tahun 2019 hingga 2023. Bagi tahun kewangan 2023 jumlah perbelanjaan yang direkodkan adalah sebanyak RM39.38 juta dengan lebih sebanyak RM4.77 juta berbanding purata tahunan. Prestasi perbelanjaan berkaitan bagi tempoh lima tahun dari tahun 2019 hingga 2023 adalah seperti Rajah 4.

Expenditure on services and supplies is the second-highest after emoluments. An average of RM34.61 million was spent for the period from 2019 to 2023. For the financial year 2023, the total expenditure recorded was as much as RM39.38 million with an increase of RM4.77 million compared to the annual average. Performance of related expenditure for a period of five years from 2019 to 2023 is shown in Figure 4.



Rajah 4 Prestasi perbelanjaan perkhidmatan dan bekalan
Figure 4 Performance of services and supplies expenses

KEDUDUKAN ASET INSTITUT

Jumlah keseluruhan aset FRIM pada 31 Disember 2023 direkodkan sebanyak RM1,368 juta berbanding RM1,384 juta pada tahun 2022, menunjukkan penurunan sebanyak RM16 juta kesan daripada perbelanjaan susut nilai yang dikenakan. Sebanyak RM1,249 juta (91.3%) merupakan aset bukan semasa atau aset tetap dan bakinya RM118.94 juta (8.7%) ialah aset semasa yang mana RM92.88 juta daripadanya merupakan tunai atau kesetaraan tunai.

Jumlah liabiliti terdiri daripada liabiliti semasa sebanyak RM9.53 juta dan liabiliti bukan semasa sebanyak RM185.13 juta. Liabiliti semasa merangkumi peruntukan manfaat kakitangan jangka pendek dan pelbagai pemiutang manakala liabiliti bukan semasa adalah manfaat kakitangan jangka panjang, Dana Pinjaman Kakitangan, Akaun Amanah dan Geran Pembangunan yang masih belum dilunaskan.

INSTITUTE ASSET POSITION

The total amount of FRIM's assets as at 31 December 2023 was recorded as RM1,368 million compared to RM1,384 million in 2022, showing a decrease of RM16 million due to the depreciation expense incurred. A total of RM1,249 million (91.3%) are non-current assets or fixed assets and the remaining RM118.94 million (8.7%) are current assets of which RM92.88 million are cash or cash equivalents.

Total liabilities consist of current liabilities amounting to RM9.53 million and non-current liabilities amounting to RM185.13 million. Current liabilities include provisions for short-term staff benefits and various creditors while non-current liabilities are long-term staff benefits, Staff Loan Funds, Trust Accounts and Development Grants that have yet to be repaid.

In the current year FRIM did not make any form of loan to finance its expenses. Surplus allocations

Dalam tahun semasa FRIM tidak membuat sebarang bentuk pinjaman untuk membiayai perbelanjaannya. Lebihan peruntukan yang belum dibelanjakan akan 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 4.

that have not been spent will be invested in fixed deposits in local banks and financial Institutions and other instruments as approved by the Ministry of Finance. Thus, all indicators and financial ratios of FRIM do not show any weaknesses as shown in Table 4.

Jadual 4 Petunjuk Prestasi Kewangan
Table 4 Financial Performance Indicators

Butiran Items	Tahun/Year (RM Juta / Million)				
	2019	2020	2021	2022	2023
Aset Semasa/ Tanggungan Semasa Current Ratio	13.1	13.53	9.86	10.79	12.48
Aset Mudah Cair/ Tanggungan Semasa Liquid Ratio	9.42	9.41	7.37	8.33	9.75
Jumlah Hutang/ Jumlah Aset Debt/Asset Ratio	0.0038	0.0023	0.0022	0.0019	0.0016
Aset Semasa/ Tanggungan Semasa Current Ratio	Nisbah semasa (12.48) menunjukkan bahawa Institut berkemampuan membayar komitmen kewangan dalam tempoh masa yang ditetapkan. The current ratio (12.48) shows that the Institute is able to pay its financial commitments within the specified time period.				
Aset Mudah Cair/ Tanggungan Semasa Liquid Ratio	Nisbah kecairan (9.75) menunjukkan Institut mempunyai tahap keupayaan yang baik untuk menyelesaikan obligasi hutang jangka pendeknya. The liquidity ratio (9.75) shows that the Institute has a good level of ability to settle its short-term debt obligations.				
Jumlah Hutang/ Jumlah Aset Debt/Asset Ratio	Nisbah hutang (0.0016) di paras atau bawah 0.40 merupakan satu nilai yang tidak signifikan atau diluar kadar memandangkan Institut memiliki nilai hartanah yang tinggi. Kadar ini menunjukkan keupayaan Institut adalah tinggi berbanding sebarang risiko kewangan. The debt ratio (0.0016) at or below 0.40 is a value that is not significant or out of proportion considering that the Institute has a high real estate value. This rate shows that the Institute's ability is high compared to any financial risk.				

LAPORAN KETUA AUDIT NEGARA

Ketua Audit Negara telah memperakukan penyata kewangan Institut bagi tahun 2023 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 2023, hasil operasi dan aliran tuainya untuk tahun tersebut berdasarkan piawaian perakaunan yang diluluskan.

AUDITORS GENERAL REPORT

The Auditor General had certified the FRIM's Financial Statement for 2023 with a Clean Audit Report, and in their opinion, the statement presented had given a true and fair view of the financial position of the Forest Research Institute Malaysia as of 31 December 2023. Its operation and cash flows for that year were in accordance with approved accounting standard.



**SIJIL KETUA AUDIT NEGARA
MENGENAI PENYATA KEWANGAN
INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
BAGI TAHUN BERAKHIR 31 DISEMBER 2023**

Sijil Mengenai Pengauditan Penyata Kewangan

Pendapat

Saya telah memberikan kuasa kepada firma audit swasta di bawah subseksyen 7(3) Akta Audit 1957 [Akta 62] untuk mengaudit Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia. Penyata kewangan tersebut merangkumi Penyata Kedudukan Kewangan pada 31 Disember 2023 Institut Penyelidikan Perhutanan Malaysia dan Kumpulan dan Penyata Prestasi Kewangan, Penyata Perubahan Dalam Ekuiti, Penyata Aliran Tunai serta Penyata Prestasi Bajet bagi tahun berakhir pada tarikh tersebut dan nota kepada penyata kewangan termasuklah ringkasan polisi perakaunan yang signifikan seperti yang dinyatakan pada muka surat 3 hingga 23.

Pada pendapat saya, penyata kewangan ini memberikan gambaran yang benar dan saksama mengenai kedudukan kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan pada 31 Disember 2023 dan prestasi kewangan serta aliran tunai bagi tahun berakhir pada tarikh tersebut selaras dengan Piawaian Perakaunan Sektor Awam Malaysia (MPSAS) dan keperluan Akta Institut Penyelidikan Perhutanan Malaysia 2016 [Akta 782].

Asas Kepada Pendapat

Pengauditan telah dilaksanakan berdasarkan Akta Audit 1957 dan International Standards of Supreme Audit Institutions. Tanggungjawab saya diuraikan selanjutnya di perenggan Tanggungjawab Juraudit Terhadap Pengauditan Penyata Kewangan dalam sijil 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 serta telah memenuhi tanggungjawab etika lain berdasarkan International Standards of Supreme Audit Institutions.

Maklumat Lain Selain Daripada Penyata Kewangan dan Sijil Juruaudit Mengenainya

Anggota Institut, Institut Penyelidikan Perhutanan Malaysia 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 Sijil 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 Perakaunan Sektor Awam Malaysia (MPSAS) dan keperluan 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 yang 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 Sijil Juruaudit yang merangkumi pendapat saya. Jaminan yang munasabah adalah satu tahap jaminan yang tinggi, tetapi bukan satu jaminan bahawa audit yang dijalankan mengikut 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 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 atau Kumpulan sebagai satu usaha berterusan. Jika saya membuat kesimpulan bahawa ketidakpastian ketara wujud, saya perlu melaporkan dalam Sijil 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 Sijil Juruaudit. Bagaimanapun, peristiwa atau keadaan pada masa hadapan berkemungkinan menyebabkan Institut Penyelidikan Perhutanan Malaysia atau Kumpulan tidak lagi berupaya meneruskan operasi secara usaha berterusan;
- e. menilai persembahan secara keseluruhan, struktur dan kandungan Penyata Kewangan Institut Penyelidikan Perhutanan Malaysia dan Kumpulan, termasuk pendedahannya, dan sama ada penyata kewangan tersebut telah melaporkan asas-asas urus niaga dan peristiwa-peristiwa yang memberikan gambaran saksama; dan
- 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.

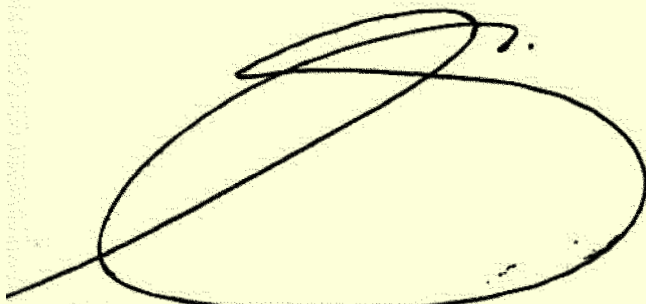
Anggota Institut telah dimaklumkan, antaranya mengenai skop dan tempoh pengauditan yang dirancang serta penemuan audit yang signifikan termasuk kelemahan kawalan dalaman yang dikenal pasti semasa pengauditan.

Laporan Mengenai Keperluan Perundangan dan Peraturan Lain

Berdasarkan keperluan Akta Institut Penyelidikan Perhutanan Malaysia 2016 [Akta 782], saya juga melaporkan syarikat subsidiari yang tidak diaudit oleh saya, telah dinyatakan di Nota 12 dalam penyata kewangan.

Hal-hal Lain

Sijil ini dibuat untuk Anggota Institut, Institut Penyelidikan Perhutanan Malaysia berdasarkan keperluan Akta Institut Penyelidikan Perhutanan Malaysia 2016 [Akta 782] dan bukan untuk tujuan lain. Saya tidak bertanggungjawab terhadap pihak lain bagi kandungan sijil ini.



(DATUK WAN SURAYA BINTI WAN MOHD RADZI)
KETUA AUDIT NEGARA

PUTRAJAYA

11 SEPTEMBER 2024



LAPORAN DAN PENYATA KEWANGAN
INSTITUT PENYELIDIKAN
PERHUTANAN MALAYSIA
(TELAH DIAUDIT)

BAGI TAHUN BERAKHIR 31 DISEMBER 2023

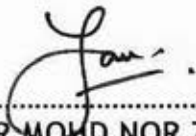


INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
52109 KEPONG, SELANGOR DARUL EHSAN

**PENYATA Pengerusi dan Seorang Anggota Institut
Institut Penyelidikan Perhutanan Malaysia**

Kami, Ts. Dr Mohd Nor Zamri bin Mat Amin dan Dr Ismail bin Haji Parlan, yang merupakan Pengerusi Silih Ganti 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 2023 dan hasil kendaliannya serta perubahan kedudukan kewangannya bagi tempoh berakhir pada tarikh tersebut.

Bagi pihak Institut,



.....
Ts. DR MOHD NOR ZAMRI BIN MAT AMIN
Pengerusi Silih Ganti Institut

26 APR 2024

SELANGOR DARUL EHSAN

Bagi pihak Institut,



.....
DR ISMAIL BIN HAJI PARLAN
Anggota Institut/Ketua Pengarah FRIM

26 APR 2024

SELANGOR DARUL EHSAN

**PENGAKUAN OLEH PEGAWAI UTAMA YANG
BERTANGGUNGJAWAB KE ATAS PENGURUSAN KEWANGAN
INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA**

Saya, **JUMAATON BINTI HAJI ABU BAKAR**, 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 Jumaaton binti Haji Abu Bakar

Pada **26 APR 2024**

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Di hadapan saya



No 3-76E, Jalan Desa 2/3,
Desa Aman Puri, 52100
Kpong, Kuala Lumpur

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

PENYATA KEDUDUKAN KEWANGAN
PADA 31 DISEMBER 2023

	NOTA	KUMPULAN		INSTITUT	
		2023	2022	2023	2022
		RM	RM	RM	RM
ASET SEMASA					
Baki tunai dan bank	5	2,390,710	4,181,807	1,283,036	2,688,782
Simpanan tetap	6	90,491,330	85,895,386	90,491,330	85,895,386
Pelaburan jangka pendek	7	23,752,560	24,026,334	23,752,560	24,026,334
Pelbagai pendahuluan	8	142,524	229,446	142,524	229,446
Bayaran balik cukai pendapatan		598,050	1,061,667	598,050	1,061,667
Inventori	9	45,504	33,360	-	-
Penghutang anak syarikat		-	-	125,490	125,776
Pelbagai penghutang, deposit dan prabayar	10	1,352,235	1,137,233	822,695	850,103
Pinjaman kakitangan	11	162,945	161,690	162,945	161,690
Jumlah aset semasa		118,935,858	116,726,923	117,378,630	115,039,184
ASET BUKAN SEMASA					
Pinjaman kakitangan	11	600,297	404,118	600,297	404,118
Pelaburan dalam anak syarikat	12	-	-	3,000,000	3,000,000
Hartanah pelaburan	13	3,440,395	3,581,690	3,440,395	3,581,690
Hartanah, loji dan peralatan	14	1,244,848,258	1,263,749,759	1,244,761,896	1,263,654,534
Jumlah aset bukan semasa		1,248,888,950	1,267,735,567	1,251,802,588	1,270,640,342
JUMLAH ASET		1,367,824,808	1,384,462,490	1,369,181,218	1,385,679,526
LIABILITI SEMASA					
Manfaat kakitangan	15	514,222	820,387	514,222	820,387
Pelbagai pemiutang	16	8,142,985	9,439,679	6,605,107	7,966,005
Cukai kena bayar		870,026	556,241	870,026	556,241
Jumlah liabiliti semasa		9,527,233	10,816,307	7,989,355	9,342,633
LIABILITI BUKAN SEMASA					
Manfaat kakitangan	15	3,207,565	2,918,200	3,207,565	2,918,200
Dana pinjaman kakitangan	17	9,431,886	9,431,886	9,431,886	9,431,886
Akaun amanah	18	20,596,307	23,871,730	20,596,307	23,871,730
Geran pembangunan	19	151,903,758	155,902,939	151,903,758	155,902,939
Jumlah liabiliti bukan semasa		185,139,516	192,124,755	185,139,516	192,124,755
JUMLAH LIABILITI		194,666,749	202,941,062	193,128,871	201,467,388
ASET BERSIH		1,173,158,059	1,181,521,428	1,176,052,347	1,184,212,138
DIBIAYAI OLEH:					
Kumpulan wang mengurus		1,144,546,601	1,153,135,977	1,147,440,889	1,155,826,687
Kumpulan wang tabung		28,611,458	28,385,451	28,611,458	28,385,451
JUMLAH KUMPULAN WANG		1,173,158,059	1,181,521,428	1,176,052,347	1,184,212,138

Nota yang disertakan di muka surat 8 hingga 23 merupakan sebahagian daripada penyata kewangan.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

PENYATA PRESTASI KEWANGAN
BAGI TAHUN BERAKHIR 31 DISEMBER 2023
KUMPULAN

	NOTA	2023	2022	2023	2022
		RM	RM	RM	RM
PENDAPATAN					
URUSNIAGA BUKAN PERTUKARAN					
Geran mengurus kerajaan		62,228,400	61,384,375	62,228,400	61,384,375
Pelunasan geran pembangunan kerajaan	19	34,242,287	37,946,749	34,242,287	37,946,749
Sumbangan dan bayaran organisasi luar		7,578,532	8,052,299	7,578,532	8,052,299
Denda		149,109	361,658	149,109	361,658
		104,198,328	107,745,081	104,198,328	107,745,081
URUSNIAGA PERTUKARAN					
Bayaran perkhidmatan		3,635,589	3,736,409	3,240,102	3,647,544
Pelbagai jualan		804,096	891,753	721,830	752,045
Sewaan		761,341	821,723	773,341	833,723
Keuntungan atas simpanan tetap dan pelaburan		3,440,271	2,264,040	3,440,271	2,264,040
Keuntungan atas pinjaman kakitangan		26,600	26,455	26,600	26,455
Keuntungan atas jualan pelupusan		45,566	-	45,566	-
Hasil-hasil lain		3,102,293	1,950,100	3,092,396	1,948,214
		11,815,756	9,690,480	11,340,106	9,472,021
JUMLAH PENDAPATAN		116,014,084	117,435,561	115,538,434	117,217,102
PERBELANJAAN					
EMOLUMEN					
Gaji dan upahan		36,220,229	35,642,396	35,695,382	35,178,445
Elaun tetap		9,453,356	9,707,642	9,442,536	9,688,502
Sumbangan berkanun untuk kakitangan		979,934	992,408	911,855	931,387
Elaun lebih masa		576,159	628,383	575,988	626,988
Imbuhan tetap tahunan		1,321,800	446,600	1,321,800	443,100
Faedah-faedah kewangan lain		301,796	286,822	301,796	286,822
		48,853,274	47,704,251	48,249,357	47,155,244
PERKHIDMATAN DAN BEKALAN					
Perbelanjaan perjalanan dan sara hidup kakitangan		4,148,179	4,742,315	4,105,605	4,714,597
Pengangkutan barang-barang		6,564	5,876	6,564	5,876
Perhubungan		185,261	213,486	176,060	201,867
Utiliti		3,823,500	3,396,990	3,815,873	3,385,892
Sewaan		1,985,979	1,829,155	1,976,126	1,822,270
Bekalan bahan mentah dan bahan-bahan untuk penyelenggaraan dan pembaikan		2,006,975	2,715,626	2,006,975	2,715,626
Bekalan dan bahan-bahan lain		3,754,098	3,577,699	3,799,164	3,573,315
Penyelenggaraan dan pembaikan kecil		7,529,246	7,196,998	7,519,549	7,190,768
Perkhidmatan ikhtisas, perkhidmatan- perkhidmatan lain dan hospitaliti		15,937,194	17,366,743	15,919,597	17,457,120
		39,376,996	41,044,888	39,325,513	41,067,331
PERBELANJAAN-PERBELANJAAN LAIN					
Pencen dan ganjaran		6,655,065	6,894,470	6,655,065	6,894,470
Cukai dan insuran		1,294,177	1,226,774	1,292,418	1,225,950
Susutnilai hartanah pelaburan	13	141,296	141,296	141,296	141,296
Susutnilai hartanah, loji dan peralatan	14	24,245,524	23,954,854	24,226,416	23,926,878
Kerugian atas jualan pelupusan		47,766	-	47,766	-
Perbelanjaan-perbelanjaan lain		2,876,022	4,386,744	2,873,061	4,386,169
		35,259,850	36,604,138	35,236,022	36,574,763
JUMLAH PERBELANJAAN		123,490,120	125,353,277	122,810,892	124,797,338
LEBIHAN/(KURANGAN) PENDAPATAN SEBELUM CUKAI					
		(7,476,036)	(7,917,716)	(7,272,458)	(7,580,236)
Cukai pendapatan	23	(887,333)	(529,257)	(887,333)	(529,257)
LEBIHAN/(KURANGAN) PENDAPATAN SELEPAS CUKAI		(8,363,369)	(8,446,973)	(8,159,791)	(8,109,493)

Nota yang disertakan di muka surat 8 hingga 23 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 2023

KUMPULAN

	Kumpulan Wang Mengurus	Kumpulan Wang Tabung	Jumlah Ekuiti
	RM	RM	RM
Baki pada 1 Januari 2022	1,160,361,650	29,606,751	1,189,968,401
Kurangan bersih bagi tahun semasa	(6,102,390)	(2,344,583)	(8,446,973)
Pindahan peruntukan tabung	(1,123,283)	1,123,283	-
Baki pada 31 Disember 2022	1,153,135,977	28,385,451	1,181,521,428
Kurangan bersih bagi tahun semasa	(5,304,228)	(3,059,141)	(8,363,369)
Pindahan peruntukan tabung	(3,285,148)	3,285,148	-
Baki pada 31 Disember 2023	1,144,546,601	28,611,458	1,173,158,059

INSTITUT

	Kumpulan Wang Mengurus	Kumpulan Wang Tabung	Jumlah Ekuiti
	RM	RM	RM
Baki pada 1 Januari 2022	1,162,714,880	29,606,751	1,192,321,631
Kurangan bersih bagi tahun semasa	(5,764,910)	(2,344,583)	(8,109,493)
Pindahan peruntukan tabung	(1,123,283)	1,123,283	-
Baki pada 31 Disember 2022	1,155,826,687	28,385,451	1,184,212,138
Kurangan bersih bagi tahun semasa	(5,100,650)	(3,059,141)	(8,159,791)
Pindahan peruntukan tabung	(3,285,148)	3,285,148	-
Baki pada 31 Disember 2023	1,147,440,889	28,611,458	1,176,052,347

Nota yang disertakan di muka surat 8 hingga 23 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 2023

NOTA	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
ALIRAN TUNAI DARIPADA AKTIVITI OPERASI				
Lebihan/(Kurangan) pendapatan sebelum cukai	(7,476,036)	(7,917,716)	(7,272,458)	(7,580,236)
Pelarasan untuk :				
Peruntukan hutang ragu / hapuskira	-	20,032	-	20,032
Pencen dan ganjaran	1,314,111	649,550	1,314,111	649,550
Susutnilai hartanah, loji dan peralatan	24,245,524	23,954,854	24,226,416	23,926,878
Susutnilai hartanah pelaburan	141,296	141,296	141,296	141,296
Terimaan cukai	430,068	-	430,068	-
Keuntungan pelaburan jangka pendek	(628,748)	(541,290)	(628,748)	(541,290)
Pelunasan geran kerajaan	(41,705,329)	(45,965,087)	(41,705,329)	(45,965,087)
Tunai digunakan dalam aktiviti operasi sebelum perubahan modal kerja	(23,679,114)	(29,658,361)	(23,494,644)	(29,348,857)
Pengurangan dalam modal kerja				
Pelbagai penghutang, deposit dan prabayar	(215,002)	665,502	27,408	398,790
Tambahan/kurangan dalam penghutang anak syarikat	-	-	286	(89,759)
Inventori	(12,144)	(6,567)	-	-
Pelbagai pendahuluan	86,922	(21,504)	86,922	(47,099)
Pelbagai pemiutang, deposit dan akruan	(1,296,694)	(1,266,702)	(1,360,898)	(1,039,755)
	(1,436,918)	(629,271)	(1,246,282)	(777,823)
Bayaran cukai	(540,000)	(619,200)	(540,000)	(619,200)
Tunai bersih digunakan dalam aktiviti operasi	(25,656,032)	(30,906,832)	(25,280,926)	(30,745,880)
ALIRAN TUNAI DARIPADA AKTIVITI PELABURAN				
Tambahan pelaburan jangka pendek	(13,000,000)	(7,000,000)	(13,000,000)	(7,000,000)
Penjualan pelaburan jangka pendek / panjang	13,902,522	9,568,904	13,902,522	9,568,904
Tambahan pinjaman kakitangan	(417,800)	(56,500)	(417,800)	(56,500)
Bayaran pinjaman kakitangan	220,366	249,308	220,366	249,308
Pembelian hartanah, loji dan peralatan	(6,114,856)	(7,478,527)	(6,104,611)	(7,475,243)
Pelarasan/pelupusan hartanah, loji dan peralatan	770,833	3,314,606	770,833	3,314,606
Tunai bersih digunakan dalam aktiviti pelaburan	(4,638,935)	(1,402,209)	(4,628,690)	(1,398,925)
ALIRAN TUNAI DARIPADA AKTIVITI PEMBIAYAAN				
Terimaan geran	34,430,725	37,751,201	34,430,725	37,751,201
Pembayaran manfaat kakitangan	(1,330,911)	(1,886,030)	(1,330,911)	(1,886,030)
Tunai bersih digunakan dalam aktiviti pembiayaan	33,099,814	35,865,171	33,099,814	35,865,171
Lebihan/(Pengurangan) bersih tunai dan kesetaraan tunai	2,804,847	3,556,130	3,190,198	3,720,366
Tunai dan kesetaraan tunai pada awal tahun	90,077,193	86,521,063	88,584,168	84,863,802
Tunai dan kesetaraan tunai pada akhir tahun	92,882,040	90,077,193	91,774,366	88,584,168
TERDIRI DARIPADA:				
Baki tunai dan bank	5 2,390,710	4,181,807	1,283,036	2,688,782
Simpanan tetap	6 90,491,330	85,895,386	90,491,330	85,895,386
	92,882,040	90,077,193	91,774,366	88,584,168

Nota yang disertakan di muka surat 8 hingga 23 merupakan sebahagian daripada penyata kewangan.

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PENYATA PRESTASI BAJET
BAGI TAHUN BERAKHIR 31 DISEMBER 2023

MENGURUS

	2023				2022			
	Asal RM	Sebenar RM	Varian RM	%	Asal RM	Sebenar RM	Varian RM	%
PENERIMAAN								
Peruntukan kerajaan	62,228,400	62,228,400	-	-	61,384,500	61,384,500	-	-
Sumber dalaman	1,130,000	1,130,000	-	-	-	-	-	-
Sekatan peruntukan	-	-	-	-	(125)	(125)	-	-
	63,358,400	63,358,400	-	-	61,384,375	61,384,375	-	-
PEMBAYARAN								
Emolumen	42,597,000	42,596,578	(422)	0.00%	41,120,000	41,116,967	(3,033)	-0.01%
Perkhidmatan dan bekalan	12,124,500	12,124,399	(101)	0.00%	11,344,500	11,336,191	(8,309)	-0.07%
Belanja modal	171,000	170,245	(755)	-0.44%	640,000	639,248	(752)	-0.12%
Pemberian dan bayaran tetap	6,494,000	6,494,658	658	0.01%	6,704,000	6,702,947	(1,053)	-0.02%
Perbelanjaan-perbelanjaan lain	1,971,900	1,971,634	(266)	-0.01%	1,576,000	1,575,802	(198)	-0.01%
	63,358,400	63,357,514	(886)	-0.45%	61,384,500	61,371,155	(13,345)	-0.23%
	-	886	886	0.45%	(125)	13,220	13,345	0.23%

Sebagai sebuah Badan Berkanun Persekutuan (BBP), penyaluran geran FRIM daripada Kementerian adalah di bawah satu (1) objek am iaitu pemberian dan bayaran tetap. FRIM akan membuat agihan peruntukan yang diterima berdasarkan keperluan dalaman. FRIM sentiasa mengawal perbelanjaan agar tidak melebihi peruntukan yang diluluskan namun sekiranya geran yang diterima tidak mencukupi, FRIM akan menggunakan sumber dalaman untuk membiayai lebihan perbelanjaannya.

Nota yang disertakan di muka surat 8 hingga 23 merupakan sebahagian daripada penyata kewangan.

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NOTA KEPADA PENYATA KEWANGAN
BAGI TAHUN BERAKHIR 31 DISEMBER 2023

1. MAKLUMAT KORPORAT

Institut Penyelidikan Perhutanan Malaysia (Institut) adalah sebuah agensi di bawah Kementerian Sumber Asli, Alam Sekitar dan Perubahan Iklim (NRECC). Pada 12 Disember 2023, nama Kementerian telah ditukar kepada Kementerian Sumber Asli dan Kelestarian Alam (NRES). 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 2023 hingga 31 Disember 2023.

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NOTA KEPADA PENYATA KEWANGAN
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3. DASAR-DASAR PERAKAUNAN YANG PENTING (SAMBUNGAN)

3.3 Perakaunan untuk pemberian (Geran) oleh Kerajaan Persekutuan

(i) Pengiktirafan bagi geran

Pemberian yang diterima daripada Kerajaan Persekutuan hendaklah diperakaunkan mengikut keperluan piawaian perakaunan yang diterima pakai. Secara amnya, pemberian boleh diperakaunkan sebagai hasil atau liabiliti pendapatan tertunda bergantung kepada inti pati yang terkandung dalam sesuatu pemberian.

(ii) Perakaunan kumpulan wang

Setiap transaksi termasuk penerimaan geran dari Kerajaan Persekutuan yang berkaitan dengan sesuatu kumpulan wang, umpamanya kumpulan wang pusingan untuk pinjaman kenderaan dan kumpulan wang pembangunan perlu diperakaunkan mengikut kumpulan wang tersebut dan tidak bercampur dengan transaksi BBP yang lain.

Baki kumpulan wang hendaklah dipersembahkan dalam penyata kewangan sebagai liabiliti atau ekuiti adalah bergantung kepada inti pati kumpulan wang tersebut.

Sebarang lebihan daripada perbelanjaan, termasuk pemberian bagi setiap tahun kewangan, tidak boleh dipindahkan kepada satu kumpulan wang rizab atau dibelanjakan untuk tujuan-tujuan lain, selain daripada tujuan yang diluluskan oleh Perbendaharaan terlebih dahulu.

(iii) Pinjaman kakitangan:

i. Pinjaman perumahan

Geran yang diterima untuk tujuan membiayai pinjaman perumahan kepada kakitangan adalah dikreditkan ke dana pinjaman kakitangan.

ii. Pinjaman kenderaan

Geran yang diterima untuk tujuan membiayai pinjaman kenderaan kepada kakitangan adalah dikreditkan ke dana pinjaman kakitangan.

iii. 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. DASAR-DASAR PERAKAUNAN YANG PENTING (SAMBUNGAN)

3.6 Hartanah, loji dan peralatan

Hartanah, loji dan peralatan dinyatakan pada kos atau penilaian semula setelah ditolak susut nilai 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 jangka masa 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, susut nilai diperuntukkan mengikut kaedah garis lurus untuk menghapuskan kos aset atau nilai penilaian semula berkenaan sepanjang hayat kegunaannya. Kadar tahunan susut nilai adalah seperti berikut:

Bangunan	2% - 4%
Infrastruktur	4%
Kenderaan	20%
Perabot dan kelengkapan	20%
Mesin dan alat-alat	20%
Peralatan Muzium	20%

3.7 Rosot nilai aset

Nilai yang dibawa oleh aset-aset, disemak bagi tujuan rosot nilai bila ada tanda-tanda menunjukkan aset tersebut mengalami kemerosotan nilai. Rosot nilai 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 rosot nilai dikenakan di dalam penyata pendapatan serta merta, melainkan jumlah aset yang telah dibawa pada penilaian semula. Sebarang kerugian rosot nilai 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 rosot nilai yang sebelum ini sehingga amaun dibawa bagi aset tersebut ditentukan (bersih daripada pelunasan dan susut nilai) tidak mempunyai kerugian rosot nilai yang diiktiraf di dalam penyata pendapatan serta merta, melainkan aset yang dinyatakan pada penilaian semula. Penolakan daripada kerugian rosot nilai atas aset yang dinilai semula dikredit secara terus kepada lebihan penilaian semula. Walau bagaimanapun, ianya terhad kepada kerugian rosot nilai bagi aset yang dinilai semula yang diiktiraf sebagai belanja dalam penyata pendapatan sebelum ini, penolakan daripada kerugian rosot nilai 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.

3. DASAR-DASAR PERAKAUNAN YANG PENTING (SAMBUNGAN)

3.8 Hartanah pelaburan

Hartanah pelaburan adalah hartanah yang dimiliki untuk mendapatkan pendapatan sewa atau untuk menambahkan nilai modal atau kedua-duanya. Hartanah pelaburan dinyatakan mengikut model kos dengan mengukur nilai semua hartanah pelaburannya, iaitu pada kos ditolak dengan susut nilai terkumpul dan kerugian penjejasan terkumpul. Hartanah pelaburan bagi bangunan disusutnilaikan pada kadar 2% - 4% mengikut kaedah garis lurus.

3.9 Pelbagai penghutang

Pelbagai penghutang dinyatakan berdasarkan jumlah yang diinvois atau yang dibuktikan sepatutnya diterima setelah ditolak jumlah yang tidak boleh dikutip. Anggaran untuk peruntukan hutang ragu dan hapus kira 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 melebihi tiga(3) tahun dan enam(6) tahun bagi hapus kira.

3.11 Inventori

Inventori adalah diukur pada nilai yang lebih rendah antara kos dan anggaran harga jualan ditolak kos siapan dan jualan. Kos inventori terdiri daripada semua kos pembelian, kos penukaran dan kos lain yang melibatkan dalam membawa inventori ke lokasi dengan keadaan semasanya. Kos inventori diukur dengan menggunakan kaedah masuk dulu keluar dulu.

Pada setiap tarikh pelaporan, inventori dinilai untuk rosot nilai. Jika sesuatu item inventori dirosotnilai, nilai bawaan dikurangkan kepada harga jualan ditolak kos untuk siapan dan jualan; kerugian rosot nilai diiktiraf dengan serta merta dalam untung atau rugi. Pada setiap tarikh pelaporan kemudian, Kumpulan dan Syarikat membuat penilaian baharu harga jualan ditolak kos untuk siapan dan jualan. Jika terdapat sebarang tanda bahawa kerugian rosot nilai diiktiraf dalam tempoh sebelumnya mungkin tidak lagi wujud atau apabila terdapat bukti jelas peningkatan dalam harga jualan ditolak kos untuk siapan dan jualan disebabkan oleh perubahan keadaan ekonomi, kerugian rosot nilai dibalikkan setakat di mana nilai bawaan baharu adalah lebih rendah antara kos dan harga jualan yang disemak semula ditolak kos untuk siapan dan jualan.

3.12 Tunai dan kesetaraan tunai

Tunai dan kesetaraan tunai seperti dicatat dalam penyata aliran tunai adalah terdiri daripada baki tunai dan bank serta simpanan tetap.

3.13 Pengiktirafan pendapatan

Pendapatan daripada hasil jualan dan perkhidmatan serta hasil-hasil lain diiktiraf berasaskan akruan.

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3. DASAR-DASAR PERAKAUNAN YANG PENTING (SAMBUNGAN)

3.14 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 180 hari bagi sepanjang tempoh perkhidmatan.

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.

3.15 Pengiktirafan hasil

(a) Pengiktirafan hasil daripada urus niaga bukan pertukaran

Urus niaga bukan pertukaran akan diiktiraf sebagai aset apabila terdapat manfaat ekonomi masa depan atau potensi perkhidmatan dijangka mengalir ke entiti, ianya berpunca daripada peristiwa lampau serta nilai saksama aset dapat diukur dengan munasabah. Urus niaga bukan pertukaran yang diiktiraf sebagai aset hendaklah diiktiraf sebagai hasil, kecuali setakat liabiliti yang juga diiktiraf berkenaan dengan aliran masuk yang sama sebagai belum dilunaskan di dalam Penyata Kedudukan Kewangan. Apabila obligasi terhadap sesuatu liabiliti itu telah dipenuhi, entiti hendaklah mengurangkan amaun bawaan liabiliti itu dan mengiktiraf amaun hasil yang sama dengan pengurangan itu.

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3. DASAR-DASAR PERAKAUNAN YANG PENTING (SAMBUNGAN)

3.15 Pengiktirafan hasil (Sambungan)

Hasil daripada urus niaga bukan pertukaran adalah seperti berikut:

(i) Geran kerajaan

Geran mengurus kerajaan yang diterima bagi membiayai perbelanjaan operasi yang tidak dikenakan syarat-syarat prestasi adalah diambil kira sebagai hasil di dalam penyata pendapatan tahun semasa. Geran kerajaan yang dikenakan syarat-syarat prestasi masa depan tertentu seperti geran pembangunan diiktiraf sebagai pelunasan geran sebagai hasil bersamaan dengan amaun bawaan liabiliti yang telah memenuhi syarat.

(ii) Sumbangan dan bayaran organisasi luar

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 susut nilai.

(iii) Denda dan hukuman

Denda dan hukuman merupakan bayaran denda, hukuman-hukuman lain yang dikenakan kerana melanggar undang-undang atau kerana kegagalan memenuhi tanggungan kontrak sama ada berkaitan dengan spesifikasi atau masa termasuk denda ganti rugi kena surcaj, bayaran pampasan ganti rugi, pecah kontrak dan lain-lain denda.

(b) Pengiktirafan hasil daripada urus niaga pertukaran

Hasil daripada urus niaga pertukaran diiktiraf apabila terdapat kemungkinan bahawa manfaat ekonomi masa hadapan atau potensi perkhidmatan akan mengalir kepada entiti dan maafaat ini boleh diukur dengan pasti.

Hasil daripada urus niaga pertukaran adalah seperti berikut:

(i) Perkhidmatan dan bayaran perkhidmatan

Perkhidmatan dan bayaran perkhidmatan ini melibatkan semua terimaan berkenaan dengan perkhidmatan yang diberi oleh Institut termasuk perkhidmatan ujian, pemprosesan kayu, nasihat, perundingan percetakan dan lain-lain perkhidmatan.

(ii) Sewaan

Perolehan daripada sewaan merupakan terimaan daripada sewaan lokasi, peralatan, tapak ujian, rumah tetamu dan lain-lain sewaan.

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3. DASAR-DASAR PERAKAUNAN YANG PENTING (SAMBUNGAN)

3.15 Pengiktirafan hasil (Sambungan)

(iii) Pelbagai jualan

Perolehan daripada jualan merupakan terimaan daripada jualan cenderahati, hasil tanaman, pokok, buku, jurnal dan lain-lain jualan.

(iv) Keuntungan atas pinjaman kakitangan

Hasil keuntungan daripada pinjaman kakitangan seperti perumahan, kenderaan dan komputer diiktiraf atas dasar kadar keuntungan 4% setahun ke atas baki pokok bulanan.

(v) Keuntungan atas simpanan tetap dan pelaburan

Hasil keuntungan daripada pelaburan diiktiraf atas dasar perkadaran masa yang mengambil kira kadar pulangan hasil efektif atas aset tersebut. Kadar pulangan hasil efektif ke atas aset ialah kadar keuntungan yang diperlukan untuk mendiskaunkan jangkaan aliran penerimaan tunai masa hadapan sepanjang hayat aset tersebut untuk disamakan dengan amaun bawaan awal aset tersebut.

(vi) Lain-lain terimaan adalah terimaan selain daripada nota 3.15 (i) hingga (v) di atas. Ianya diiktiraf selepas perkhidmatan diberikan.

3.16 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.

3.17 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.

3.18 Cukai anak syarikat

Cukai pendapatan untuk untung atau rugi bagi tempoh semasa terdiri daripada cukai semasa dan cukai tertunda. Cukai semasa ialah jumlah anggaran cukai pendapatan yang perlu dibayar ke atas keuntungan boleh cukai bagi tempoh semasa dan dikira menggunakan kadar cukai yang dikuat kuasa pada tarikh penyata kedudukan kewangan.

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3. DASAR-DASAR PERAKAUNAN YANG PENTING (SAMBUNGAN)

3.18 Cukai anak syarikat (Sambungan)

Cukai tertunda diperuntukkan dengan menggunakan kaedah liabiliti ke atas perbezaan sementara pada tarikh penyata kedudukan kewangan di antara asas cukai dan nilai bawaan bagi aset dan liabiliti dalam penyata kewangan. Secara prinsipnya, liabiliti cukai tertunda diiktiraf bagi kesemua perbezaan sementara boleh cukai, dan aset cukai tertunda diiktiraf bagi kesemua perbezaan sementara boleh tolak, kerugian cukai belum digunakan dan kredit cukai belum digunakan sehingga ketahap di mana perbezaan sementara boleh ditolak, kerugian cukai belum digunakan dan kredit cukai belum digunakan boleh direalisasikan dengan keuntungan boleh cukai masa depan yang boleh dicapai.

Cukai tertunda tidak akan diiktiraf jika perbezaan sementara wujud daripada muhibah atau muhibah negatif atau daripada pengiktirafan awal sesuatu aset atau liabiliti dalam transaksi yang bukan kombinasi perniagaan dan pada masa transaksi tersebut, tidak memberi kesan terhadap keuntungan perakaunan atau keuntungan boleh cukai.

Cukai tertunda dikira pada kadar cukai yang diramal akan dikenakan dalam tempoh apabila aset itu direalisasikan, atau liabiliti itu diselesaikan, berdasarkan kadar cukai yang telah dikuat kuasa ataupun telah dikuat kuasa sebahagian besarnya pada tarikh penyata kedudukan kewangan. Cukai tertunda diiktiraf dalam penyata pendapatan, kecuali jika terhasil daripada transaksi yang diiktiraf terus ke dalam ekuiti, di mana cukai tertunda dicajkan atau dikreditkan terus ke dalam ekuiti ataupun bila ia terhasil daripada kombinasi perniagaan yang merupakan pengambilalihan syarikat di mana cukai tertunda dimasukkan ke dalam muhibah atau muhibah negatif yang terhasil.

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 disebut harga 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 urusan 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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	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
5. BAKI TUNAI DAN BANK				
Baki di Bank	2,378,275	4,169,323	1,270,686	2,676,352
Baki Tunai	12,435	12,484	12,350	12,430
	2,390,710	4,181,807	1,283,036	2,688,782

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
6. SIMPANAN TETAP				
Simpanan dengan bank berlesen	65,790,023	59,266,815	65,790,023	59,266,815
Simpanan dengan institusi kewangan yang diluluskan	24,701,307	26,628,571	24,701,307	26,628,571
	90,491,330	85,895,386	90,491,330	85,895,386

Kadar keuntungan yang diterima bagi simpanan tetap bagi tempoh berakhir 31 Disember 2023 adalah diantara 1.85% sehingga 3.8% setahun bagi tempoh diantara satu bulan sehingga tiga bulan.

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
7. PELABURAN JANGKA PENDEK				
Simpanan dengan bank berlesen	15,482,683	16,664,256	15,482,683	16,664,256
Simpanan dengan institusi kewangan yang diluluskan	8,269,877	7,362,078	8,269,877	7,362,078
	23,752,560	24,026,334	23,752,560	24,026,334

Kadar keuntungan yang diterima bagi pelaburan jangka pendek bagi tempoh berakhir 31 Disember 2023 adalah diantara 2.2% sehingga 4% setahun bagi tempoh diantara empat bulan sehingga setahun.

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
8. PELBAGAI PENDAHULUAN				
Pendahuluan diri kakitangan	121,174	212,880	121,174	212,880
Deposit dibayar	21,350	16,566	21,350	16,566
	142,524	229,446	142,524	229,446

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
9. INVENTORI				
Kos Inventori			45,504	33,360

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
10. PELBAGAI PENGHUTANG, DEPOSIT DAN PRABAYAR				
Pelbagai penghutang perniagaan	750,281	831,173	220,741	544,043
Tolak : Elaun bagi rosotnilai	(66,682)	(66,682)	(66,682)	(66,682)
	683,599	764,491	154,059	477,361
Faedah terakru (simpanan tetap)	548,781	316,791	548,781	316,791
Pelbagai penerimaan lain	119,855	55,951	119,855	55,951
	1,352,235	1,137,233	822,695	850,103

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	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
11. PINJAMAN KAKITANGAN				
Pinjaman yang perlu dibayar selepas 12 bulan	600,297	404,118	600,297	404,118
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	162,945	161,690	162,945	161,690
	763,242	565,808	763,242	565,808
a. Perumahan				
Pinjaman yang perlu dibayar selepas 12 bulan	-	258	-	258
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	258	3,657	258	3,657
	258	3,915	258	3,915
b. Kenderaan				
Pinjaman yang perlu dibayar selepas 12 bulan	589,424	399,416	589,424	399,416
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	154,485	149,896	154,485	149,896
	743,909	549,312	743,909	549,312
c. Komputer				
Pinjaman yang perlu dibayar selepas 12 bulan	10,873	4,444	10,873	4,444
Pinjaman yang perlu dibayar dalam tempoh 12 bulan	8,202	8,137	8,202	8,137
	19,075	12,581	19,075	12,581
	763,242	565,808	763,242	565,808

Institut menawarkan tiga jenis kemudahan pinjaman kepada kakitangannya dengan kadar keuntungan sebanyak 4% setahun ke atas baki pokok bulanan.

	INSTITUT	
	2023	2022
	RM	RM
12. PELABURAN DALAM ANAK SYARIKAT		
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.		

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
13. HARTANAH PELABURAN				
Bangunan				
Kos	4,464,789	4,464,789	4,464,789	4,464,789
Susutnilai terkumpul	(883,098)	(741,803)	(883,098)	(741,803)
Susutnilai semasa	(141,296)	(141,296)	(141,296)	(141,296)
Nilai buku	3,440,395	3,581,690	3,440,395	3,581,690

Hartanah pelaburan bagi bangunan disusutnilaikan pada kadar 2% - 4% mengikut kaedah garis lurus.

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14. HARTANAH, LOJI DAN PERALATAN

14.1 TAHUN 2023

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
1,237,633,769	95,094,799	22,784,225	3,493,906	9,671,282	33,332,474	12,750	3,456,858	1,405,480,063
-	400,459	555,064	224,300	1,270,004	2,509,100	-	968,854	5,927,781
-	187,075	-	-	-	-	-	(187,075)	-
-	-	(223,802)	(41,019)	(112,924)	(10,564)	-	-	(388,309)
-	-	-	-	-	-	-	(371,959)	(371,959)
1,237,633,769	95,682,333	23,115,487	3,677,187	10,828,362	35,831,010	12,750	3,866,678	1,410,647,576

Susutnilai terkumpul

87,739,802	16,136,690	4,829,695	2,555,476	6,464,790	23,991,304	12,547	-	141,730,304
14,124,083	2,621,896	924,872	415,336	1,334,941	4,824,396	-	-	24,245,524
-	-	(15,026)	(41,015)	(109,972)	(10,497)	-	-	(176,510)
-	-	-	-	-	-	-	-	-
101,863,885	18,758,586	5,739,541	2,929,797	7,689,759	28,805,203	12,547	-	165,799,318

Nilai Bawaan

1,135,769,884	76,923,747	17,375,946	747,390	3,138,603	7,025,807	203	3,866,678	1,244,848,258
1,149,893,967	78,958,109	17,954,530	938,430	3,206,492	9,341,170	203	3,456,858	1,263,749,759

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
1,237,633,769	95,094,799	22,736,725	3,493,906	9,517,245	33,332,474	12,750	3,456,858	1,405,278,526
-	400,459	555,064	224,300	1,259,759	2,509,100	-	968,854	5,917,536
-	187,075	-	-	-	-	-	(187,075)	-
-	-	(223,802)	(41,019)	(112,924)	(10,564)	-	-	(388,309)
-	-	-	-	-	-	-	(371,959)	(371,959)
1,237,633,769	95,682,333	23,067,987	3,677,187	10,664,080	35,831,010	12,750	3,866,678	1,410,435,794

Susutnilai terkumpul

87,739,802	16,136,690	4,828,903	2,555,476	6,359,270	23,991,304	12,547	-	141,623,992
14,124,083	2,621,896	920,122	415,336	1,320,583	4,824,396	-	-	24,226,416
-	-	(15,026)	(41,015)	(109,972)	(10,497)	-	-	(176,510)
-	-	-	-	-	-	-	-	-
101,863,885	18,758,586	5,733,999	2,929,797	7,569,881	28,805,203	12,547	-	165,673,898

Nilai Bawaan

1,135,769,884	76,923,747	17,333,988	747,390	3,094,199	7,025,807	203	3,866,678	1,244,761,896
1,149,893,967	78,958,109	17,907,822	938,430	3,157,975	9,341,170	203	3,456,858	1,263,654,534

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14. HARTANAH, LOJI DAN PERALATAN

14.2 TAHUN 2022

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	1,237,633,769		94,994,190		22,468,771		3,653,721		7,422,577		31,690,763		12,762		3,104,997		1,400,981,550	
Pada 1 Januari 2022	-		153,609		120,877		-		2,332,400		1,863,145		-		3,008,496		7,478,527	
Penambahan	-		-		1,192,719		-		-		-		-		(1,192,719)		-	
Pindahan	-		(53,000)		(998,142)		(98,215)		(83,693)		(221,433)		-		-		(1,454,483)	
Pelupusan	-		-		-		(61,600)		(2)		(1)		(12)		(1,463,916)		(1,525,531)	
Pelarasan	1,237,633,769		95,094,799		22,784,225		3,493,906		9,671,282		33,332,474		12,750		3,456,858		1,405,480,063	
Susutnilai terkumpul																		
Pada 1 Januari 2022	73,615,719		13,541,943		3,233,042		2,236,601		5,279,670		19,521,337		12,547		-		117,440,859	
Susut nilai semasa	14,124,083		2,605,877		902,921		409,766		1,260,118		4,652,089		-		-		23,954,854	
Pelupusan	-		(11,130)		(94,921)		(78,571)		(74,998)		(182,122)		-		-		(441,742)	
Pelarasan	-		-		788,653		(12,320)		-		-		-		-		776,333	
Pada 31 Disember 2022	87,739,802		16,136,690		4,829,695		2,555,476		6,464,790		23,991,304		12,547		-		141,730,304	
Nilai Bawaan																		
Pada 31 Disember 2022	1,149,893,967		78,958,109		17,954,530		938,430		3,206,492		9,341,170		203		3,456,858		1,263,749,759	

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	1,237,633,769		94,994,190		22,421,271		3,653,721		7,271,824		31,690,763		12,762		3,104,997		1,400,783,297	
Pada 1 Januari 2022	-		153,609		120,877		-		2,329,116		1,863,145		-		3,008,496		7,475,243	
Penambahan	-		-		1,192,719		-		-		-		-		(1,192,719)		-	
Pindahan	-		(53,000)		(998,142)		(98,215)		(83,693)		(221,433)		-		-		(1,454,483)	
Pelupusan	-		-		-		(61,600)		(2)		(1)		(12)		(1,463,916)		(1,525,531)	
Pelarasan	1,237,633,769		95,094,799		22,736,725		3,493,906		9,517,245		33,332,474		12,750		3,456,858		1,405,278,526	
Susutnilai terkumpul																		
Pada 1 Januari 2022	73,615,719		13,541,943		3,232,250		2,236,601		5,202,126		19,521,337		12,547		-		117,362,523	
Susut nilai semasa	14,124,083		2,605,877		902,921		409,766		1,232,142		4,652,089		-		-		23,926,878	
Pelupusan	-		(11,130)		(94,921)		(78,571)		(74,998)		(182,122)		-		-		(441,742)	
Pelarasan	-		-		788,653		(12,320)		-		-		-		-		776,333	
Pada 31 Disember 2022	87,739,802		16,136,690		4,828,903		2,555,476		6,359,270		23,991,304		12,547		-		141,623,992	
Nilai Bawaan																		
Pada 31 Disember 2022	1,149,893,967		78,958,109		17,907,822		938,430		3,157,975		9,341,170		203		3,456,858		1,263,654,534	

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	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
15. MANFAAT KAKITANGAN				
(a) Peruntukan Gantian Cuti Rehat				
Baki Awal	3,581,319	4,807,164	3,581,319	4,807,164
Peruntukan	804,143	708,852	804,143	708,852
Pembayaran	(1,164,422)	(1,751,869)	(1,164,422)	(1,751,869)
Pelarasan berkurangan peruntuk	335,698	806,057	335,698	806,057
Pelarasan nilai saksama	(530)	(988,885)	(530)	(988,885)
Baki Akhir	3,556,208	3,581,319	3,556,208	3,581,319
Gantian yang perlu dibayar selepas 12 bulan	3,207,565	2,918,200	3,207,565	2,918,200
Gantian yang perlu dibayar dalam tempoh 12 bulan	348,643	663,119	348,643	663,119
	3,556,208	3,581,319	3,556,208	3,581,319
(b) Peruntukan Ganjaran Tamat Kontrak				
Baki Awal	157,268	167,903	157,268	167,903
Peruntukan	178,066	176,986	178,066	176,986
Pembayaran	(166,489)	(134,161)	(166,489)	(134,161)
Pelarasan	(3,266)	(53,460)	(3,266)	(53,460)
Baki Akhir	165,579	157,268	165,579	157,268
Ganjaran yang perlu dibayar dalam tempoh 12 bulan	165,579	157,268	165,579	157,268
JUMLAH	3,721,787	3,738,587	3,721,787	3,738,587
	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
16. PELBAGAI PEMIUTANG				
Pemiutang dan akruan	7,583,431	8,885,931	6,045,553	7,412,257
Deposit diterima	559,554	553,748	559,554	553,748
	8,142,985	9,439,679	6,605,107	7,966,005
	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
17. DANA PINJAMAN KAKITANGAN				
Dana pinjaman perumahan :				
Baki pinjaman perumahan belum terima	258	3,915	258	3,915
Pinjaman belum digunakan	4,131,628	4,127,971	4,131,628	4,127,971
	4,131,886	4,131,886	4,131,886	4,131,886
Dana pinjaman kenderaan :				
Baki pinjaman kenderaan belum terima	743,910	549,312	743,910	549,312
Pinjaman belum digunakan	4,056,090	4,250,688	4,056,090	4,250,688
	4,800,000	4,800,000	4,800,000	4,800,000

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17. DANA PINJAMAN KAKITANGAN (SAMBUNGAN)

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
Dana pinjaman komputer :				
Baki pinjaman komputer belum terima	19,075	12,581	19,075	12,581
Pinjaman belum digunakan	480,925	487,419	480,925	487,419
	500,000	500,000	500,000	500,000
JUMLAH	9,431,886	9,431,886	9,431,886	9,431,886

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
18. AKAUN AMANAH				
Baki Awal	23,871,730	24,100,267	23,871,730	24,100,267
Terimaan	4,187,619	7,789,801	4,187,619	7,789,801
Pelunasan	(7,463,042)	(8,018,338)	(7,463,042)	(8,018,338)
Baki Akhir	20,596,307	23,871,730	20,596,307	23,871,730

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
19. GERAN PEMBANGUNAN				
Baki Awal	155,902,939	163,888,288	155,902,939	163,888,288
Terimaan:				
Terimaan daripada RMKe12 NRES	25,271,600	26,600,000	25,271,600	26,600,000
Lain-lain terimaan	4,971,506	3,361,400	4,971,506	3,361,400
	30,243,106	29,961,400	30,243,106	29,961,400
Pelunasan:				
Pelunasan daripada RMKe12 NRES	22,439,529	21,152,632	22,439,529	21,152,632
Lain-lain pelunasan	11,802,758	16,794,117	11,802,758	16,794,117
	34,242,287	37,946,749	34,242,287	37,946,749
Baki Akhir	151,903,758	155,902,939	151,903,758	155,902,939

Lain-lain terimaan adalah terdiri daripada penerimaan geran daripada pelbagai kementerian selain RMKe12 NRES.

20. PENGLIBATAN MODAL

Penglibatan modal bagi kontrak-kontrak dalam pelaksanaan yang tidak diiktiraf bagi tahun berakhir 31 Disember 2023 sebanyak RM2,480,368.(31 Disember 2022: RM1,092,337)

21. BILANGAN KAKITANGAN

Bilangan kakitangan tetap (tidak termasuk Anggota Institut) pada 31 Disember 2023 adalah seramai 591 orang. (31 Disember 2022: 603 orang)

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.

INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA
(Ditubuhkan di bawah Akta Institut Penyelidikan Perhutanan Malaysia 2016)

NOTA KEPADA PENYATA KEWANGAN BAGI TAHUN BERAKHIR 31 DISEMBER 2023

22. TRANSAKSI PIHAK BERKAITAN (SAMBUNGAN)

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
(a) Urusniaga Pihak Berkaitan				
FRIM Incorporated Sdn Bhd				
Pendapatan perkhidmatan	136,424	191,899	136,424	191,899
Jualan	54,806	2,330	54,806	2,330
Sewaan	12,000	12,000	12,000	12,000
	203,230	206,229	203,230	206,229
(b) Ganjaran Kepada Ahli Lembaga Pengarah				
Elaun Anggota Institut	319,155	314,292	319,155	314,292
Elaun Ahli Lembaga Pengarah Anak Syarikat	26,000	32,508	-	-
	345,155	346,800	319,155	314,292

Elaun Pengerusi dan Anggota Institut adalah masing-masing sebanyak RM6,116 dan RM1,835 sebulan serta sebanyak RM500 dan RM300 bagi elaun kehadiran mesyuarat.

23. CUKAI PENDAPATAN

	KUMPULAN		INSTITUT	
	2023	2022	2023	2022
	RM	RM	RM	RM
Cukai pendapatan berdasarkan keputusan tahun semasa:				
Cukai Malaysia	540,000	561,150	540,000	561,150
Lebihan/ (Kurangan) peruntukan cukai semasa pada tahun terdahulu	347,333	(31,893)	347,333	(31,893)
	887,333	529,257	887,333	529,257
Pendapatan cukai dipersetujui / (belanja) pada keuntungan / (kerugian) dengan kadar cukai setara:				
Kurangan pendapatan sebelum cukai	(7,476,036)	(7,917,716)	(7,272,458)	(7,580,236)
Cukai pada kadar berkanun 24%	(1,794,249)	(1,900,252)	(1,745,390)	(1,819,257)
Perbelanjaan tidak dibenarkan cukai	28,700,139	29,281,212	28,652,786	29,269,847
Elaun modal diserap	(73,454)	(68,256)	(74,961)	(92,150)
Pendapatan tidak dikenakan cukai	(24,984,575)	(25,784,486)	(24,984,574)	(25,784,486)
Kerugian perniagaan diserap	(998,498)	(1,018,120)	(998,498)	(1,018,120)
Terlebih / (Terkurang) peruntukan cukai tahun sebelumnya	37,970	(26,577)	37,970	(26,577)
Pendapatan tertunda yang dinilai dalam tahun semasa	-	18,288	-	-
Tidak menggunakan kerugian yang tidak diserap	-	530,435	-	-
Kerugian perniagaan agregat	-	(502,987)	-	-
Cukai tahun semasa	887,333	529,257	887,333	529,257

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NOTA KEPADA PENYATA KEWANGAN BAGI TAHUN BERAKHIR 31 DISEMBER 2023

24. MAKLUMAT BAJET

Bajet diluluskan pada asas tunai ubahsuai secara pengelasan. Bajet yang diluluskan meliputi tempoh fiskal daripada 1 Januari 2023 hingga 31 Disember 2023.

Jumlah dalam Penyata Kewangan ini telah disusun semula dari asas akruan kepada asas tunai ubahsuai dan diklasifikasikan berdasarkan asas yang sama seperti bajet akhir yang diluluskan.

Penyesuaian antara jumlah sebenar secara setanding yang dinyatakan dalam Penyata Prestasi Bajet dan Penyata Aliran Tunai bagi tahun berakhir 31 Disember 2023 adalah seperti berikut:

	Operasi	Pelaburan	Pembiyaan	Jumlah
	RM	RM	RM	RM
Amaun Sebenar dalam Asas				
Perbandingan yang Dibentangkan Dalam Bajet dan Penyata Perbandingan Sebenar	(63,357,514)	-	-	(63,357,514)
Perbezaan Asas				
(i) Pendapatan Sebenar	73,568,506	-	-	73,568,506
(i) Perbezaan Asas yang Lain	(35,498,502)	(4,628,690)	33,106,398	(7,020,794)
Jumlah Sebenar dalam Penyata Aliran Tunai	(25,287,510)	(4,628,690)	33,106,398	3,190,198

25. PENGESAHAN PENYATA KEWANGAN

Penyata Kewangan ini telah dibentangkan dalam Mesyuarat Anggota Institut Penyelidikan Perhutanan Malaysia (FRIM) pada 26 April 2024 dan telah dipersetujui oleh semua Anggota Institut.



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