POPSIG Newsletter, Issue 24, May 2023 - July 2023

POPSIG

Greener Future with Palm Oil

A palm oil newsletter brought to you by:

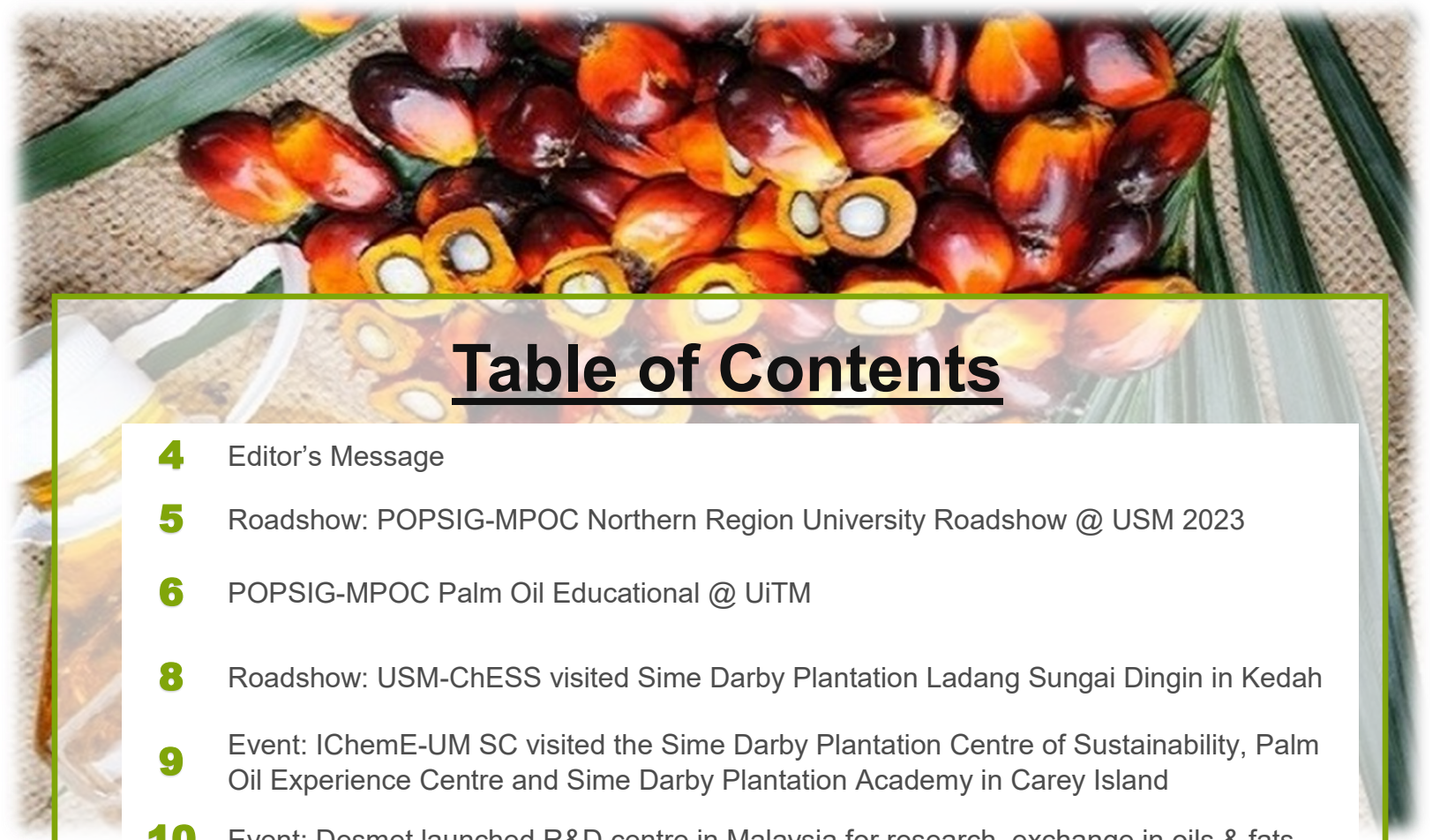
IChemE Palm Oil Processing Special Interest Group

IChemE

Palm Oil Processing
Special Interest Group

Beyond Palm Oil: Connecting Life

WHAT'S IN THIS ISSUE



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IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE

Palm Oil Processing Special Interest Group

Leadership Team

Editor's Message

We are excited to share with you a series of events and collaborations in the world of palm oil, sustainability, and innovation. Here's a brief overview of some noteworthy activities that have taken place recently:

The USM-Chemical Engineering Student Society (ChESS) and Palm Oil Processing Special Interest Group (POPSIG), in collaboration with the Malaysian Palm Oil Council (MPOC), organized an educational roadshow on May 3, 2023, at USM. The event aimed to shed light on the pivotal role of the palm oil industry in addressing climate change and its contributions to the UN Sustainable Development Goals.

POPSIG-MPOC Palm Oil Educational Roadshow at UiTM Shah Alam was conducted on Zoom from May 26 to May 27, 2023. It continued the dialogue on palm oil's environmental impact and its alignment with sustainability goals.

Futhermore, students from the USM Chemical Engineering Student Society and IChemE-Universiti Malaya Student Chapter had the opportunity to visit Sime Darby Plantation facilities, gaining insights into the types of oil palm trees cultivated in Malaysia and the significance of hybrid varieties like tenera.

Desmet Oils & Derivatives Innovation Centre Asia: Desmet unveiled its innovative research and development center in Shah Alam, Malaysia. This facility represents a significant step in advancing oils and fats technology, fostering collaboration between Desmet, Asian clients, and local academic institutions.

Additionally, international Collaborations through the POPSIG network, collaborative initiatives with international researchers and institutions were established, strengthening ties between Malaysia and Japan.

Furthermore, KLK had hosted the Japanese Professor Naomi Shibasaki-Kitakawa and Dr. Kousuke Hiromori from Japan, facilitating knowledge exchange and research collaboration.

Last but not least, the Chairlady Yang Berbahagia Professor Ir Dr. Chong Mei Fong and Mr. Ng Wai Lun represented POPSIG in visiting Sime Darby Plantation Research Sdn Bhd (SDPR), furthering engagement and collaboration in the palm oil industry.

These events and collaborations signify the commitment of various stakeholders to sustainability, research, and international cooperation within the palm oil industry. We look forward to witnessing further advancements and initiatives that will shape the future of this vital sector.

Stay tuned for more updates on the evolving landscape of palm oil and its contributions to global sustainability goals.

POPSIG would like to express our sincere appreciation to Desmet Malaysia Sdn Bhd, Malaysian Palm Oil Council (MPOC), Kuala Lumpur-Kepong (KLK) Oleomas Sdn Bhd and Malaysian Oleochemical Manufacturers Group (MOMG) for their support to POPSIG.

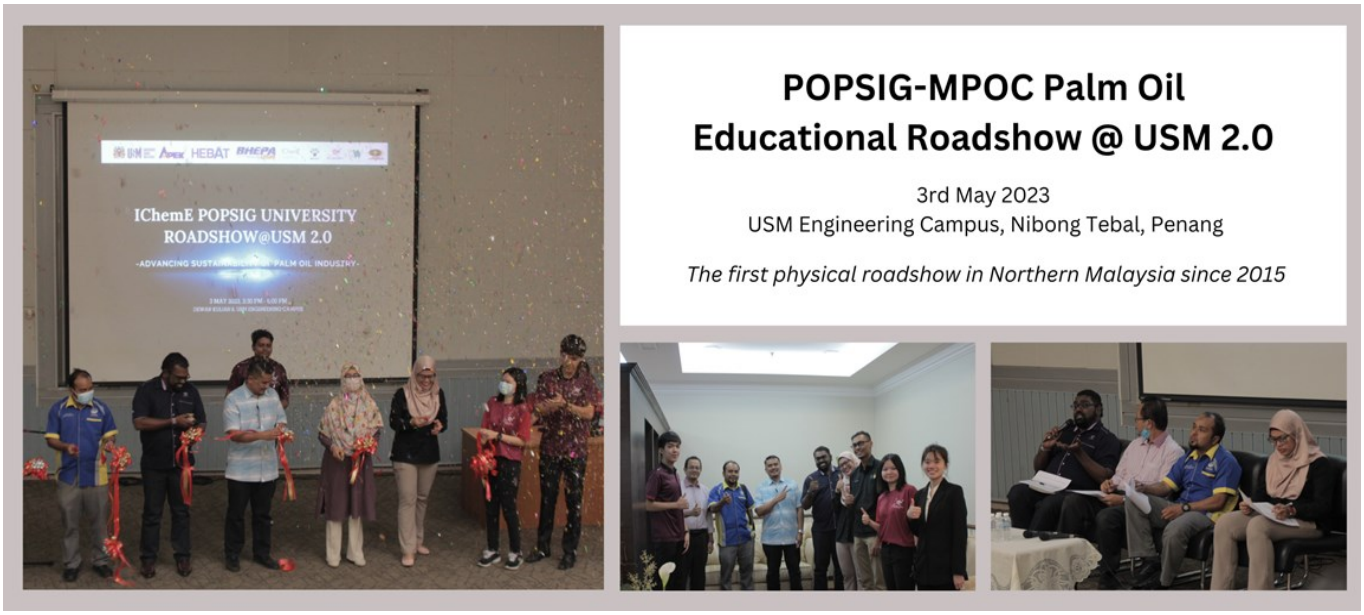
Roadshow: POPSIG-MPOC Northern Region University Roadshow @ USM 2023

POPSIG-MPOC Palm Oil Educational Roadshow @ USM 2023 was organised by USM-Chemical Engineering Student Society (ChESS). The event was co-organised by Palm Oil Processing Special Interest Group (POPSIG), in conjunction with Malaysian Palm Oil Council (MPOC) on the 3rd May 2023.

The primary objectives of the event are to offer insights into the manufacturing processes and sustainable development within the palm oil industry through interactive activities, facilitate a dynamic exchange of ideas between students and industry professionals, provide students with hands-on industry exposure to apply their knowledge, and deliver updates on the latest technological advancements in palm oil to address sustainability concerns, all while emphasizing the industry's contributions to the United Nations Sustainable Development Goals (SDGs) and addressing Environmental, Social, and Governance (ESG) challenges and opportunities. Additionally, the event aims to foster an understanding of sustainable palm oil processing practices within the industry.

During the POPSIG-MPOC Palm Oil Educational Roadshow at USM 2023, Director Chong Yong Sheng expressed his gratitude to all participants, committee members, speakers, collaborators, and guests. He emphasized the importance of gaining knowledge and insights from palm oil industry experts and encouraged attendees to contribute to a more sustainable and innovative future for the industry from a chemical engineering perspective. The technical presentations featured Mr. Anthony Veerayan, who highlighted the Malaysian palm oil industry's commitment to economic development, poverty reduction, environmental protection, and sustainability. Ms. Amni Syazana Azahar discussed the role of MSPO (Malaysian Sustainable Palm Oil) in ensuring social, health, safety, and employment standards. Ts Dr. Mohd Sharizan Md Sarip emphasized the need for process improvements and advanced separation techniques to enhance yield and quality in palm oil extraction.

The event also included a Teh Tarik session where the panelists, including Mr. Anthony Veerayan, Ms. Amni Syazana Azahar, Ts Dr. Mohd Sharizan Md Sarip, and Dr. Nik Muhammad Azhar Bin Nik Daud, shared their opinions and suggestions with students. The session, moderated by Mr. Anthony, provided valuable insights and discussions related to the palm oil industry and its sustainable practices, fostering a productive exchange of ideas between industry professionals and students.



Roadshow: POPSIG-MPOC Palm Oil Educational @ UiTM

POPSIG-MPOC Palm Oil Educational Roadshow was organised at UiTM Shah Alam on Zoom from 26th to 27th May 2023.

The objective of this event is to recognize the roles of palm oil industry in tackling climate change. And to understand how palm oil industry contributes to UN SDGs.

Sime Darby Plantation was established in Singapore in 1821. Today, Sime Darby Plantation is the world's largest producer of certified sustainable palm oil, and is present in over 90 countries. They are leaders in innovation. SDP upstream and downstream operations are fully integrated, allowing SDP to maximise efficiencies, creating better value for all their stakeholders.

The keynote speakers for this session are Dr Zainab Idris, the Deputy Director General (Research and Development), Malaysian Palm Oil Board, Mr Benjamin Loh, the Sustainable Markets Programme, Lead of WWF Malaysia, Mr Tan Chee Yong, the Manager for Technical Outreach and Extension Service Unit, Malaysian Palm Oil Certification Council, and Ms Aiman Najati Akmar Binti Rahman, the Senior Manager for the Sime Darby Oils Biodiesel Sdn Bhd.

In this session, Dr Zainab Idris highlighted that improving the yield and special traits is one of the strategies for crop improvement. Suitable plantation practices, nutrient recycling and fertiliser practices are also in place to properly manage the crop. It was also emphasised that the integrated pest management (IPM) via biological control acts as the backbone for resolving pest problems. Dr Zainab underlined that the industry was committed to compliant with the stringent DOE regulation. However, there were numerous challenges, including high operation and maintenance cost and emphasis on profit over environmental awareness. He welcomed the chemical engineers to work with MPOB to develop the value addition section at the downstream sector. It included to eliminate the processes that are not needed, and eventually to reduce the cost of production. She also looked forward the chemical engineers to promote the downstream programmes so to encourage the use of MSPO-certified palm oil in our food or non-food products.

Mr Benjamin Loh highlighted that BUR-4 was submitted to UNFCCC in December 2022 as the most updated GHG inventory for Malaysia. He emphasised the increased focus on the sustainable infrastructure development. The net land use, land-use change and forestry (LULUCF) sinks increased by 8.95% for 2019 as compared to 2005 due to the increase in forest land areas. Retention of LULUCF as a key removal source is vital, as the reduced LULUCF net removal creates pressure on other sectors, for example energy and transport, to decarbonise. Net zero ambition by 2050 is projected to be achievable. Agility is required to adjust pathways based on the latest GHG inventory which will continually evolve with enhanced data quality.

Mr Tan Chee Yong emphasised that the palm oil industry can contribute to tackling climate change. Palm oil industry can play its roles in renewable energy, sustainable transportation, sustainable agriculture and conservation-based solutions. Among the key new elements in MSPO 2022, which contributed to overcoming the pressing issues, were: high conservation value (HCV) assessment, no conversion of HCV area, protected area and natural forest, and GHG calculator.

Ms Aiman presented the palm value chain at Sime Darby Plantation (SDP). At Sime Darby Oils (SDO), palm oil mill effluent (POME), empty fruit bunch (EFB), spent bleaching earth (SBE) oils and used cooking oil (UCO) were converted into waste-based biodiesel at the SDO Biodiesel plant. It gave lower lifecycle GHG emission. Through the sustainable conversion, it reduced the cost of waste treatment and disposal. This greener and renewable energy alternative avoided improper disposal of waste that may cause domestic issue, for example, clogged drain. However, wide quality variation of waste oils required flexibility in processing technology. Another challenge was the logistic capability in aggregation and collection for small batches of waste oil especially UCO.

The insight talks were conducted by Professor Ir Dr Dominic Foo C W, the Professor of Process Design and Integration for University of Nottingham Malaysia, Mr Karthi Subramaniam Loganathan, Senior Process Engineer for Oleochemicals Department, Desmet Malaysia Sdn Bhd, Ms Rachel Chok Si En, the Process Engineer for Genting Biorefinery Sdn Bhd, and Mr Eddy Lee Wen Hui, the Corporate Strategy Manager for

Professor Foo introduced the three scopes of greenhouse gas (GHG) emissions. Scope 1 emissions are sourced from a company's production and other internal operations; Scope 2 adds most forms of power; Scope 3 captures the rest of the value chain and is more complex and it has more overlap between companies and their customers. He presented difference cases of carbon footprint intensity in edible oil refinery. Ms Chok presented the commitment of the company in reducing carbon footprint intensity via the delivery of raw materials and chemicals, in which the GHG emission was reduced to 0.13 kg CO2 eq/mt feedstock. Effective production planning eliminated 3,500 kg CO2 eq GHG emission by minimising fuel and energy consumption for plant start-up. The improvement on the process can be achieved by the elimination of unnecessary processes/chemicals, process optimisation (saved 29.7 kg CO2 eq GHG emission/mt feedstock) and process improvement through equipment upgrade. Mr Lee highlighted that the renewable energy generation (solar, mini-hydro and biofuels) was widely used in the upstream sector, while the downstream sector focused on green energy technology (IoT, AI, REC, digital solution). Solar is the largest renewable energy in Malaysia. He shared that TNB was the power purchase agreement (PPA) offtaker. RE certificates (RECS) targeted at Scope 2 emissions, while carbon credit targeted Scope 1 and 3 emissions. He reported that the total number of EV (BEV, PHEV, HEV) exceeded 100,000 units in Malaysia, as of December 2022; the number of charging stations was about 900 units, as of February 2023. On EV development, the company involved in energy provision, development and installation, and acted as the charge point operator. Solarvest also developed urban vertical machine farming, which can produce up to 1,200 kg food per month, which can feed 200 houses, from one machine unit.

The winners for the Kahoot session for this event are Muhammad Hasif bin Azmi, Ibnu Tryansar Purba, Muhammad Ulvi Al Zidane, Azreen Nurhidayah binti Sharudin, and Nur Suhaila binti Shahril.

POPSIG management expressed its appreciation for the excellent organization provided by the SOWHC committee and gratefully acknowledged the support from the Malaysian Palm Oil Council (MPOC) for the POPSIG-MPOC Palm Oil Educational Roadshow. They also extended their gratitude to the representatives from various organizations, including MPOB, MPOCC, WWF-Malaysia, Sime Darby Oils, Genting Biorefinery, Desmet Malaysia, and university professors, for their valuable contributions. Additionally, POPSIG management proudly recognized the support received from Desmet Malaysia Sdn Bhd, Kuala-Lumpur Kepong Oleomas Sdn Bhd (KLK OLEO), and the Malaysian Oleochemical Manufacturers Group (MOMG) for their involvement in POPSIG activities.

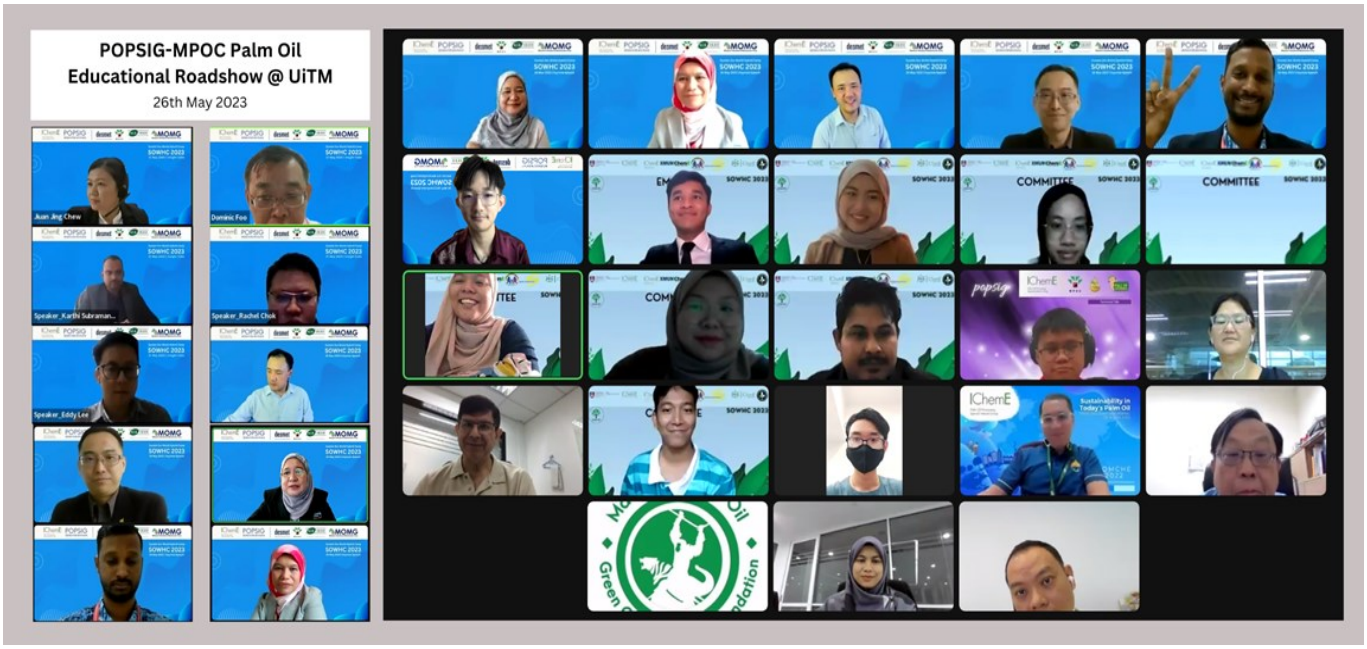


Figure 1: Group photo with the panellists: Dr Zainab Idris (MPOB), Mr Tan Chee Yong (MPOCC), Mr Benjamin Loh (WWF), Ms Aiman Najati Akmar Rahman (SDO), Professor Ir Dr Dominic Foo C. W. (UNM), Mr Karthi Subramaniam Loganathan (Desmet), Ms Rachel Chok Si En (Genting), Mr Eddy Lee Wen Hui (Solarvest), Ir Dr Viknesh

Roadshow: USM-ChESS visited Sime Darby Plantation Ladang Sungai Dingin in Kedah

On 10 May 2023, a group of USM Chemical Engineering Student Society (USM-ChESS) visited the Sime Darby Plantation Ladang Sungai Dingin, Dublin Golf Club, Karangan, Kedah from 09:30 to 12:30 MYT. The event recorded 28 participants.

The students learned about the type of oil palm tree in Malaysia. All of the oil palm trees are interbreeding and no GMO oil palm tree is currently planted in Malaysia. In Malaysia, the oil palm species commonly planted is tenera, a hybrid between dura and pisifera species. Interbreeding allows oil palm seeds to have thicker mesocarp and kernel with thinner shell of the kernel. Tenera was chosen because it produced a good ratio of palm oil and palm kernel oil yields.

The group learned about the suitable living conditions for oil palm trees. Oil palm trees can only be planted in the countries located 5° to the north and south from Equatorial Line. Oil palm trees grow well in the region where it is hot and humid. It requires at least 85% of sunlight penetration to grow well. Oil palm trees will also get stressed if the growing environment is too hot and too humid. The male and female flower composition will change from 20% male, 80% female to 80% male, 20% female. As a consequence, the palm oil production will decrease.

Next, the oil palm is normally replanted with a newer breed for every 25-30 years due to economic reasons. The group was presented the harvesting and collection process of oil palm's bunches. With the help of technologies, the collecting process becomes easier and less labour is needed. Loose fruits from the oil palm's bunches need to be collected to avoid them growing into breeds and competing for nutrients with the mother tree

Sarawak Darby Plantation was established in Singapore in 1821. Today, Sarawak Darby Plantation is the world's largest producer of certified sustainable palm oil, and is present in over 90 countries. They are leaders in innovation. SDP upstream and downstream operations are fully integrated, allowing SDP to maximise efficiencies, creating better value for all their stakeholders.

POPSIG gratefully acknowledges the support provided by Malaysian Palm Oil Council (MPOC) to POPSIG-MPOC Palm Oil Educational Roadshow. POPSIG gratefully appreciated the host company, Sime Darby Plantation Berhad (Northern Region).

POPSIG has collaborated with MPOC on Palm Oil Educational Roadshow since 2019. MPOC is a corporate body with a mission to promote the market expansion of Malaysian palm oil and its product by enhancing the image of palm oil and creating better acceptance through awareness of various technological and economic advantages (techno-economic advantages) and environmental sustainability.

POPSIG also gratefully acknowledges the support provided by Desmet Malaysia Sdn Bhd, Kuala Lumpur-Kepong Oleomas Sdn Bhd (KLK OLEO) and Malaysian Oleochemical Manufacturers Group (MOMG) to our activities.

Event: IChemE-UM SC visited the Sime Darby Plantation Centre of Sustainability, Palm Oil Experience Centre and Sime Darby Plantation Academy in Carey Island

On 23 May 2023, a group of IChemE-Universiti Malaya Student Chapter (IChemE-UM SC) visited the Sime Darby Plantation Centre of Sustainability, Palm Oil Experience Centre and Sime Darby Plantation Academy in Carey Island from 10:00am to 1:00pm MYT. The event recorded 30 participants.

The tour was led by Mr Irwan Ramlee Amran Lee at Sime Darby Plantation Berhad (SDP). He introduced to the visitors about the palm oil value chain, upstream and downstream operations.

SDP was established in Singapore in 1821. Today, SDP is the world's largest producer of certified sustainable palm oil, and is present in over 90 countries. They are leaders in innovation. SDP upstream and downstream operations are fully integrated, allowing SDP to maximise efficiencies, creating better value for all their stakeholders.

The participants observed the 3D modeling and visual environment of Sime Darby Plantation Centre of Sustainability in Carey Island. Besides, a brief introduction regarding the oil palm tree was given by Mr Irwan. The participants were also amazed that the plantation was spread to 13 countries, including China, Singapore, South Africa and so forth with more than 740,000 hectares landbank. The group observed the procedures on harvesting and collecting the oil palm brunch.

The IChemE-UM SC group was presented with a film demo on using the palm oil in a cooking competition which was held by Sime Darby Plantation. The overall benefits and advantages of palm oil were introduced such as the fact that the palm oil is rich in vitamins and contains no trans fat. They were also exposed to the upstream operation like seed plantation, brunch formation, harvesting process of palm oil as well as the downstream operation such as production and usage of palm oil in various fields.

At the SDP museum, the participants learned about the history of palm oil in Malaysia including the origin of palm oil and the year when the oil palm trees were introduced in Malaysia. Moreover, a fascinating collection was showcased in the museum, including vintage items such as typewriters and microscopes. The visitors had the opportunity to explore the rich history of Sime Darby while gaining a deeper appreciation for the technological advancement in the palm oil industry.POPSIG gratefully acknowledges the support provided by Malaysian Palm Oil Council (MPOC) to POPSIG-MPOC Palm Oil Educational Roadshow. POPSIG gratefully appreciated Sime Darby Plantation Berhad for hosting the visit.

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ICHEME-UM SC VISIT TO SDP WWW.ICHEME.ORG/PALM ICHEMEPOPSIG

Event: Desmet launched R&D centre in Malaysia for research exchange in oils & fats

Desmet on Wednesday officially launched its new Desmet Oils & Derivatives Innovation Centre Asia in Malaysia, as part of the company's broader its oils & fats research and development (R&D) expansion into the Asian market.

Located next to Desmet Malaysia office in Shah Alam, this innovation centre is Desmet's first R&D facility for oils & fats outside Europe and is set to become a platform for research exchange between Desmet's global R&D teams, Asia-based clients and local universities and research institutes. Desmet is a global leader in engineering and delivery of processing facilities and technologies for the edible oil and biofuel industries.

"We are very excited about this development as this will allow us to better serve our local oil processing industry in Asia, where our customers can test their products, customise our technologies to meet their specific needs. It also paves the way for collaborative R&D through partnership projects with universities, research institutes allowing a better access to industrial research. Ultimately, this will help enhance the scientific capability of the oils & fats processing industry, as per our company motto – Science Behind Technology" said KK Khoo, Desmet Malaysia's managing director.

"Asia is an important region for Desmet and establishing a R&D facility here is a logical and necessary step, as this is the region where the world's top two palm oil producing countries—Malaysia and Indonesia—are located. We also gain better access to customers with business in other major oils such as palm kernel oil, coconut oil, ricebran oil and cocoa butter," Khoo said.

Sin Lu Liew, Technical Director of Desmet Malaysia and facility lead added that the R&D centre will be equipped with pilot scale plants of Desmet's patented technologies—Mobulizer™ and Statolizer™— as well as other crystallisers of different design and various lab and pilot filtration units. A further development of the Desmet Oils & Derivatives Innovation Centre Asia will be done in three phases in the next three years, with the first phase focused on fats modification, phase two on oil refining and phase 3 on oleochemical processing, to cover the whole up- and downstream processing of oils and fats.

Tan Sri Datuk Dr Augustine Ong said that growing global demand for edible oils, especially palm oil, and the objective of the processing sector to meet national and global carbon emissions targets, will need greater R&D focus. On top, food oils need to reply to higher food quality and food safety standards requiring new innovative solutions.

"Palm oil remains the most widely used vegetable oil globally due to its versatility and affordability. It is therefore important that R&D activities, specifically in the processing industry, continue to take place, constantly improving existing technologies and developing new smart and innovative solutions. Not only to meet the global sustainability targets but also to achieve the national net-zero carbon targets as well," Ong noted.

Desmet, with its global network and now global R&D close to its key Asian market, is well-positioned to support the local oil industry in meeting the increasingly stringent market and regulatory demands. The Oils & Derivatives Innovation Centre Asia in Kuala Lumpur will become another valuable instrument to support the Asian oils & fats industry in responding to growing demand for high quality and highly sustainable oils through science behind technology.

Desmet Oils & Derivatives Innovation Centre Asia will start operating in June 2023.

IChemE Palm Oil Processing Special Interest Group
POPSIG GREENER FUTURE WITH PALM OIL
gratefully acknowledges the sponsorship provided by
desmet

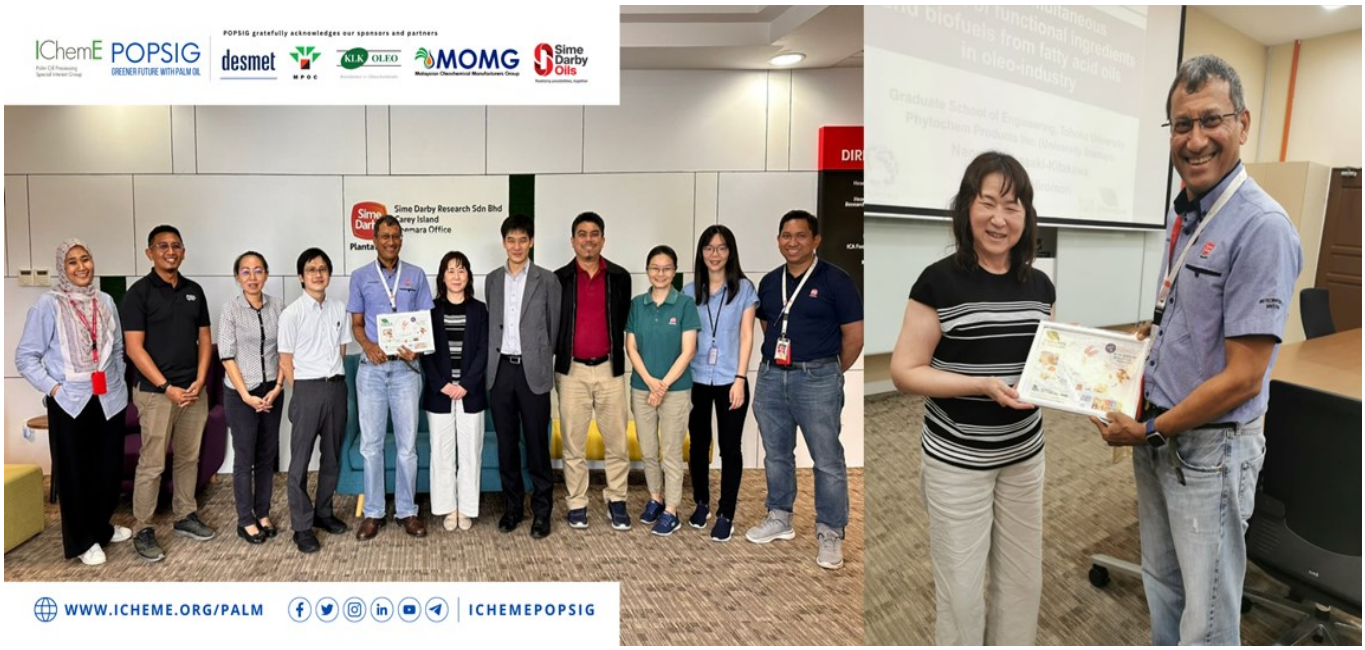
Event: Professor Kitakawa Visited Sime Darby Plantation Research

Through POPSIG connection, Sime Darby Plantation Research hosted Professor Naomi Shibasaki-Kitakawa, Dr Kousuke Hiromori and Dr Yuichiro Kanematsu from Japan in Carey Island, Selangor during Professor Kitakawa's visit to Malaysia on 20th July 2023.

The meeting between the company and Japanese experts was attended by Japanese visitors (Professor Naomi Shibasaki-Kitakawa, Professor at Tohoku University and Chief Technology Officer of Phytochemical Products Inc, Japan, Dr Kousuke Hiromori, Assistant Professor at Tohoku University and Chief Intellectual Property Officer of Phytochemical Products Inc, Japan, and Dr Yuichiro Kanematsu, Lecturer at The University of Tokyo, Japan), Sime Darby Plantation representatives (Dr Harikrishna Kulaveerasingam, Chief Research and Development Officer of Sime Darby Plantation Berhad, Syed Said Syed Saggaf, Head of Manufacturing for APAC and Oceania, Sime Darby Oils, Dr Teh Huey Fang, Manager of Industrial Chemistry, Sime Darby Plantation Technology Centre, and Norliza Saparin, Manager of Oils and Fats, Sime Darby Plantation Research Sdn Bhd).

The Japanese team shared their technology and discussed the production of super vitamin E and biodiesel from PFAD through resin technology. During their interactions, the two organizations also explored the possibility of employing currently available resin as an alternative method for producing super vitamin E, biodiesel, and glycerin from palm oil.

POPSIG management gratefully acknowledges the technical support provided by Sime Darby Plantation and Sime Darby Oils to POPSIG on our technical activities and university roadshow. POPSIG management also gratefully acknowledges the support provided by Desmet Malaysia Sdn Bhd, Malaysian Palm Oil Council (MPOC) and Malaysian Oleochemical Manufacturers Group (MOMG) to our activities.



Event: Technical Exchange with Professor Naomi Shibasaki-Kitakawa in Malaysia

Through POPSIG connection, Sime Darby Plantation Research hosted Professor Naomi Shibasaki-Kitakawa, Dr Kousuke Hiromori and Dr Yuichiro Kanematsu from Japan in Carey Island, Selangor during Professor Kitakawa's visit to Malaysia on 20th July 2023.

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During the dinner, YBhg Professor Chong welcomed Professor Kitakawa and Dr Hiromori for visiting Malaysia in July 2023. The two organisations explored the opportunities for the technologies in Japan to be implemented in Malaysia. YBhg Professor Chong shared with Professor Kitakawa about the YBhg Professor Chong connected the Japanese professionals with the companies in Malaysia.

Mr Tommy See and Mr Naoki Sato from Sojitz Malaysia greeted Professor Kitakawa and Dr Hiromori in Subang Jaya on 20th July 2023. They identified the key challenges in Malaysia, such as the maturity of the technology, raw material security and off takers. They also discussed on the new technology utilising existing available resin as an alternative route to produce super vitamin E, biodiesel and glycerin from sustainable source.

POPSIG management gratefully acknowledges the support provided by Desmet Malaysia Sdn Bhd, Malaysian Palm Oil Council (MPOC), Kuala Lumpur-Kepong Oleomas Sdn Bhd (KLK OLEO), Malaysian Oleochemical Manufacturers Group (MOMG), Sime Darby Plantation Berhad (SDP) and Sime Darby Oils (SDO) to our activities.

Event: Oscar Visited Industriepark Höchst in Germany

Upon the invitation, Oscar Ting paid a visit to Industriepark Höchst in Frankfurt am Main, Germany on 20th July 2023.

He was presented the production of biodiesel and pharmaceutical-grade glycerin from vegetable oils and waste fuel at Industriepark Höchst. At the meeting, the project leaders informed Oscar that palm oil, which was previously used in manufacturing, has then been replaced by other vegetable oils.

Walking down the Industriepark equivalent to the size of 644 soccer fields, he also observed the significant investment in implementing large-scale green technologies in edible oil industry in Germany.

Oscar also visited Rheinland-Pflaz and Hessen to observe the sustainable development, circular economy and hydrogen projects in Germany.

During the visit, he has taken note about the views of the firms and organisations in Europe on palm oil. At the same time, he also shared about the work done by companies and institutions in other countries, such as: Japan and Malaysia.

He also shared to the leaders in Frankfurt a.M. about the great support to POPSIG by its sponsors and partners, namely Desmet, MPOC, KLK OLEO, MOMG and Sime Darby Oils.

Oscar, who leads the EU, UK, Switzerland and Norwegian Affairs, has made POPSIG the first palm oil group in the world to be recognised by the EU as the top performed organisation on the sustainable youth development project in recent year.

Oscar, speaking in German, expressed his sincere appreciation to the companies in the European Union for hosting him a visit in Frankfurt a.M.

He said in his speech: “Change is inevitable, and we are always preparing ourselves to be more resilient in the ever-changing environment. Despite those changes, we can still help each other; we can work together; and, we can serve the global communities together.”

During his second visit, Oscar renewed the positive relationship with the firms and organisations located at the heart of the EU’s financial centre.

IChemE was established in 1922 and granted as The Royal Charter in 1957. King Charles made his first state visit abroad to Germany as the sovereign in March 2023. As one of the first engagements abroad in Germany, The King involved in the leading international sustainability forum. The Germany’s President praised The King for championing sustainability and climate action. Four months after The King’s state visit to Germany, Oscar Ting from POPSIG visited Germany to exchange the views on sustainable development in the industries in Europe.

POPSIG management gratefully acknowledges the support provided by Desmet Malaysia Sdn Bhd, Malaysian Palm Oil Council (MPOC), Kuala Lumpur-Kepong Oleomas Sdn Bhd (KLK OLEO), Malaysian Oleochemical Manufacturers Group (MOMG), Sime Darby Plantation Berhad (SDP) and Sime Darby Oils (SDO) to our activities.

Event: Professor Kitakawa Visited KLK

Through POPSIG connection, KLK hosted Professor Naomi Shibasaki-Kitakawa and Dr Kousuke Hiromori from Japan at Menara KLK during Professor Kitakawa's visit to Malaysia on 20th July 2023.

The meeting between Malaysian company and Japanese experts was attended by Process Technology Division, Corporate Engineering, Kuala Lumpur-Kepong Berhad, Malaysia (Mr Leong Tat Loong, General Manager, Ms Kan Wei Lee, Senior Manager, and, Dr Leong Jun Xing, Technologist); Tohoku University and Phytochemical Products Inc, Japan (Professor Naomi Shibasaki-Kitakawa, Professor at Tohoku University and Chief Technology Officer of Phytochemical Products Inc, and Dr Kousuke Hiromori, Assistant Professor at Tohoku University and Chief Intellectual Property Officer of Phytochemical Products Inc).

The two parties discussed the ion-exchange resin (IER) technology in oleochemical industry, which covers the several processes, such as: esterification, transesterification, vitamin E extraction from PFAD and bio-based surfactant.

The Japanese professionals also discussed about the potential collaboration with Malaysia palm oil industry: (1) Implementation of IER technology in producing biofuel through esterification and transesterification process with suitable resins helps in improving the yield by inhibiting the reverse reaction, reducing CO2 emission due to lower operating temperature and operating pressure is atmospheric, and reducing waste generation; (2) Co-production biofuel and tocopherol/ tocotrienol using the IER technology

There is a growth demand for natural vitamin E/super vitamin E (tocopherol/ tocotrienol) as a supplement and in personal care industry.The purity of total vitamin E extracted from the resin is high, with excellent yield, less energy intensity compared to common separation technology using molecular distillation; and (3) production of bio-based surfactant. The example of bio-based surfactant is sugar ester surfactant. IER offers a more sustainable and environmentally friendly approach to produce sugar ester surfactants, making them increasingly popular in various industries seeking green and renewable alternatives.

POPSIG management gratefully acknowledges the support and sponsorship provided by KLK OLEO to POPSIG on our technical activities and university roadshow. POPSIG management gratefully appreciated KLK for hosting the visit. KLK OLEO is one of the world's leading oleochemical producers that is committed to delivering excellence in the global marketplace. Strategically integrated to our upstream plantations parent, KLK OLEO is able to extract synergies and focus on developing sustainable solutions and reliable supply for our customers. KLK OLEO's production portfolio ranges from basic oleochemical products, such as Fatty Acids, Glycerine, Fatty Alcohols and Fatty Esters, all the way down the spectrum to specialties, such as Methyl Ester Sulphonates (MES), Surfactants and Phytonutrients. POPSIG management also gratefully acknowledges the support provided by Desmet Malaysia Sdn Bhd, Malaysian Palm Oil Council (MPOC), Malaysian Oleochemical Manufacturers Group (MOMG), Sime Darby Plantation Berhad (SDP) and Sime Darby Oils (SDO) to our activities.

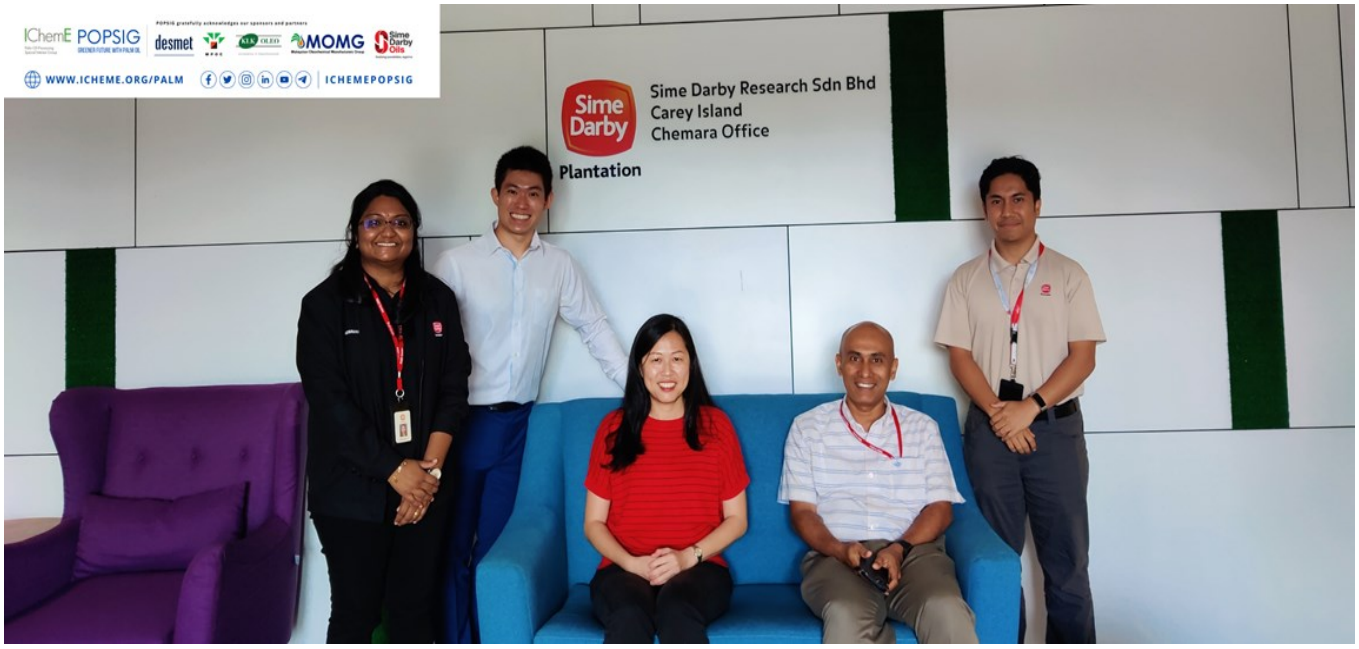
Event: Courtesy Visit to Sime Darby Plantation Research

The Chairlady Yang Berbahagia Professor The Chair Professor Ir Dr Chong Mei Fong and Head of Industrial and Corporate Communications Unit, Mr Ng Wai Lun represented POPSIG management to pay a visit to Sime Darby Plantation Research Sdn Bhd (SDPR).

SDPR was represented by Ir Dr Shiraz Aris, Head of Processing Technology at Sime Darby Plantation Research Sdn Bhd; Mr Nik Mohd Farid Mat Yasin, Head of Processing and Engineering (Covering) at Sime Darby Plantation Research Sdn Bhd; and Ms Hemavathi Silvamany, Senior Engineer, Value Creation Unit, Processing and Engineering Section, Sime Darby Plantation Research Sdn Bhd.

The topic of discussion include the following: (a) POPSIG student visit to Sime Darby Plantation Ecogardens; (b)Practicability of academic research in industry; (c) POPSIG management welcomes SDPR representatives to attend POPSIG annual award ceremony; and (d) POPSIG management invited SDPR representative to deliver a talk at POPSIG university roadshow.

POPSIG management gratefully acknowledges the technical support provided by Sime Darby Plantation and Sime Darby Oils to POPSIG on our technical activities and university roadshow. POPSIG management gratefully appreciated Sime Darby Plantation Research for hosting the visit. POPSIG management also gratefully acknowledges the support provided by Desmet Malaysia Sdn Bhd, Malaysian Palm Oil Council (MPOC) and Malaysian Oleochemical Manufacturers Group (MOMG) to our activities.



Webinar: Hydrogen Enriched Syngas Production Derived from Co-Gasification of Palm Oil Biomass and Plastic Waste Mixtures

On the 8th May 2023, Dr Bridgid Chin Lai Fui, the Associate Professor of Curtin University Malaysia had shared on the recent advancements on the gasification technologies utilizing both palm oil biomass and plastic wastes for hydrogen production. It was highlighted that gasification is one of the thermochemical conversion has a potential to produce hydrogen enriched syn-gas in a commercialization scale. The advantages of using the gasification technology are resolving the instability of crude fossil oil price, meeting demand for transport fuel aggressively intensifying, solving the depleting crude oil reserves, and diversifying the prime energies for fuel production. Gasification involved four main steps i.e. heating and drying, pyrolysis, gas-solid reaction followed by gas phase reactions. It was mentioned that different application required different syngas quality. Stringent gas fuel requirement is required for gas turbine application compared to other applications such as fuel gas for boiler, synthetic fuel, methanol and hydrogen production. The energy content for hydrogen fuel is reported 120 MJ/kg. Background and theoretical aspect on gasification was also briefed to the attendees. In addition, a case study on syngas production from palm kernel shell and polyethylene waste mixtures through catalytic steam co-gasification process was discussed in this session. From this study, temperature shows the most significant effect on the catalytic steam gasification on determining the final product composition. High temperature allows high production of syngas to be produced in this gasification system. Meanwhile, the gasification efficiency is affected by the parameter of steam to feedstock ratio. An optimum gasification efficiency of 90.2% was achieved in this system. Furthermore, Dr Bridgid has concluded the challenges and future recommendations of this technology in her presentation. Challenges faced from gasification process are the removal of carbon dioxide from product gases are still not economic viable, high production of tar in the gasification system results to blockage in the pipeline, higher operating cost of producing fuel gas from gasification compared to fossil fuel. Few recommendations suggested for this technology are adsorbent to be introduced in the gasification system especially at higher temperature to capture carbon dioxide from the byproduct gaseous, utilizing metal catalyst such as Nickel for the reduction of tar, and introducing OLGA technique into the system.

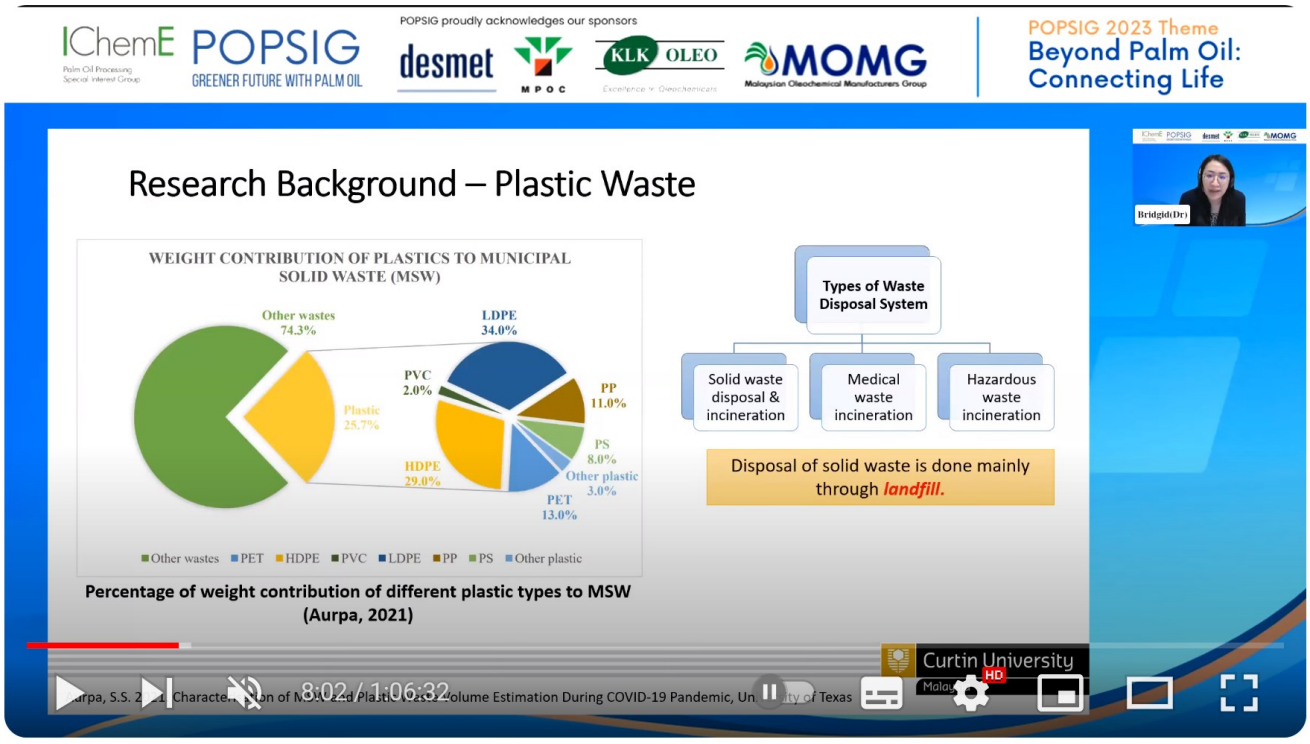


Figure 1: Dr Bridgid presenting the plastic waste statistics produced globally.

Webinar: Enzymatic Approach for Production of Healthy Functional Oils

On the 12nd June 2023, Dr Phuah Eng Tong, a lecturer from Universiti Teknologi Brunei (UTB) shared on the enzymatic approach for the healthy functional oils. In his talk, he had covered on the important of fats and oils, limitation and possible strategy, chemical methods for modification, enzymatic method for modification, and the key challenges faced in this research. The importance of palm oils are the high energy value for various physical activities, consists of balanced composition of fatty acid profile, used in a broad range of foods, high concentrated in Vitamin A and E, and able to be utilized in the cosmetic and pharmaceutical industries. However, there are some limitations to the palm oil are it is not easily available in native states, high in saturated fatty acids or unsaturated fatty acids, and specific physiochemical and functional properties are required. For the modification strategy, it consists of 3 approaches i.e. hydrogenation, physical approach (blending, and fractionation), and chemical approach (interesterification). As for the physical approach (blending and fractionation), it offers advantages such as cheap, enhance physicochemical properties such as smoke point, heat stability, and ease of operation. However, this approach has some disadvantages such as incompatible between oils and fats (non-eutectic system), and limited functional properties. The speaker also explained on the structured lipids which consist of low calorie fat, easily absorbable oil, indigestible oil, diaylglycerol oil, millk fat substitute, and specialty fat for chocolate. For the chemical methods (hydrogenation, and interesterification process), it requires high temperature, high pressure, and the presence of chemical catalyst. The deterioration of oil quality is due to the destruction of unsaturated bonding due to the formation of peroxides, aldehydes, and ketones. Meanwhile, the low specificity is due to the high oil losses with low amount of desired products. As for the additional purification steps may be required in this process, the refining process is recommended. The enzymatic methods has the following criteria such as high specificity (high purity products), shorter reaction time (faster reaction rate due to lower activation energy), milder operating conditions (mild temperature at ambient pressure), and environmentally friendly (lower energy consumption), and high cost (high enzyme cost).

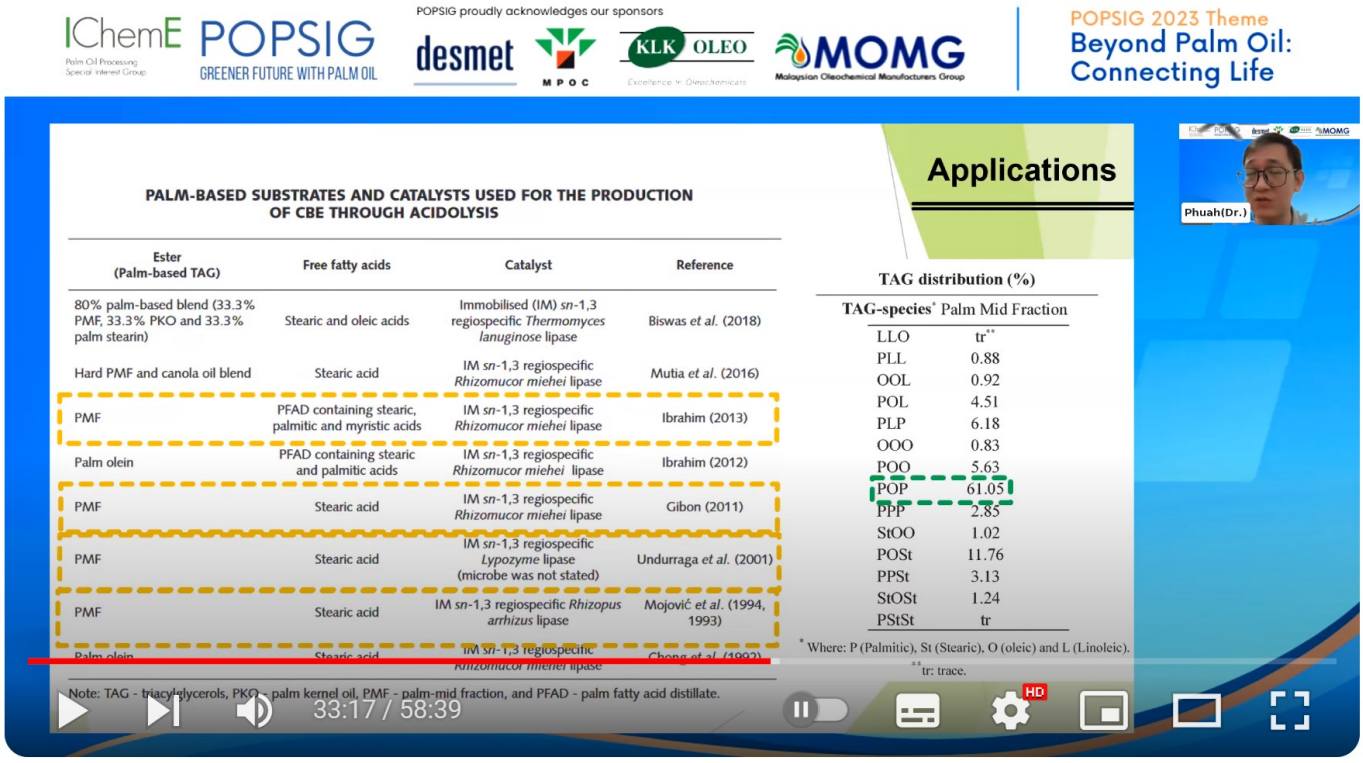


Figure 1: Dr Phuah presenting on the palm-based substrates and catalyst used for the production of CBE through acidolysis.

Webinar: Process for Simultaneous Production of Functional Ingredients and Biofuels from Unused Resources in Palm Oil Refinery

On the Professor Naomi Shibasaki-Kitakawa, the Professor of Tohoku University in Japan and the Chief Technology Offcier for Phytochemical Products Inc, Japan presented a talk on the process for simultaneous production of functional ingredients and biofuels from unused resources in palm oil refinery. The speaker introduce the practical application of their technology where a multiple production process for functional ingredients and biofuels from fatty acid oils of rice bran. And also, she also proposed the application of this technology to palm industry where the simultaneous production of super vitamin E and biofuel from palm fatty acid distillate (PFAD). This research aims to realise a resource-recycling society. Currently, there are few examples of realization and limited implemented due to lack of a technology that is both environmentally compatible and economically viable. The traditional process is not suitable for bioresources containing a variety of components and only focused on maximize economics of target product. Meanwhile, the new process allows the maximised overall economics of the process. For example, there is no technology available for economical use of non-edible oils contain functional ingredients especially oil production from rice bran. The brown rice can be derived polished rice and rice bran. The rice bran can be divided into defatted rice bran for livestock feeds and crude oil for the production of rice bran oil and non-edible oil such as the deodorizer distillate. However, the current practice for managing the rice bran is through burning in boilers due to the lack of economically feasible technology go their utilization. Hence, in this talk, it highlights the potential of non-edible oils that could be used as functional ingredients such as super vitamin, Vitamin E, and phytosterol, and cooking oils (fatty acid ester) and etc. The innovative technology proposed in this talk is to have both fatty acid and triglyceride to be completely converted to fuel without reverse reaction and vitamin E is selectively recovered. The process diagram can be seen in Figure 1. The issue to use the non-edible oils is due to the neutralization of homogenous acid and alkali catalyst, additional processes to remove the catalysts or their salts were required. In addition, these complex upstream and downstream processes eld to an increase in production costs, making it commercially unviable. It was suggested to use the porous resin to resolve this process. These resins are typically used for separating low molecular weight subtances in aqueous system as there is little understanding on how to use them as catalysts in oil systems. Furthermore, the anion-exchange resin has been reported to show no activity for transesterification of oils. Hence, the researcher considered this is because the reaction cannot proceed unless all three phases make contact.

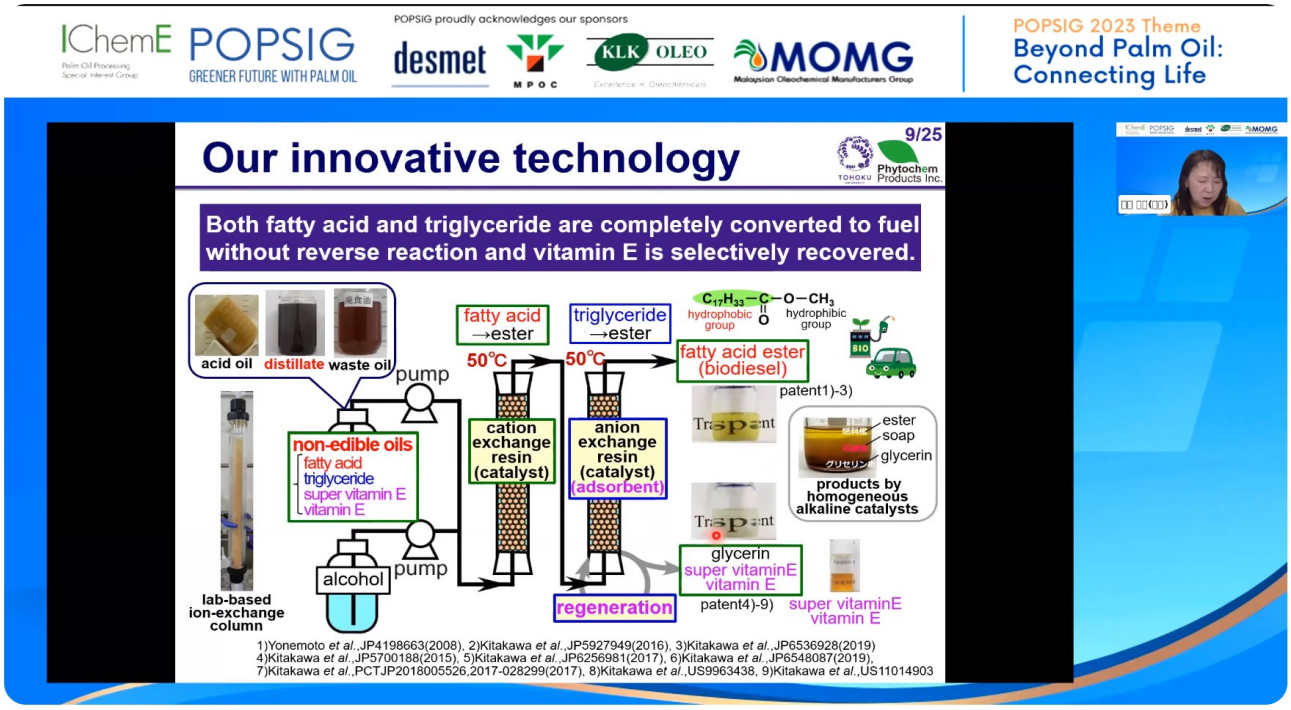


Figure 1: Professor Naomi presenting her innovative technology for the production of functional ingredients produced globally.

Webinar: Journey Towards Achieving Zero Liquid Discharge for Palm Oil Mills

On the 17th July 2023, Mr Nik Mohd Farid Mat Yasin, the Head of Processing and Engineering (Covering), Sime Darby Plantation Research Sdn Bhd to deliver on the topic for the journey towards achieving zero liquid discharge for palm oil mills. He also highlighted the opportunities for the circular economy in the palm oil industry. The current effluent treatment plant (ETP) for palm oil mill effluent (POME) represents a comprehensive and sustainable approach to managing the environmental impact of palm oil processing. This state-of-the-art system is designed to minimize the negative effects of POME on the environment, promote resource recovery, and ensure compliance with stringent biochemical oxygen demand (BOD) standards, specifically achieving a remarkable BOD level of 20 mg/L, which is well below the regulatory limits. The ETP is an intricate network of processes that efficiently and effectively treat POME, transforming it from a polluting waste stream into valuable resources while safeguarding the surrounding ecosystems. Here is a detailed description of each stage within the ETP which are (1) Palm Oil Mill: The journey of POME treatment begins at the palm oil mill, where fresh fruit bunches are processed to extract crude palm oil. POME is generated as a byproduct during this extraction process; (2) Biogas Plant: In an effort to harness renewable energy, the POME is first directed to a biogas plant. Here, anaerobic digestion takes place, breaking down organic matter in POME to produce biogas. This biogas is a valuable energy source for the mill and can be used for electricity generation; (3) Solid Removal and Dewatering: After biogas extraction, the treated POME is separated to remove solid particles. Solid removal and dewatering processes are employed to separate the solids from the liquid phase. These solids can be further processed for composting or as a source of biomass for energy production; (4) Extended Aeration and Membrane System: The liquid portion of POME is then subjected to advanced wastewater treatment processes. Extended aeration is used to provide the necessary oxygen levels for aerobic microorganisms to further degrade organic compounds. A membrane system, which typically includes ultrafiltration or microfiltration membranes, is utilized to separate remaining suspended solids and microorganisms from the treated water; (5) Water Bodies: The clarified and treated water is released into designated water bodies, such as ponds, rivers, or lakes. The water that is discharged is now significantly cleaner and poses minimal environmental harm; and (6) BOD 20 mg/L Compliance: The final effluent from the ETP is carefully monitored to ensure compliance with regulatory standards. Achieving a BOD level of 20 mg/L is a remarkable feat, as it signifies that the treated water meets stringent environmental requirements. Such low BOD levels demonstrate a commitment to environmental stewardship and sustainability. This comprehensive ETP system not only mitigates the environmental impact of palm oil production but also contributes to resource recovery by generating biogas and valuable organic solids. Furthermore, it aligns with regulatory standards, ensuring that the discharge of treated water into the environment poses minimal harm. This approach exemplifies a sustainable and responsible model for the palm oil industry, balancing the economic benefits of palm oil production with the imperative to protect our environment.

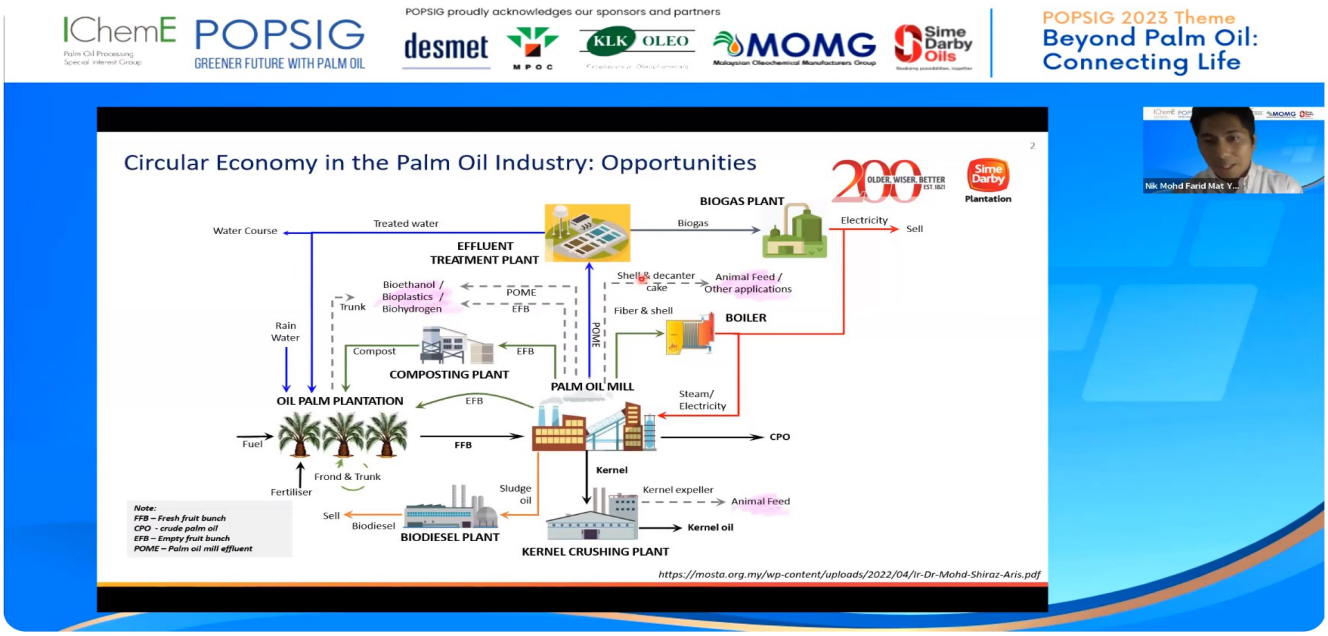


Figure 1: Mr Nik Mohd Farid Mat Yasin presented on the opportunities of the circular economy in the palm oil industry.

Article: Climate Change and Oil Palm: Understanding the Impact on Sustainable Palm Oil Production

Written by Christy Wee and Loh Grierson (Universiti Sains Malaysia)

How much does it take to quench the need for global demand? Is it enough when the planet gets hotter? Drier? Weaker? Do you feel it? The sizzling sun burning on your skin feels different compared to the warm, gentle embrace of the sun 10 years ago. Whether we like it or not, we are living in a strange time indeed, from the COVID-19 pandemic to the changing climate. This leaves many unanswered questions for future generations. Drastic changes in the climate call for drastic changes in our actions. To answer the first question, it may never be enough to fulfil global demand as the human population is projected to reach 9.7 billion people by 2050 (United Nations, n.d.). As the second-largest producer of palm oil, we should unveil the link between climate change and the future of the palm oil industry. It is vital to navigate through the challenges of climate change in the oil palm plantations and devise a strategy to ensure a sustainable and resilient palm oil industry.

Climate change is the result of long-term shifts in temperature and weather patterns that can occur naturally but are mostly driven by human activities such as the burning of fossil fuels (United Nations, n.d.). Rising global temperatures, altered rainfall patterns, prolonged droughts, and intensified precipitation events affect the yield and quality of oil palm fruits (Sarkar et al., 2020). Climate change disrupts the delicate ratio between male and female inflorescence produced by Dura pisifera, which ranges from 65% to 70% (Malaysian Palm Oil Board, 2018). Global warming will compromise the production of male inflorescence, which leads to a great loss in crop production. Unusual weather patterns of hot and dry conditions from the El Nino phenomenon have led to a decline in the production of oil palm fruit set and fresh fruit bunch (FFB) (Malaysian Palm Oil Board, 2010).

While warmer temperatures during the 21st century may enable the growth of oil palm in new locations, the overall area suitable for cultivation is expected to decrease. Researchers project that by 2100, there could be up to three-quarters less land highly suitable for oil palm cultivation (Li et al., 2009; Paterson et al., 2015, 2017). Particularly affected are major oil palm-growing nations such as Thailand, Colombia, and Nigeria, while parts of Indonesia and Malaysia, currently significant producers, will also become less suitable (Corley & Tinker, 2015). The warming temperatures and increased risk of droughts will render some regions unsuitable for cultivation (Corley & Tinker, 2015). In fact, it is projected that by the end of the century, temperatures will become too high for oil palm in certain areas of Southeast Asia (Paterson et al., 2015).

Conversely, as temperatures rise, new areas previously considered too cool for oil palm cultivation, such as high-elevation and high-latitude regions, may become suitable (Corley & Tinker, 2015; Paterson et al., 2015, 2017). However, these potential expansions in suitable areas cannot compensate for the overall loss of suitable land due to climate change. It is essential to note that while warmer temperatures and, in some instances, wetter climates may improve oil palm's suitability in certain regions throughout the 21st century, the net impact on oil palm yield remains uncertain (Corley & Tinker, 2015).

Similarly, changes in rainfall patterns can cause water stress or flooding that can affect soil moisture and nutrient availability for oil palm growth (Abubakar et al., 2021). Sea level rise is one of the consequences of climate change that can affect low-lying areas where oil palm plantations are located since it is prone to flooding (Wen & Sidik 2000). Sea level rise can lead to land loss and the salinization of coastal soils, which can reduce the suitability and productivity of oil palm plantations. It is estimated that if sea level rose by 0.5 m, 1 m, and 2 m by 2100, about 2%, 4%, and 8% of the total area under oil palm production in Malaysia would be lost, respectively. Climate change can also affect the hydrological cycle and soil properties, which can influence water and nutrient availability for oil palm growth. For example, changes in precipitation intensity and frequency can affect the runoff, infiltration, evaporation, and drainage of water in oil palm plantations (Abubakar et al., 2021). Likewise, changes in temperature and moisture can affect the decomposition, mineralization, leaching, and erosion of organic matter and nutrients in oil palm soils (Corley and Tinker, 2016).

The interplay between changing climatic conditions and oil palm pests and diseases further compounds the challenges faced by the industry. Suboptimal conditions for oil palm, such as high temperatures and limited water availability, may weaken the palms and make them more susceptible to pests and diseases. Climate change could potentially affect the pollination activity of E. kamerunicus (Jackson et al., 2010). Higher temperatures and humidity favour the outbreak of fungal diseases such as Ganoderma basal stem rot and Fusarium wilt, which can cause wilting and the death of oil palm trees (Sarkar et al., 2020). Likewise, higher temperatures and rainfall can increase the population and activity of insect pests such as rhinoceros beetles, leaf-eating caterpillars, and bagworms, which can defoliate and bore into the oil palm trunks and fronds (Abubakar et al., 2021).

One of the adaptation strategies that can help reduce the negative impacts of climate change on oil palm production is improving water management. Water management practises such as irrigation, mulching, drainage, and water harvesting can help maintain soil moisture and prevent water stress. It is proven that irrigation can increase oil palm yield by 15% to 20% under drought conditions (Murtilaksono et al. 2011). In addition, pits and tranches can increase oil palm yield by 10% to 15% under drought conditions (Sarkar et al. 2020). Pits and tranches are small holes or channels dug around or between oil palm trees that can collect rainwater or runoff water and store it in the soil for later use by the roots.

Another adaptation strategy that can help cope with climate change challenges includes breeding hybrid varieties that are tolerant and resistant to heat and pests. Climate change can increase the risk of droughts and pest outbreaks, which can damage oil palm trees and reduce their productivity. Therefore, using drought-tolerant and pest-resistant varieties can

help enhance the survival and performance of oil palm trees under stressful conditions. It was found that some oil palm genotypes showed higher tolerance to drought stress than others, based on morphological and physiological traits (Bohluli et al. 2014).

Another adaptation strategy that can help reduce the negative impacts of climate change on oil palm production is sustainable soil management. Climate change can affect soil quality and fertility as well as increase soil erosion and compaction. Therefore, sustainable management of soil can help to maintain or improve soil health and productivity. For example, using organic fertilisers, mulching, composting, or biochar can help enhance soil organic matter and nutrient cycling, as well as suppress weeds and pests. Moreover, zero burning and minimum tillage can help reduce soil disturbance and GHG emissions (Abubakar et al., 2021).

As climate change continues to reshape the suitability of regions for oil palm cultivation, it is imperative for stakeholders to consider investing in new countries or areas that may not be suitable presently but hold potential for future oil palm growth. While these regions may face climatic constraints at present, the anticipated shifts in temperature and rainfall patterns present an opportunity for oil palm expansion in the coming decades. By strategically investing in these areas, stakeholders can position themselves for long-term success and mitigate the risks associated with climate change impacts on existing plantations.

Furthermore, investing in new countries or areas for oil palm cultivation aligns with sustainable practises and conservation efforts. The expansion of oil palm into regions with low forest cover and limited biodiversity can help minimise the impact on existing high-biodiversity areas and fragile ecosystems (Proctor et al., 2011; Struebig et al., 2015a; Scriven et al., 2015). By identifying areas that strike a balance between suitable climatic conditions for oil palm growth and limited forest cover, stakeholders can reduce the risk of deforestation and contribute to the preservation of vital habitats.

Investing in new countries or areas that may not be suitable for oil palm cultivation now but hold potential in the face of climate change is a forward-thinking approach that can secure the future of the industry. By diversifying geographic locations and incorporating adaptive management practises, stakeholders can navigate the challenges posed by climate change, reduce environmental impacts, and ensure the sustainability and profitability of oil palm cultivation in the years to come.

It is crucial to include assessments of the potential impacts of climate change at proposed planting sites as part of the RSPO (Roundtable on Sustainable Palm Oil) Principles and Criteria and the New Planting Procedure. By integrating climate change considerations into plantation planning, the long-term viability and sustainability of new plantations can be ensured.

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Figure 1: Picture shows the male and female inflorescence as well as an unripe oil palm fruit in Sime Darby Plantation, Simpang Empat, Kedah

Figure 2: Picture shows integration of machineries, palm oil grabber in picking up the Fresh Fruit Bunch.

Figure 3: Picture shows a field visit of students from USM Engineering campus to Sime Darby Plantation, Simpang Empat, Kedah

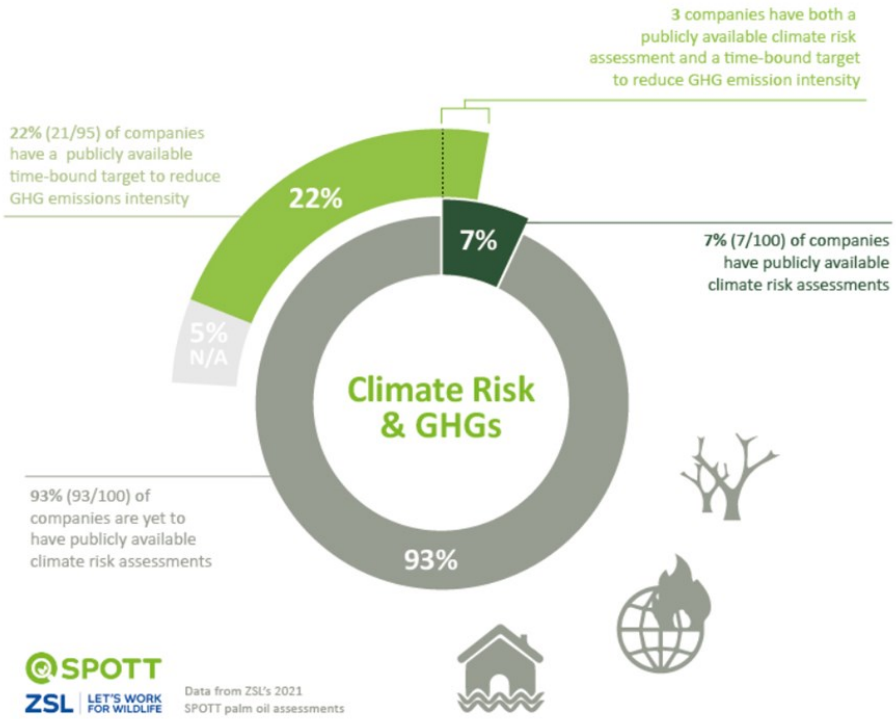

Figure 4: Palm Oil Industry Unprepared for Climate Change (Source: https://www.spott.org/news/palm-oil-industry-unprepared-for-climate-change/)

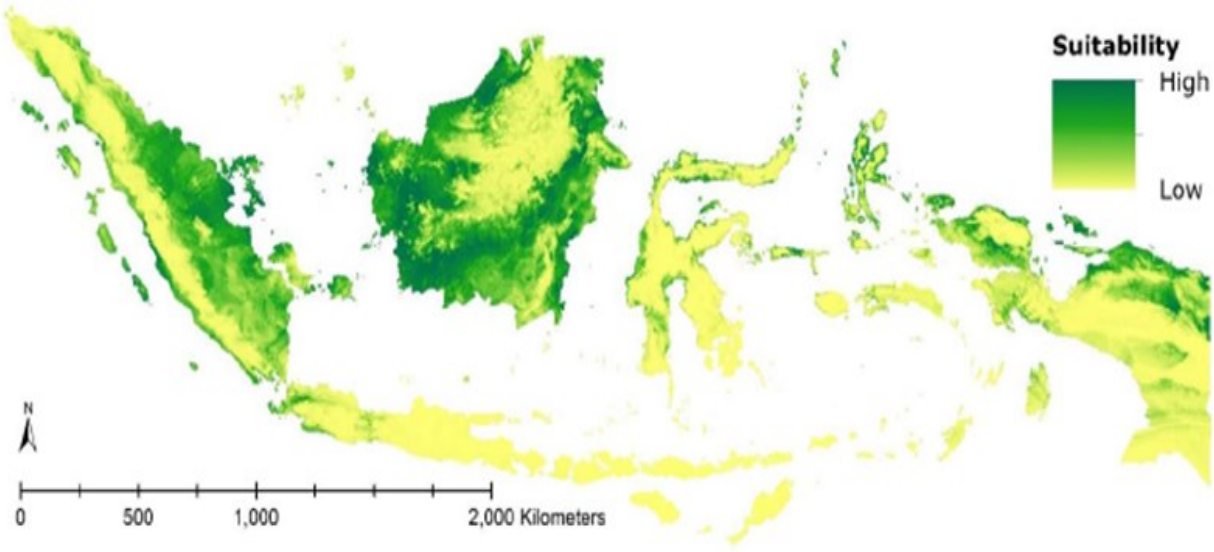

Figure 5: Modelled distribution of suitability to grow oil palm in Sarawak and Indonesia at the current climate (Source: Pirker er al. 2016)

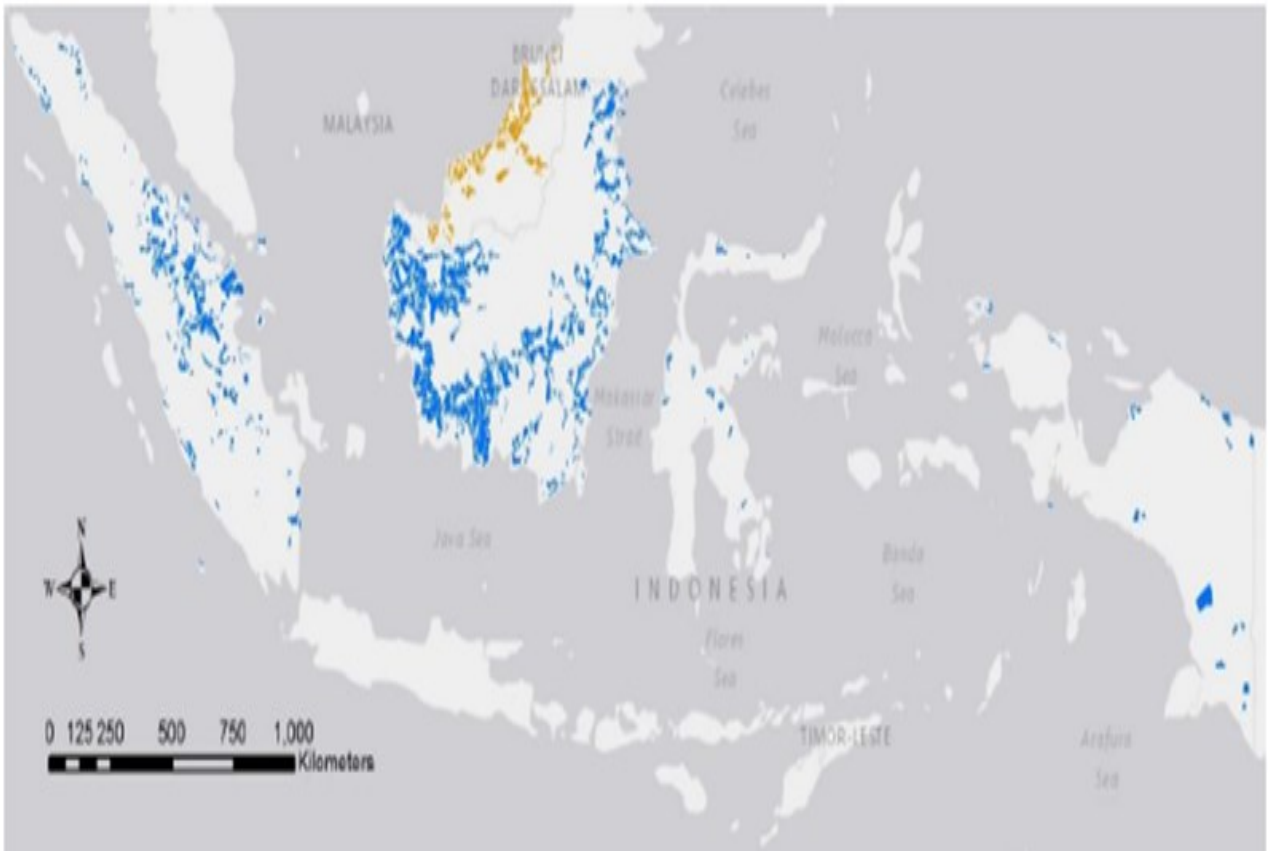

Figure 6: Locations for oil palm plantations in Malaysia (orange) and Indonesia (blue).

(Source: Global Forest Watch (SADIA, Aid environment & Earth sight Investigations 2016; Indonesia Ministry of Forestry 2016)

Article: From Chemical Dependency to Sustainability: Reducing Caustic Usage in Palm Oil Refinery

Written by Tan Kian Seng (Universiti Sains Malaysia)

Vegetable oils are the major source of monounsaturated and polyunsaturated fatty acid in our daily diet [1]. Monounsaturated and polyunsaturated fatty acids are required by the human body to reduce the unhealthy cholesterol levels in the blood, while providing nutrients for the body's cell production [2]. Among all the vegetable oil that exist currently in the world, palm oil is one of the most widely used edible vegetable oil. It accounts to almost 27% of the world's vegetable oil market back in 2015, placing itself in the second position among other vegetable oils such as soybean oil (30%), rapeseed oil (15%), sunflower oil (10%), peanut oil (5%), cotton oil (4%), olive oil (3%) and others (6%) [3].

The production of palm oil involves many stages, from planting and harvesting the oil palm in oil palm plantations, to crushing the fresh fruit bunch (FFB) of oil palm to obtain the crude palm oil (CPO) in palm oil mills and refining the CPO into edible vegetable oil in palm oil refineries. To obtain and facilitate these processes, various chemicals are used in the industry. In a palm oil refinery, examples of chemicals that are used are caustic soda, citric acid, and phosphoric acid. The usage of chemical depends on the type of process that is implemented in the refinery. Generally, the refining process can be done via two routes, which are chemical refining and physical refining [4]. When CPO is received by the refinery, the traditional method of refining it is by using chemical refining. In chemical refining, the crude oil will be pre-treated with phosphoric acid, and then the oil will be neutralized by using caustic soda (sodium hydroxide) to remove the impurities in CPO, to obtain Neutralized Palm Oil (NPO). On the other hand, physical refining uses steam and vacuum for the purpose of impurities removal, but the process will be more complex and has a higher capital investment [4].

Focusing back to chemical refining, the usage of caustic soda is to reduce the free fatty acid (FFA) that is present in the crude palm oil [4]. Abundant amounts of FFA in edible oils will pose a threat to the human health. Thus, clear quality standards specification was set by the Malaysian Palm Oil Board (MPOB) regarding the allowable FFA levels in palm oils. The allowable content of FFA in CPO should be below 5 percent while after refining, bleaching, and deodorizing the CPO, the allowable FFA content should be less than 0.1% in Refined Bleached Deodorized Palm Oil (RBDPO) [5]. The FFA levels in CPO varies from batches to batches as many factors contributes to the production of FFA in CPO. It could be released naturally in CPO, and the amount can increase due to the lipase enzymes contained in the palm fruit itself. If the FFB was damaged during harvesting, this will further increase the enzyme in the fruit, increasing the FFA contained in CPO [6]. Besides, if the CPO is kept too long before harvesting, this will also contribute to the high levels of FFA as well. High levels of FFA in CPO result in more caustic to be used for the removal of FFA in CPO. This is not good as using caustic excessively is not sustainable as it will result in higher waste generation and causing more negative impacts towards the environment.

Thus, to control the use of caustic soda used, different approach could be implemented in the early stages of obtaining CPO, up until to making changes to the refining process. First and foremost, the quality of CPO obtained should be well maintained so that the initial levels of FFA is low. When harvesting the FFB, proper harvesting and handling method should be used in the plantation and mills to minimize the damages done to the FFB. According to research done, the FFA levels in the damaged part of FFB will increase rapidly to 60 percent within an hour [7]. Besides, changing the refining method from chemical to physical refining could be a potential solution as well. But this method may not be suitable for all companies as some companies may still want to do chemical refining to obtain the soap stock for soap production or by reselling it to generate revenue. Thus, controlling the FFA levels in CPO to the minimal will be the most optimum option. During the refining stage, the use of caustic should be on point as well as in some company, the amount of caustic they use are not varied based on the FFA levels in CPO. FFA levels should be measured from time to time and the sufficient amount of caustic needed for the neutralization process should be based on the measured level. This is to prevent any excessive usage of caustic during the process. Automation and advanced process control can be applied to this process as well, to ensure that the manipulation of amount of caustic is done fast and accurately. To the existing plant with automation already in place, timely fine tuning of the process must be taken in place as well. Overall, staring from the harvesting step up until to the refining step, various solutions can be applied to minimize the usage of caustic soda in the palm oil industry.

In conclusion, usage of caustic in the palm oil industry is still a necessity, and proper dosage is required so that no excessive drops of caustic is used that will harm and bring negative impacts to the environment. Besides, this action supports multiple sustainable development goals (SDG) such as SDG 12, responsible consumption, and production. Palm oil is a wonder oil that is used in many products, thus responsible production of the vegetable oil in a sustainable way is a must, to ensure that not only the current generation, but the future generations have a greener future.

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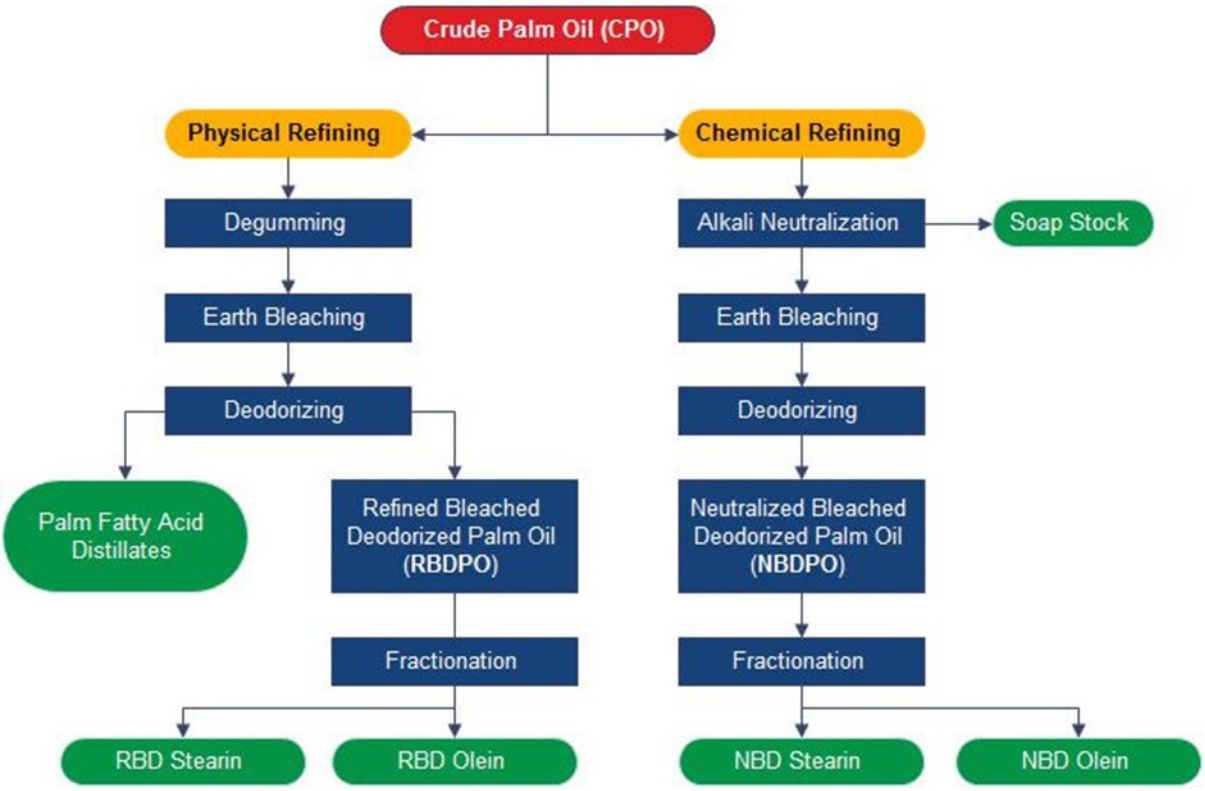

Figure 1: Refining Flow Chart of Crude Palm Oil (CPO)

Source: https://www.palmoilmillplant.com/related-products/palm-oil-chemical-physical-refining-process.html

News: Dialogue session with the Deputy Prime Minister at the High Commission of Malaysia in London

Malaysian students in UK had the opportunity to meet and participate in a dialogue session with the Deputy Prime Minister of Malaysia at the High Commission in London on 2 June 2023. More than 40 students from undergraduates, postgraduates and professional bodies were present at the event, which saw discussions ranging from overseas voting processes to the sustainable palm oil trading. The Deputy Prime Minister concluded his working visit to the UK on a high note, following policy makers from the UK giving their commitment to recognise the Malaysian Sustainable Palm Oil (MSPO) certification in the due diligence guidelines, which could open up more business opportunities between Malaysia and UK.

News: The International Sustainable Palm Oil Forum

The International Sustainable Palm Oil Forum took place on 2nd June 2023. It began with a keynote speech by the Deputy Prime Minister of Malaysia YAB Dato' Sri Fadillah Yusof. The UK is set to join CPTPP. It opens doors for trade and expansion, including in collaboration with Malaysia. The Deputy Prime Minister emphasised on integrating environmental, social, and economic considerations. With a remarkable 94.23% of planted areas and 95.89% of mills certified under the MSPO certification scheme, Malaysia demonstrates its unwavering commitment to its responsible practices. The event saw the participation of parliamentary lobby groups, civil societies, and non-governmental organisations. Also present were High Commissioner, High Commission of Malaysia in London Dato' Zakri Jaafar, Sarawak Deputy Minister for Urban Planning Land Administration and Environment Datuk Len Talif Salleh, Sarawak Deputy Minister for Energy and Environmental Sustainability Dr Hazland Abang Hipni, Secretary General of the Ministry of Plantation and Commodities Dato' Haji Mad Zaidi Bin Mohd Karli, CEO of MPOC Ms Belvinder Kaur Sron.

News: Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)

"This is an opportunity to open the doors for better growth and access to new markets." - Deputy Prime Minister Datuk Seri Fadillah Yusof said at a High-Level Business Event in London on 1 June 2023. He added that the United Kingdom's accession to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) expected in a few months will set the stage for a new phase in Malaysia-UK bilateral relations.

News: Sime Darby Plantation Hari Raya Open House

Attended by the former Minister of Primary Industries YB Teresa Kok, YBhg Academician Tan Sri Emeritus Professor Datuk Dr Augustine Ong, YBhg Datuk Nageeb Wahab (Deputy Secretary General of CPOPC), YBhg Datuk Dr Ahmad Parveez Hj Ghulam Kadir (DG of MPOB), YBrs Mr Mohamad Helmy Othman Basha (Chairman of MPOB and Group Managing Director of Sime Darby Plantation Berhad), YBrs Mr Joseph Tek (CEO of MPOA).

News: Happy Coronation, His Majesty The King

News: Congratulations Yang Berbahagia Dato' Carl Bek-Nielsen on your appointment as the Chairman Malaysian Palm Oil Council

News: Congratulations YBhg Dato' Mad Zaidi Bin Mohd Karli on his appointment as Secretary General Ministry of Plantation & Commodities

News: Congratulations YBhg Datuk Mohamad Helmy Othman Basha on beng conferred Darjah Kebesaran Panglima Jasa Negara (P.J.N.)

News: Thank You to Professor Naomi Shibasaki-Kitakawa for your contribution at POPSIG Webinar (26 June 2023)

News: Thank You & Happy Retirement YBhg Zurinah Binti Pawanteh for all her services as Secretary General of Ministry of Plantation and Commodities

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UPCOMING EVENTS

DATES	EVENTS
1 August 2023	Webinar: MPOC Digital Market Forum—Analyzing Palm Oil Prospect and Potentials—2023 and Beyond
22 August 2023	Event: Palm International Nutra-Cosmeceutical Conference
25 –27 September 2023	Event: RSPO - Monash Joint Symposium 2023
2 October 2023	Webinar: Liquid Biofuel Production from Biogas for Carbon Neutral
4 October 2023	Seminar: Sustainable and Circular Economy in Palm Oil Global Outlook
18 October 2023	Conference: POPSIG Research Showcase 2023
21 October 2023	POPSIG-MPOC Palm Oil Educational Roadshow at Swinburne 2023
30 October 2023	POPSIG-MPOC Palm Oil Educational Roadshow at 2023
7-9 November 2023	Congress: International Palm Oil Congress and Exhibition 2023

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