Curtin Malaysia IChemE
Virtual Palm Oil Site Visit

Introduction to Palm Oil Industry

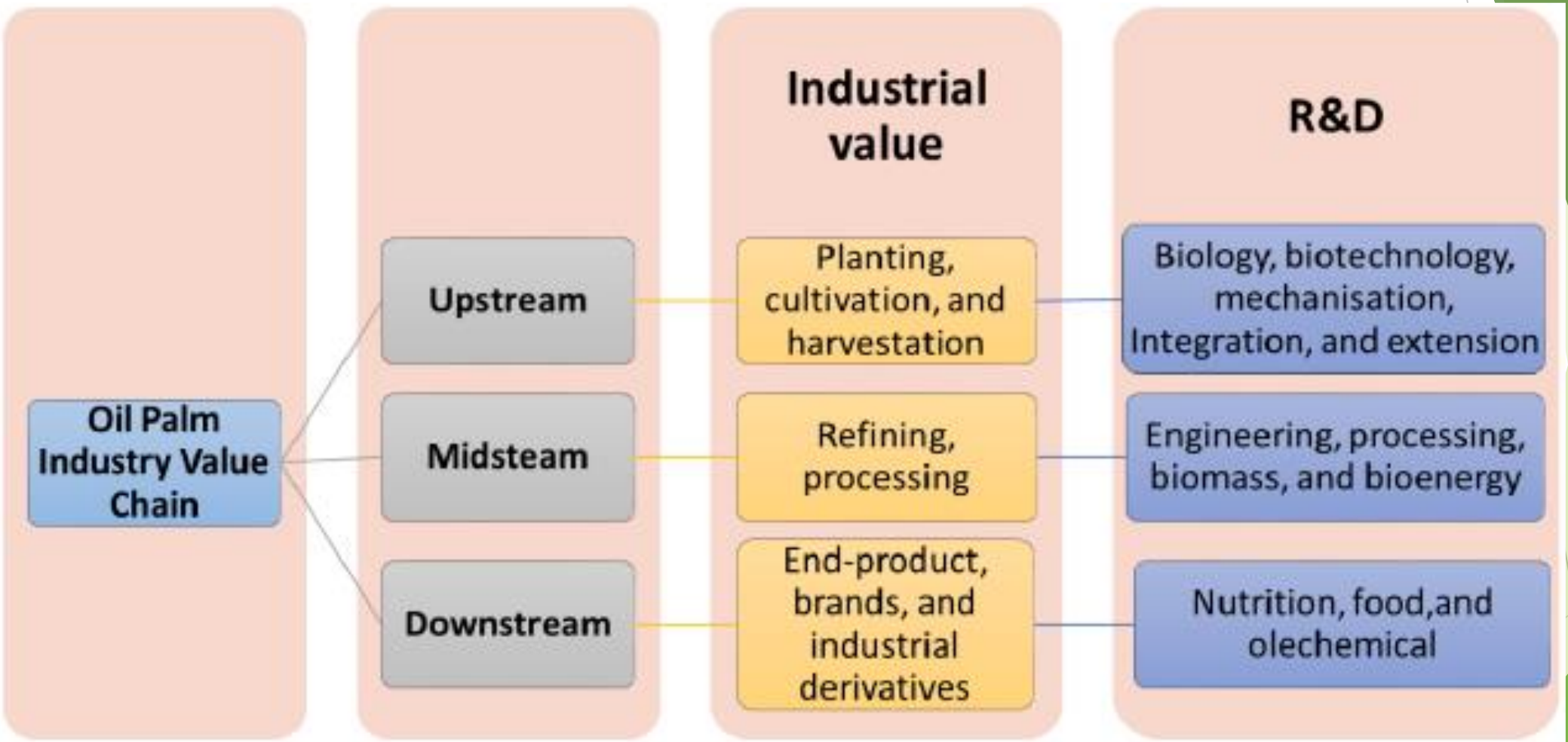
Scope of Presentation

1. Background information for the Oil Palm (OP) Industry
2. Sarawak Oil Palms Bhd (SOPB) in the Sarawak OP Industry
3. Challenges of the Industry
4. Public Perception of the Oil Palm Industry
5. Benefits of the OP Industry
6. Future Potential for OP Industry
7. Conclude

1. Background information for the OP Industry

- Oil Palm: First grown in Malaysia in 1917.
- As of 2020, there are around *1,584,520 ha of land planted with oil palm in Sarawak, around 27.01% of overall total oil palm area of Malaysia.
- Sarawak produce CPO *4,054,339 MT in year 2020, around 21.18% of overall total CPO produce in Malaysia
- **Data source from OVERVIEW OF THE MALAYSIAN OIL PALM INDUSTRY 2020, MPOB, Department of Statistics, Malaysia*

Overview of Oil Palm industry players



Industrial value chain in oil palm cultivation

https://www.mdpi.com/2073-4395/10/3/356/htm Agronomy 2020, 10(3), 356; https://doi.org/10.3390/agronomy10030356

2. Sarawak Oil Palms Bhd. (SOPB) - Background

- Sarawak Oil Palms Sdn. Bhd. (SOP) was incorporated in 1968, a joint-venture Company between the Commonwealth Development Corporation (CDC) and the Sarawak State Government to pioneer the commercial planting of oil palms in the state with an initial land area covering 4,600 hectares of oil palm plantation.
- Previously known as Sarawak Oil Palms Sdn. Bhd. (SOP), was public listed in 1995 and changed name to Sarawak Oil Palms Bhd. (SOPB)
- SOPB Group has since then expanded its land bank to over 122,000 hectares, with 88,000 hectares planted with oil palm trees in Sarawak.
- SOPB's upstream oil palm estates and mills are all located in the state of Sarawak, the largest state in Malaysia, and **Malaysia is the world's second largest producer of palm oil**.

Overview of the Sarawak Oil Palms Operations

http://www.sop.com.my/

Basic information for the Industry Segments

Upstream

Oil Palm Cultivation (Plantation, Outgrowers and Smallholder) – produce Fresh Fruit Bunches (FFB)

- Planning
- Nursery Establishment
- Site Preparation
- Field Establishment & Maintenance
- Harvesting & Collection

Mid- Stream

Palm Oil Mills – FFB processing to Crude Palm Oil (CPO) and Palm Kernel (PK)

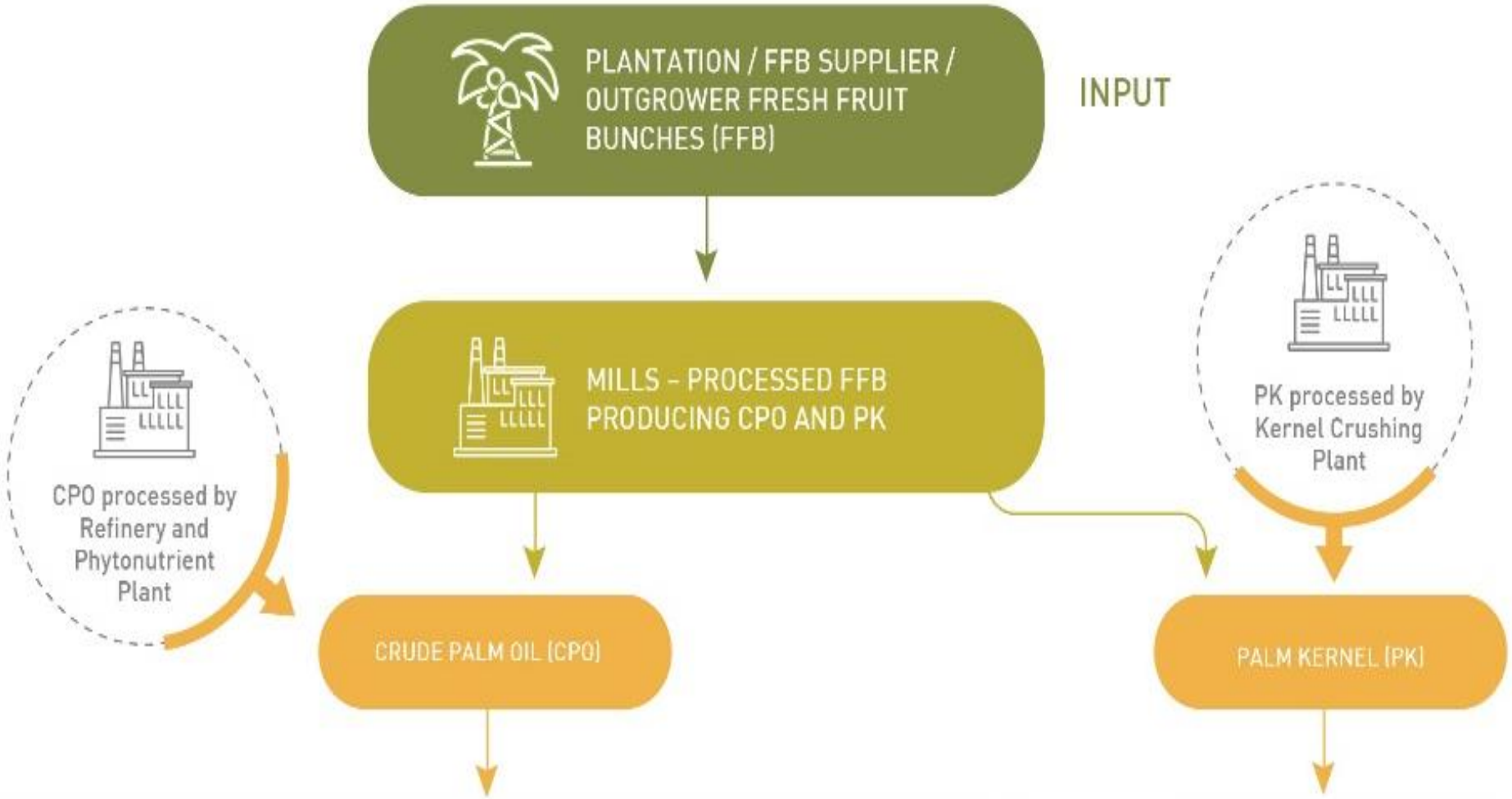
- Sterilization
- Threshing and Stripping
- Oil Extraction and Depericarping
- Produce CPO and PK

Downstream

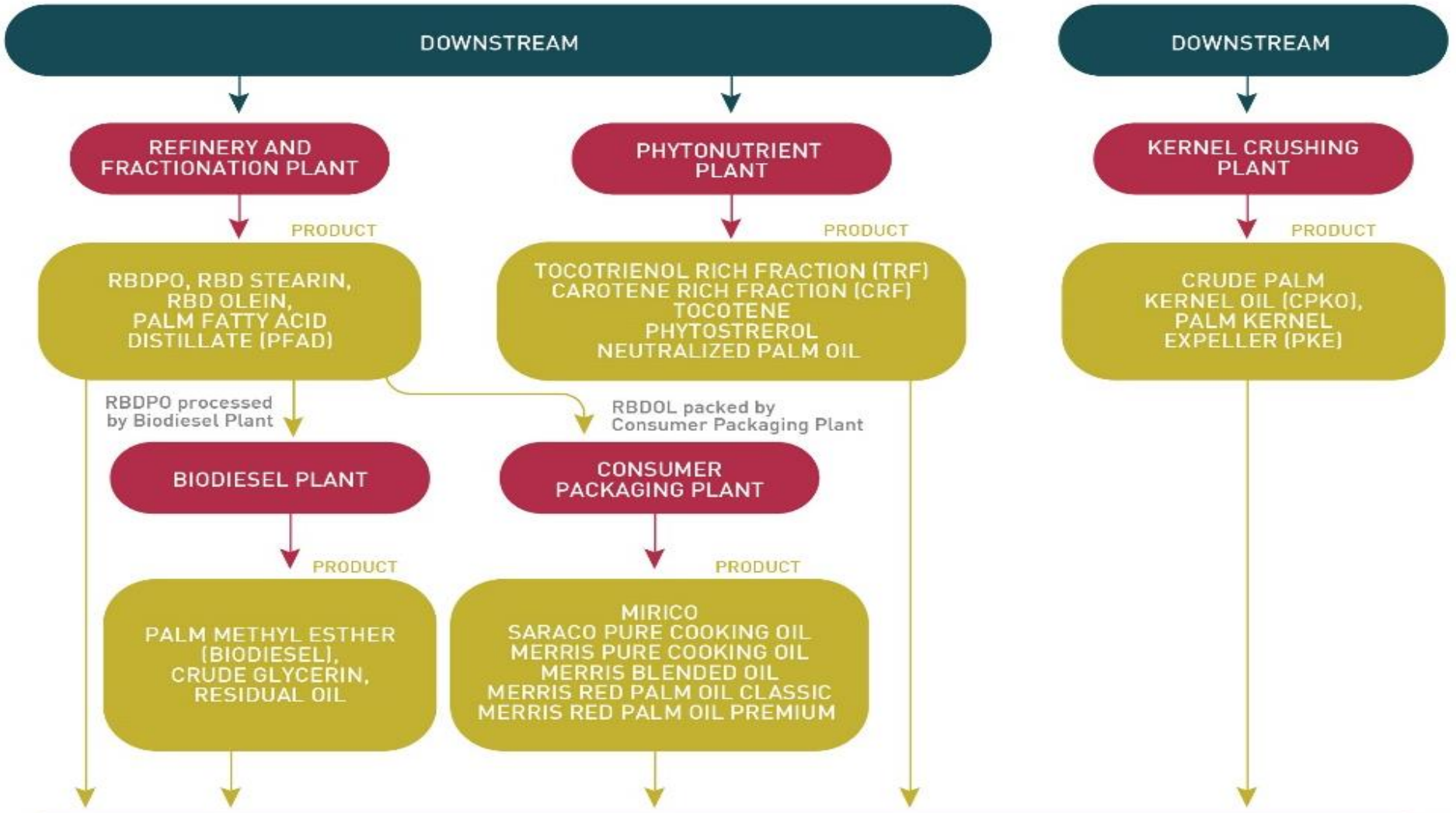
Refinery, Plants (Kernel Crusher, Biodiesel, Phytonutrients, Foods Packaging's), etc.

- Refine, Bleaching, Deodorized
- Produce Stearin & Olein
- Final Palms Products

Overview of the SOPB Operations



Overview of the SOPB Operations



Overview of the SOPB Operations

EXPORT PRODUCTS

INTERNATIONAL MARKET

- India
- Netherland
- France
- Spain
- Turkey
- South Africa
- Singapore
- Germany
- Switzerland
- Belgium

LOCAL MARKET

Mirico | Saraco | Merris Cooking Oil | Merris Blended Oil | Merris Red Palm Oil Classic | Merris Red Palm Oil Premium

Oil Palm Cultivation – The Beginnings (Upstream)

Oil Palm Cultivation - Maintenance and Upkeep

Mature Area – Integrated Pest Management - Planting of Beneficial Plants

Maintenance and Upkeep

Weeds Management

Harvesting

Manuring

Unloading / delivery of of Fresh Fruits Bunches (FFB) to POMs

Palm Oil Mill - Overview

Overview

3. Challenges in Oil Palm Industry

- In recent years, the oil palm sector has witnessed a period of historically high prices with **buoyant global demand** and high levels of production driven largely by economic development in major Asian countries such as India and China.
- Oil palm sector is also confronted by many important challenges that require attention - Such challenges include fragmentation of the industry, **stagnating yields**, and **an image problem** that is largely due to the conversion of tropical rainforest and peatlands in a few regions in South-east Asia.
- The biological and managerial tools to surmount these challenges already exist but need more **focused application** and government support.

Challenges in the Image (Marketing) of the Oil Palm Products

Pre-judge (Negative Perception) of Oil Palm and Competition with Other Oil Crops / Seeds

- Pre-judge (Negative Perception) of Oil Palm
  - **Alleged / Linked to Deforestation**
  - **Exploitation of Workers / Local Communities**
  - **Unhealthy Oil - Contaminations**
- Competition with Other Oil Crops / Seeds and Allegation by NGO

In addition, new limits on food contaminants in refined fats and oils, including palm oil, are also being considered. The EU is looking at imposing a limit for 3-MCPD esters, which it says pose *'potential health concerns'*.

Other major Challenges faced by the Industry

Labor Shortage

- As in December 2020, oil palm industry utilize around 101,988 workers in Sarawak, around 22.8% local manpower and 77.2% of foreign workers.
- Types of main labor in palm oil industry including: Mandor, Harvesting workers, loading workers, maintenance and upkeep workers as well as general workers.
- Due to restriction of entry of foreign workers since Covid-19 outbreak in year 2020, the oil palm industry are facing shortage of labor.
- For Sarawak, shortage of manpower is around 10,571 person.
- *Data source: MPOB

Note: Opportunity for Engineers to invent / innovate machineries / approaches to harvesting

4. Public Perception of the Palm Oil Industry

- "Few **developments generate as much controversy** as the rapid expansion of oil palm into forest-rich developing countries such as Indonesia" (Sheil et al., 2009).
- Why some crops have received relatively little attention from conservationists is a matter of debate, yet the negative impacts of the South-East Asian oil palm industry on biodiversity, and on orangutans in particular, **have been well documented and publicized** (Fitzherbert et al., 2008).
- Even Environmental NGOs admits that "**good palm oil**" is acceptable if policy makers:
  1. put an end to deforestation;
  2. introduce peatland restoration policies;
  3. support small-holder farms and
  4. involve local communities in palm oil business

5. Benefits of the OP Industry to the Country Economy

- Development of the oil palm plantation **improve the accessibility to rural area**, including accessibility to rural communities.
- With the improve accessibility, **local communities also able to develop their land into oil palm plantation**/ farm and indirectly improve the livelihood of local communities. Government policies in Malaysia, Indonesia and rest of the oil palms producing countries, **favor smallholder involvement in the oil palm industry.**
- Besides, establishment of oil palm plantation and palm oil mills also **create job opportunity** for the Sarawak's residents.
- Further development of downstream operation and export of palm products, palm oil industry also **contribute to significant income for the nation**.

Advantages of Oil Palm as an Agricultural Crop

- On the other hand, oil palm was found **most sustainable** with respect to the maintenance of soil quality, net energy production and greenhouse gas emissions, when biodiversity loss due to oil palm expansion was analyzed in relation to alternative crops for oil or energy, such as soybean, rapeseed, corn or sugar cane (de Vries et al., 2010).
- However, **global analysis of oil palm cultivation suggests that crop may encourage forest reversion and lower global emissions** (Villoria et al., 2013), mainly because oil palm plantations store more carbon than alternative agricultural land uses (Sayer et al., 2012).
- Oil palm (Elaeis guineensis, Jacq.) is by far **the most productive oil crop and alone is capable to fulfill the large and growing world demand for vegetable oils that is estimated to reach 240 million tons by 2050** (Corley, 2009). Per hectare of cropland, oil palm plantations give 3–8 times more oil than any other temperate or tropical oil crop.

6. Future Potential for Oil Palm Industry

- Plant scientists commonly argue that **finding solutions for increasing crop yield potential**, e.g., doubling yield by improving photosynthesis efficiency, and closing the yield gap will satisfy food demand by the growing human population that is estimated to reach 9–10 billion by the year 2050.
- The **challenge for oil palm planters will be to close the yield gap** between the average plantation output at present 3.5t, compared to some best known varieties that in favorable agro-climatic conditions produce up to 9–12t (Murphy, 2009).

Future Potential for PO Industry - R&D

- The opportunities for **nanotechnology** development in oil palm-based related research. The major points are as follows:
  - Nano-sensing enables **real-time monitoring of plantation status** and crop progression, including soil, water and **nutrient management**, early pest/disease detection, and the spreading of pests/diseases (Integrated of Pest / Disease Management). The use of nano-sensing conveniently extends into **advanced breeding** topics, such as the **development of disease-tolerant plants**;
  - Nanotechnology could be the answer for the development of active agricultural ingredients which can be entrapped or encapsulated into nano carrier systems to improve their solubility, stability, enhance their efficient delivery to site-specific targets, with longer shelf life, and consequently improved efficacy;
  - Valuable nano materials can be isolated and generated from oil palm biomass waste.

Research and Development (R&D) of the PO Industry

- MPOB and Industry players **invested in Research and Development** in several aspect relevant to palm oil industry.
- This **create opportunity of development of new/ innovative technology** for the industry, including mechanization.
- Potentially groundbreaking biological tools include the **new molecular breeding technologies**, such as those **made possible** by the recent publication of the oil palm genome sequence (Singh et al., 2013a, b).
- Two key R&D targets for the industry are:
  - **higher oil yield** in fruits and trees; and
  - higher mesocarp oleic acid composition – preferably over 65% w/w. The **more focussed use of new and traditional technologies** can also help **to confront pest and disease problems**, to redesign of crop architecture, and **to facilitate yield and harvesting efficiency**.

Conclude – The Way Forward for Oil Palms Industry - Environment

- To ensure sustainability in the palm oil sector, **reduced environmental impact** through / with involvement / engagement with relevant local / national / international stakeholder groups.
- Implement effective monitoring strategies (e.g. remote sensing) to ensure a **halt to deforestation**, and improve enforcement regulations with respect to deforestation, cultivation on high-carbon peatland, and worker exploitation.
- At midstream (POMs) - **Better waste management** of Mill's byproduct - empty fruit bunches (EFB) and palm oil mill effluent (POME), methane reduction / capture / composting measures in place.

Conclude – The Way Forward for Oil Palms Industry - Social

- The crop is often considered as an industrial crop, but in many areas **it is a valuable smallholder crop** (Feintrenie et al., 2010). Globally, three million smallholders live from oil palm cultivation).
- Establishment of oil palm plantation and palm oil mills also **create job opportunity** for the Sarawak's residents.
- **Collaborations with buyers** / NGO on pertinent environmental / social issues - to demonstrate and adoption of sustainable practices.
- Further development of downstream operation and export of palm products, palm oil industry also **contribute to significant income for the nation.**
- To increase market demand for sustainable palm oil, there must be **economic and regulatory drivers.**

Conclude – The Way Forward for Oil Palms Industry - Economics

- The palm oil industry is a Malaysian success story and to ensure that the industry continues to expand, sustaining its competitive edge remains the most important challenge for the industry.
- To achieve this, we need to improve on our efficiency and productivity to reduce cost, explore opportunities to diversify the income base and widen the demand base for Malaysian palm oil, create innovative marketing approaches as well as encourage greater integration among the sub-sectors of the industry.
- World market for palm oil has been growing at a steady pace over the years in tandem with the vegetable oil sector. While food applications contribute towards a major chunk of growth, steady adoption in industrial applications is also benefiting the market. Palm oil represents a key ingredient in almost 50% of all processed food products give its numerous health benefits such as improved vision; rich in antioxidants & vitamin K; Improved metabolism & weight loss; reduced risk of cancer & cardiovascular diseases; and ability to slowdown degenerative neurological diseases.

https://www.globenewswire.com/news-release/2020/09/09/2090687/0/en/Global-Palm-Oil-Industry.html

In Conclusion – The Way Forward for OP Industry

- Future growth in the market will be driven by growing prominence of certified sustainable palm oil (CSPO) against the backdrop of public concerns over environmental, social, and deforestation issues related to palm oil cultivation.
- Demand for sustainably produced palm oil is also driven by growing focus of developed nations on clean and green fuel and growing application as a feedstock in biofuel production. The biofuel productivity yield of palm oil is the highest among all oilseed crops and is surpassed only by sugarcane in terms of productivity yield.
- Other factors driving increasing consumption of palm oil include its attribute of being the cheapest form of vegetable oil; increasing production in Indonesia and Malaysia; growing demand from the food sector for use as margarine, bakery fat, frying fat, and cooking oil; and high yields produced from a hectare of palm oil plantation.
- Increasing consumer focus on health & wellness along with undesirable effect of partially hydrogenated oils on the cholesterol level is driving food and snack processors to switch towars Trans-fat-free, and GMO-free palm oil.

https://www.globenewswire.com/news-release/2020/09/09/2090687/0/en/Global-Palm-Oil-Industry.html


"Building a sustainable future"
Thank You