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Environmental friendly biodiesel from palm oil

Why did MPOB embark on developing biodiesel from palm oil?

The biodiesel initiative started in Malaysia as early as 1981 as a safety net to stabilize palm oil prices by removing surplus stock, and led to the successful development of several processes to transform crude palm oil into methyl esters, both for use as biodiesel and as feedstock for the oleochemical sector.

As the world moves to decarbonising various sectors, palm oil biodiesel offers the following socioeconomic and environmental benefits:

- Palm oil of lower quality is converted into biodiesel. This ensures the resources used to grow the trees are fully turned into valuable products and nothing goes to waste.
- Excess palm oil is converted to biodiesel that allows removing excess stocks of palm oil from the market to support palm oil smallholders
- Palm oil biodiesel offers an alternative renewable energy resource that reduces carbon footprint
- The MPOB patented process for producing biodiesel allows the retention and enrichment of valuable palm phytonutrients like carotenes, tocotrienols, sterols and squalene as co-products. This makes the process cost-effective and low in environmental impact.

Is palm biodiesel good for engines?

In 1986-1994, MPOB carried out field trials with palm biodiesel (B100, i.e. 100% Biodiesel) on diesel engines of different makes and models of taxis in collaboration with Petronas, engine manufactures, Universiti Teknologi Malaysia and University of Malaya. Scientifically designed exhaustive field trials were also done with Daimler Benz Germany using 36 commercial buses fitted with new Mercedes engines. Each bus covered 300,000 km, the life time of the engine and the fuels used were B100, B50 (50% Biodiesel with 50% petroleum diesel) and B0 (100% petroleum diesel as control). Results in terms of engine performance, fuel consumption, exhaust emissions, repair and maintenance showed that palm biodiesel is technically superior to normal diesel.

Palm biodiesel has also been shown to be a diesel/cetane number improver. Cetane number is an indicator of ease of combustion. The higher cetane number of palm biodiesel showed that it would result in better engine performance with more complete combustion and lower harmful emissions. Analysis of the exhaust gases showed that palm oil methyl esters reduced emissions of black smoke, CO, CO₂, and SO₂.

Where is this biodiesel available?

Many might not be aware that from December 2014 to early 2019, all the diesel sold in petrol stations in Malaysia was B7 biodiesel (i.e. 7% palm biodiesel with 93% petroleum diesel). B10 biodiesel was mandated in February 2019, and today, the petrol stations mainly offer B10 (10% biodiesel), and in some places B20 (20% biodiesel).

B10 for Euro 2M diesel is available in all petrol stations in Malaysia. B7 for Euro 5 diesel (premium) is only available in selected petrol stations. B20 for Euro 2M diesel has been implemented in Langkawi, Labuan and Sarawak.

Is Malaysian palm biodiesel exported to other countries?

Yes. MPOB has built commercial biodiesel plants in Korea, Columbia and Thailand besides Malaysia. Today, there are 10 such commercial plants. It is a home-grown Malaysian technology that has been shared with the world. The MPOB technical team helped set up the quality control laboratories for the plants we built. This clearly shows the acceptance and endorsement of our expertise and technology by others.

Another testament is the export performance. In 2020, Malaysia exported 378,582 tonnes of palm biodiesel to various countries including Europe.

We have also developed a technology to produce low pour-point palm biodiesel (-21°C compared to 15°C for normal palm biodiesel) to meet the seasonal requirements of the palm biodiesel used in temperate countries (Spring and Autumn, 0°C; winter, -21°C). Pour point is the temperature at which the biodiesel will remain liquid to allow it to flow. Three commercial plants for production of low pour-point palm biodiesel have been built in Malaysia

Is the plantation itself environmentally sustainable?

Planted on only 8.5% of the land occupied by oil crops worldwide, oil palm provides 43% of the world's edible oil. As the most productive oil crop in the world with 5-10 times more oil yield than competing oil crops like rapeseed and soybean, it is the most sustainable crop for meeting increasing world demand for oil. Oil palm has a smaller environmental footprint because all other oil crops would require 5 to 10 times more land for producing the same quantity of oil. However, the importance of sustainable practice cannot be over-emphasised.

What would you say about the food-fuel argument?

The world needs food and it needs alternatives to fossil fuels. Both are not mutually exclusive. We thus need to strike a balance between food security, energy security and environmental sustainability. Palm biofuel offers this balance. We also need to invest in technology to further increase oil palm yield to ensure that there is sufficient oil for both food and fuel so that food security and energy are complementary rather than exclusive. Our approach has always been to optimise use of palm oil and minimise environmental effects through the development of renewable energy. Besides removing surplus palm oil stock, one of our strategies was also to utilise low quality palm oil such as high fatty acid oils, sludge oil, palm fatty acid distillate, used cooking oils, which are actually not able to meet cooking grade standards for biofuel production.

This allows us to fully utilise our palm oil, leading to less industrial waste. It is thus an opportunity to turn our waste into wealth. Several countries especially the European Union are promoting this approach, subsidized with environmental incentives, where applicable, for the production of biofuel.

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