

February

## Land Use Effects from using Vegetable Oils as Biofuel Feedstocks

YEW FOONG KHEONG\* AND YEW MEI LEE

*Agro Planten Sdn.Bhd, 82, Jalan SS2/105, 47300 Petaling Jaya, Selangor Darul Ehsan, Malaysia*

*Palm oil, rapeseed, sunflower and soya are the four major vegetable oils in the world that have been used as non-biofuels viz. food, animal feed and oleochemicals for a long time. These resources are now also used as biofuel feedstocks and result in a growing demand for more of these resources to be produced. Increased production can be obtained either by intensifying oil yields from presently cultivated areas and/or land expansion to grow more of these crops. The latter activity results in land use change (LUC).*

*There are two ways that the use of vegetable oils as biofuel feedstocks affect LUC viz.*

- i) Size of land during expansion to grow these crops, and*
- ii) Resource sufficiency that places pressure or urgency to expand land area to grow more of these crops due to declining stocks.*

*This study evaluated the four major vegetable oil crops on LUC if they were to be used as biofuel feedstocks to supply European Union's (EU's) total biodiesel demand, which amounted to 15.29 million tonnes, in 2020. The results showed that oil palm was the highest yielding biofuel crop, followed by rapeseed, sunflower and soya in this order. As a result, these crops needed 5.1, 20.1, 20.7 and 34.0 million hectares respectively, to serve the purpose mentioned. These land sizes comprised 22, 63, 76 and 27 per cent of the total harvested area of the four crops in the world respectively in 2020. In other words, low quantities of the total stock of palm and soya oils in the world, which amounted to 22 and 27 per cent respectively were sufficient to meet the total biodiesel requirement for EU in 2020. A huge balance of 78 per cent of total palm oil stock and 73 per cent of total soya oil stock in the world still remained for non-biofuel use as food, feed and oleochemicals and demonstrated their large resource sufficiency.*

*On the contrary, if rapeseed oil was used, 63 per cent or nearly two thirds of its total stock in the world in 2020 would be needed to produce the required biodiesel quantities for EU for that year. For sunflower, 76 per cent or three-fourths of its total stock in the world was needed to fulfil the same purpose. This left low amounts of less than half of the total available stocks of both rapeseed and sunflower oils for food and other non-biofuel use; these being 37 and 24 per cent respectively. The large declining stocks of these two vegetable oils would put pressure or urgency to increase production and lead to LUC.*

*Based on a classification system that combined the features of size of land expansion and resource sufficiency that would create urgency to expand production caused by dwindling resources, the study concluded that palm oil had a low LUC effect when it was used as a biofuel feedstock. The use of rapeseed, sunflower and soya led to high LUC effects. As such, based on the consideration of judicious use of limited land resource, palm oil was found to be a better biofuel feedstock to use than the other three feedstocks.*

**Keywords:** *Land use, vegetable oils, biofuel crop, biodiesel, resource sufficiency, palm oil, rapeseed.*