

**Prof ES Chan**

**Is palm oil a healthy oil for deep frying?**

**What are the different types of cooking oil in terms of their chemical properties?**

Many cooking oils sold in the supermarket are soft oils. Examples of the soft oils are soybean, canola and sunflower oil. Typically, soft oils have higher amount of unsaturated fatty acids than saturated fatty acids. It is well established that unsaturated fatty acids, in particular the polyunsaturated fatty acids are chemically less stable than the monounsaturated and saturated fatty acids when exposed to oxygen and high heat (Choe & Min, 2007). Palm oil contains a balanced amount of unsaturated fatty acids and saturated fatty acids, and the unsaturated fatty acids are primarily mono-unsaturated fatty acids that makes it heat stable (May & Nesaretnam, 2014).

**What happens to oil at high temperature?**

During deep-frying, food is submerged in hot oil, normally at a temperature between 160 to 190°C. During this process, the oil will undergo a number of physical and chemical changes. The main chemical reactions that take place during deep-frying are hydrolysis, oxidation, polymerisation and isomerisation (Nayak et al., 2016). In hydrolysis, the oil breaks down to form free fatty acids upon contact with water; whereas in oxidation, the oil reacts with dissolved oxygen to form oxidised products such as ketones and aldehydes; in polymerisation, the free fatty acids react with each other to form longer molecules that increases the viscosity of the oil - an increase in viscosity could increase the oil absorption by the food (Arslan et al., 2018); and in isomerisation, the oil undergoes changes in its molecular structure and this could result in the formation of trans fats (Zhang et al., 2012).

**How do all these reactions affect our health?**

Obviously, the changes in the physical and chemical properties of oil during deep-frying are not desirable. This is because it is a sign that the oil is degrading and undesirable compounds are formed. Animal studies have shown that the consumption of oxidised oils can cause liver diseases and diabetes (Islam et al., 2020); and some of the aldehydes formed are known to be genotoxic and cytotoxic and they can cause diseases such as cancer, Parkinson's and Alzheimer's (Pizzimenti et al., 2013); on the other hand, trans fats are widely known to raise cholesterol level, thus increasing the risk of heart disease and stroke (Authority, 2018).

**How do different oils behave during deep frying?**

Soft oils are more prone to oxidation and heat degradation, causing higher formation of oxidised compounds, polymers and hydrolysed products during deep-frying (Abd Razak et al., 2021).

One way to overcome this problem is to partially hydrogenate the soft oils to improve their deep-frying stability. However, hydrogenation process is known to produce a high amount of trans fats, which is very bad for health when consumed.

Palm oil appears to be a better choice as it is heat stable. It is more resistant to break down and oxidation during deep-frying (Ahmad Tarmizi et al., 2019). This has a number of benefits. Firstly, less harmful compounds are formed; secondly, the physical properties of the oil, such as viscosity can be better preserved, therefore, reducing the fat absorption by the food (Al-Khusaibi et al., 2012). As a result, the foods are safer and healthier to eat.

### **What are the other benefits of palm oil?**

Palm oil does not contain cholesterol and trans-fats. Besides, palm oil also contains tocotrienol, which is a rare form of vitamin E that has powerful antioxidant property (May & Nesaretnam, 2014). The unique chemical structure and composition of palm oil makes palm oil naturally stable at high temperature without any chemical modification or chemical additive.

Since there is less oxidation or hydrolysed products, palm oil has lesser tendency to give out bad odour and produce smoke (Ahmad Tarmizi & Ismail, 2008). Odour spoils the taste of foods, and smoke creates an unpleasant cooking experience and makes the kitchen greasy.

It is also affordable, and its stability to oxidation and heat allows it to be reused for a longer period of time compared to the soft oils, therefore, making it a cost-effective cooking oil for home or commercial use.

Malaysians love to eat deep-fried foods. From a scientific point of view, it is important to cook foods using the right type of oil.

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