

"We do not inherit the Earth from our ancestors, we borrow it from our children."

*- Ralph Waldo Emerson*

# USED COOKING OIL

How does it impact us?

2021

these information is brought to you by;

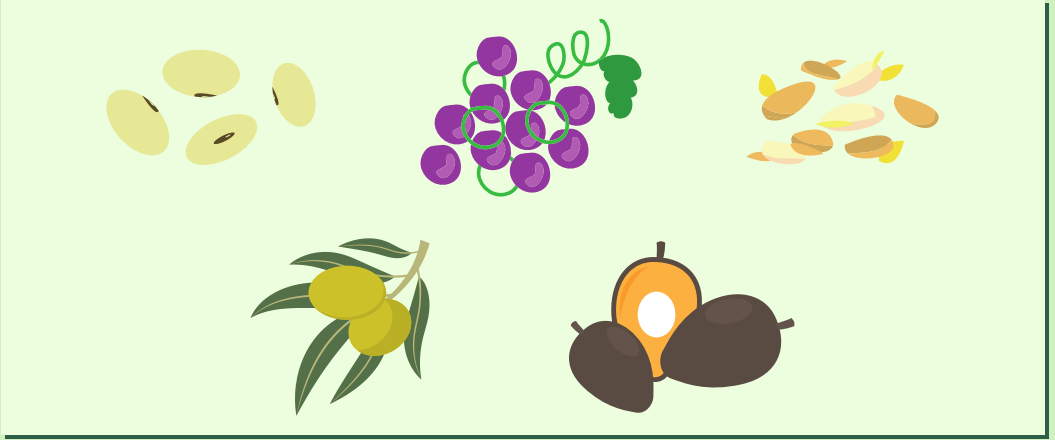


**IOI PROPERTIES**

# INTRODUCTION

## Plant based oil

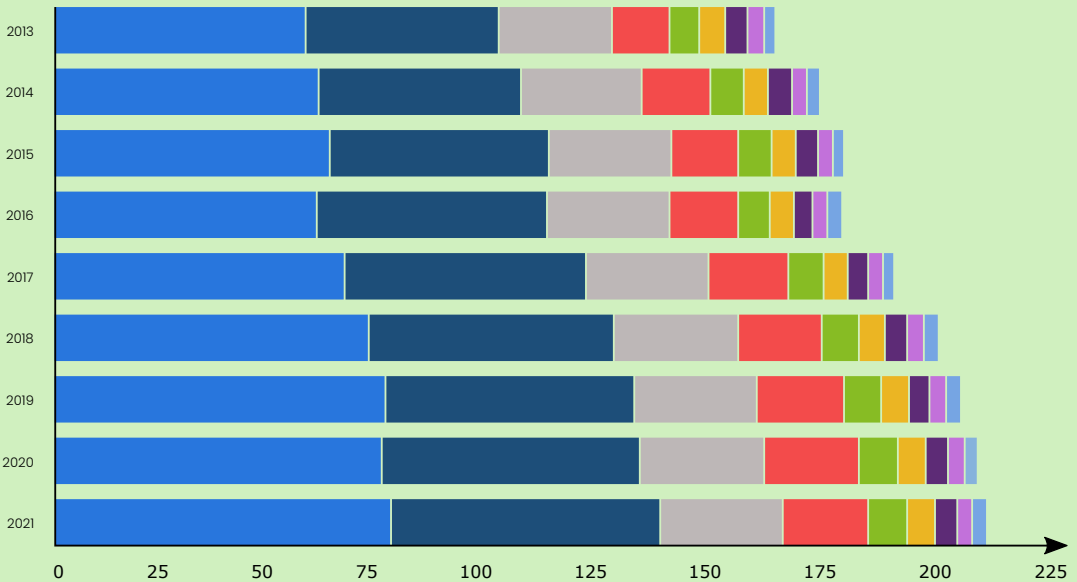
**Vegetable oils**, or plant based oil, are oils extracted from seeds or from other parts of fruits. Soybean oil, grape seed oil, and cocoa butter are examples of fats from seeds. Olive oil, palm oil, and rice bran oil are examples of fats from other parts of fruits.



Vegetable oils is a **versatile compound**. Due to it's chemical and physical properties, it can be used in a wide array of sectors. From the manufacturing to culinary, the usage are endless.



# A GLOBAL OVERVIEW



## PRODUCTION OF VARIOUS VEGETALBE OIL (MILLION METRIC TONNES)



Globally, humans produce over **200 million metric tonnes** of plant based oil each year. Out of which **90%** of it is used for consumption. Accounting for retained oil in food (8-25%) after cooking, there should be an estimated of **at least 125 million metric tonnes** yield of Used Cooking Oil (UCO) annually.

However, according to latest census, only **20 million metric tonnes** are re-collected annually to be recycled and reused thus creating a problem in the long run.

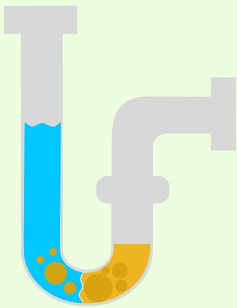
*We are wasting so much more than we are producing*

# ENVIRONMENTAL EFFECTS

## Sewage System

Due to its physical properties (low density, high viscosity, high adhesion), used cooking oil proves to be a huge issue to our local municipal council. When poured in the sink or sewage system, used cooking oil **solidifies**, clogging up drainage system.

This in turn creates a suitable condition for pests (rodents & insects) to breed thus allowing various infectious disease to spread. In Malaysia, **Dengue Fever** and **Leptospirosis** (vectorised by mosquitoes and rodents) increases expenditures of not only our healthcare system but also our country's infrastructure.



Malaysia has an average of **130,000 cases** of Dengue Fever annually with a 0.18% fatality rate.



Malaysia has an average of **5,000 cases** of leptospirosis "penyakit kencing tikus" annually with a 1.47% fatality rate.

## Landfills

Used cooking oil (UCO) dumped into landfills along with other waste poses a major **fire hazard**. Spontaneous landfill fire has doubled in recent years. These catastrophic disaster not only pollutes the soil, but also the air that we breathe. Four harmful gases **CO, CO<sub>2</sub>, NH<sub>4</sub>, and CH<sub>4</sub>** have been recorded at high concentrations during these occurrences. These pose major side effects to populations within the aftermath of the disaster.

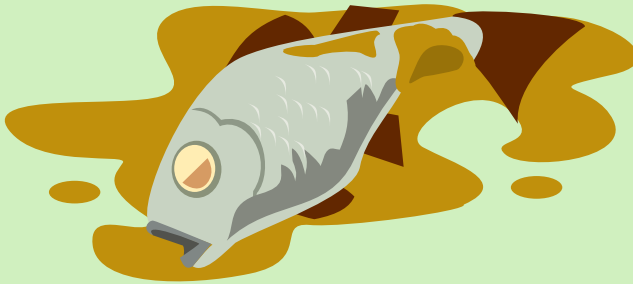
# ENVIROMENTAL EFFECTS

## Water polution

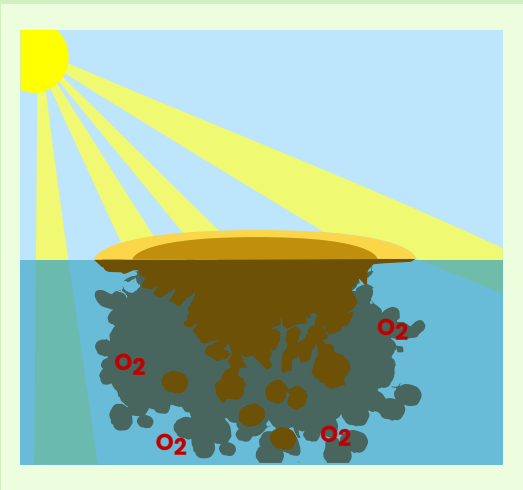
Used cooking oil (UCO) can pollute our water source through our sewage system or seeping into soil **contaminating underground water source**. In both cases, harmful agents can be introduced into our drinking water source and harm aquatic life. **25%** of all water pollutions, is caused by irresponsible oil disposal.

## Aquatic Ecosystem

Used cooking oil can damage our aquatic excosytem in 3 manners; i) due to the high adhesion properties of oil, it can **adhere to surfaces of fishes**, and plants thus inhibiting their respiratory system.



ii) oil on water surfaces **blocks sun ray** from reaching the bottom of sea beds / lakes. Lack of sun ray can disrupt vegetation growth and thus reducing food supply of aquatic animals.



iii) over time, oil begins to oxidise and degrade. This process **consumes vast amount of oxygen** from the surrounding medium (water) thus depriving aquatic organism of these life preserving elements.

# ENVIROMENTAL EFFECTS

## Greenhouse Effect

A recent study shows that lakes and rivers emits greenhouse gaseous such as **carbon dioxide**, **nitrous oxide** and **methane gas** into our atmosphere and it has a direct colloration with levels of air polution. It is estimated that rivers and streams releases up to **3.9 billion tonnes of carbon** each year (around **four times** the amount of carbon emitted annually by our global aviation industry). In addition, it is estimated that aquatic systems such as rivers and lakes contribute more than **50% of all atmospheric methane**, and global river **nitrous oxide emissions** have come to exceed 10% of human emissions.

**Microbial activities** (anaerobic respiration) are the main contributing factor to these rising figures. **The higher the pollution, the higher the concentration of microorganisma**. This in turn contributes to global climatic warming.



# HEALTH EFFECTS

## Smoking Point

Smoke point refers to the temperature at which oil starts to burn and converts into smoke. When cooking with oil that's being heated past its smoke point, besides imparting a burnt flavour to foods, beneficial **nutrients** and **phytochemicals** are **destroyed**. Overheating also creates **harmful chemicals** and **free radicals** (carcinogens).

Used cooking oil, has a **lower heat tolerance** after each usage. Food particles may break off and blend with the oil, lowering its smoke point by **accelerating oil's breaking down process**.

Type of Oil	Smoking Point
Butter	149 - 175°C
Olive	163 - 210°C
Coconut	175 - 196°C
Sesame	175 - 210°C
Grapeseed	195°C
Canola	204 - 230°C
Palm	210 - 230°C



*With each burn, the  
smoking  
point reduces*

# HEALTH EFFECTS

## Cancer Causing Agents (Carcinogen)

A recent study found that a toxin called **4-hydroxy-trans-2-nonenal (HNE)** forms when vegetable based oils are reheated. Consumption of foods containing HNE has been associated with increased risks of **cardiovascular disease, stroke, Parkinson's disease, Alzheimer's disease, Huntington's disease, various liver disorders, and cancer**. Once absorbed in the body, HNE reacts with DNA, RNA and proteins **affecting basic cellular processes**.

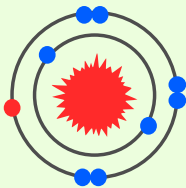
## Low Density Lipoprotein (LDL) cholesterol

Food cooked in blacked, smoked oil which has used or reheated can increase level of **LDL cholesterol** in our blood. High levels of LDL cholesterol can increase risks of cardiovascular diseases, and stroke.

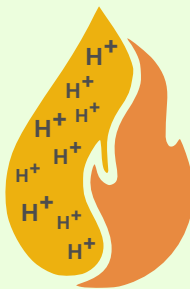
## Acidity ( $H^+$ )

The heating of fat till frying temperatures in an environment in which is moist and oxygen are present, triggers off the formation of **carboxylic acids, oxalic acids, keto-acids, epoxy acids, and alcohols**. This in turn makes your food acidic.

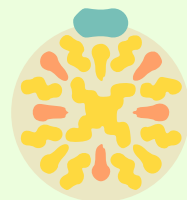
High acidity can cause a disbalance in our digestive tract.



Free Radicals



Acidity



LDL Cholesterol

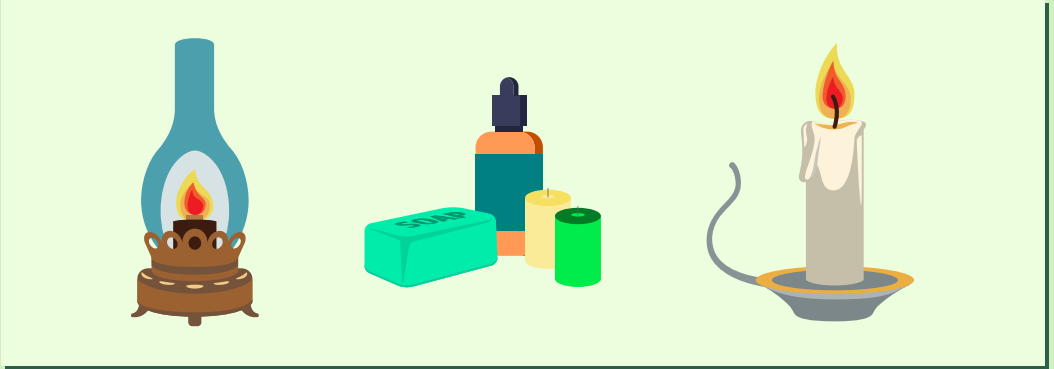


## *Money can't bring the bird, fish and whales back to life*

International Union for Conservation  
of Nature has listed 5,652 marine  
species that are in serious trouble

# BIODIESEL

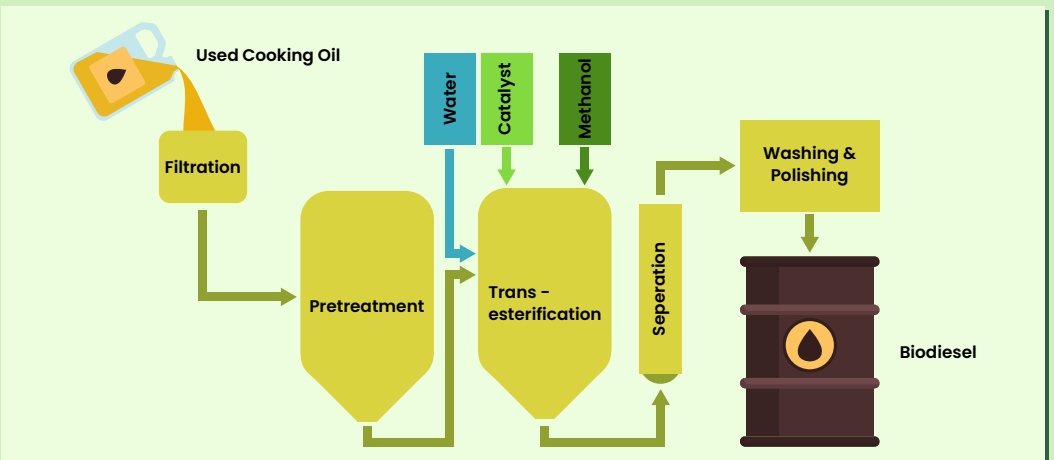
Used Cooking Oil can be **reused** and **repurposed** in a number of different ways. From being used as a lubricant in your home to being made into animals' feed or even fueling oil lamps, the possibilities are endless. In recent years, mankind has perfected the process of producing **Biodiesel** from Used Cooking Oil.



## Biodiesel - Transesterification

Transesterification is a chemical reaction used for conversion of **triglycerides (fats)** contained in oils, into usable biodiesel. Biodiesel produced by the process of transesterification has a much **lower viscosity**, making it capable of **replacing petroleum diesel in diesel engines**.

Biodiesel **bio-degrades four times faster** in natural environments and emits **78% less carbon dioxide** ( $\text{CO}_2$ ) than fossil fuel.



# Biodiesel – Advantages



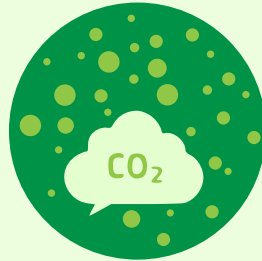
RENEWABLE SOURCE



CLEAN BURN / NON TOXIC



BIO-DEGRADABLE



LESS CARBON EMISSION

**Biodiesel** can be used in **pure form (B100)** or may be **blended** with petroleum diesel at any concentration in most injection pump diesel engines. Besides powering engines, biodiesel has shown superior functionality as **lubricants** as well as a **solvent** for crude oil.

As humans move into an industrial period, demand for energy continues to soar high, way more than our natural reserves. Biodiesel may be the solution for **sustenance of life on earth**.

***Biofuels are the future of  
energy for you and me***

# 5 RESPONSIBLE STEPS

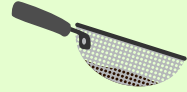


## COOL

Allow oil to cool down to room temperature

Don't flush it down the sink or toilet bowl ! Recycle it today

## SIEVE



Sieve out residues and food particles



## POUR

Pour cooled oil into a clean container



## STORE

Container must be heat resistant and air tight

Learning proper management of used cooking oil can make a huge difference to the environment.

**DON'T POUR IT DOWN THE SINK!**

**DON'T COOK IT BEYOND SMOKING POINT!**



**RECYCLE**





# RECYCLE USED COOKING OIL



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drop of Used Cooking Oil**

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