

## *Industrial Oil Crops*

Seed oils and other vegetable oils are mostly thought of as food ingredients, many of these oils are also used for nonfood industrial applications. Over the years, many plants that produce oils well suited to industrial use have been identified. Often these were wild or decorative species, referred to as “new crops,” which are not well suited to large-scale production or cultivation without agronomic improvement.

**Vegetable oils** : are a group of fats that are derived from some seed, nuts, cereal grains, and fruits of certain crops and are most often used for food or animal feed.

**It is important to understand that** : 1. Not all of these vegetable oils are liquid oils at ambient temperatures. Also, 2. not all of the vegetable oils are produced in commercial quantities, and of those that are, 3. not all are considered to be edible as in the sense of being a typical dietary component.

Vegetable oils, as used in foods, are comprised of complex mixtures of triacylglycerols (TAGs), with some minor amounts of various organic compounds including sterols and antioxidant for most of the commodity vegetable oils.

### *The Importance of Oil Crops*

The **economic importance** of oil crops shows growing interests in the world for its oil content. There are hundreds of products made entirely or partially from oils extracted from various oil plants such as artificial butter, like margarine used in pastries and cooking and chocolate for candy coating. **Also**, for making soap, paint, lubricants, lighting, pesticides, cosmetics, some medicines, dyes, ink, and polishes. Also, the by-products can be as animal feed due to high content protein between 20 – 40 %.

Besides the above various uses of seed oil crops, some have the following **benefits and use to human health**.

1. Vegetable oil provides the body with an energy equivalent to more than double the supply of carbohydrates and proteins, where the energy of one gram of oil equivalent nine calories.
2. The body takes advantage of soluble vitamins A, D, E, K in the vegetable oils and fats.
3. Vegetable oils provide the body with essential fatty acids necessary to prevent skin disease that cannot be formed inside the body like Linoleic acid, and Linolenic acid.
4. Vegetable oils help to increase food taste and decrease appetites.
5. Lower cholesterol level, as in safflower oil and corn, unlike animal fats, which contain a high level of saturated oils.

### ***Classification of Oil Crops***

Oil plants can be classified according to one of the following characteristics:

1. Essential oil plants which are grown mainly for their oils, these plants may be field crops such as, Sunflower, Soybean, Sesame, Peanut, Safflower, Rapeseed, ..... or a tree such as oil palm and coconut, and some other mainly grown for their fiber besides extracting the oils from it seeds such as Cotton, Flax, and Ramie.
2. Growth season
3. Oil strength in the natural weather
4. Common fatty acids in the oil

#### ***Classification according to growth season:***

Oil crops are classified according to thermal requirements during their growth period to:

1. **Summer oil crops:** Crops that need hot or warm weather for growth and maturity, for example, soybean, peanut, sesame, castor bean, and sunflower.
2. **Winter oil crops:** Crops that need cold weather during a period of their growth, for example, rapeseed, safflower, and flax.

There are oil crops that can adapt to *winter* and summer conditions such as castor bean.

### ***Classification according to common fatty acids in oil:***

1. Oil crops containing (Oleic acid and Linoleic acid), for example, sunflower, sesame, peanut, and cottonseed.
2. Oil crops containing (Linolenic acid), for instance, flax.
3. Oil crops containing (Erucic acid), for example, rapeseed, cramp.
4. Oil crops containing (Hydroxyl acid), for instance, castor bean.
5. Perennial plants which oil contains (Lauric acid), for example, oil palm tree and coconut tree.

<b><i>Crops name/Type of fatty acids</i></b>	<b><i>Saturated Fatty Acids %</i></b>			<b><i>Unsaturated Fatty Acids %</i></b>		
	<b><i>Palmitic acid</i></b>	<b><i>Stearic acid</i></b>	<b><i>Myristic acid</i></b>	<b><i>Oleic acid</i></b>	<b><i>Linoleic acid</i></b>	<b><i>Linolenic acid</i></b>
Sunflower	5	2	/	35	57	/
Sesame	8	3	/	47	41	/
Soybean	9	2	/	32	53	<b>3</b>
Safflower	5	1	/	20	70	/
Peanut	8	4	/	55	25	/
Rapeseed	1	1	/	22	22	<b>3</b>
Flax	/	9	/	23	20	<b>48</b>
Cottonseed	21	2	1	25	50	/
Olive	9	1	1	42	10	/

### ***The chemical composition of oils and fats (Lipids)***

#### ***Lipids:***

Organic substance is relatively insoluble in water but soluble in organic solvents like chloroform, ether, and benzene.

Fat is found in all living cells and is also abundant in oilseed seeds such as sunflower seeds, soybean, sesame, cottonseed oils and animal sources such as beef, milk, yolk and perform general functions in the organism.

## ***Classification of lipids:***

1. ***Simple lipids:*** They are esters of fatty acids with various alcohols. For example, oils, fats, and waxes.
2. ***Complex lipids:*** These are esters of fatty acids with alcohol + containing additional groups. For example, phospholipids, glycolipids, and lipoproteins.
3. ***Derived lipids:*** Are the substance derived from simple or complex lipids by hydrolysis. For example, steroids, cholesterol, and vitamin A and D.

## ***All Oils are fats, but not all fats are oils***

### ***Fatty Acids (FA)***

Fatty acids are carboxylic acids due to the presence of a carboxylic group (-COOH) with a long hydrocarbon chain attached. Fatty acids are either saturated or unsaturated carboxylic acids with carbon chains varying between 2 and 36 carbon atoms.



