

Plant fatty acids

Prepared by Dr.K.Radhika,
Assistant Professor, Department of Agricultural Engineering

- Fatty acids are **carboxylic acids** with hydrocarbon chains of 2 to 36 carbons.
- More than 200 fatty acids have been isolated from higher and lower plants.
- Of these, only a few are present in large quantities in most plant lipids. These are referred as **major fatty acids**.
- Fatty acids present in smaller proportions are called as **minor fatty acids**.
- Major and minor fatty acids are usually biosynthesised by analogous pathways.
- Fatty acids that occur only in a few plant species are called as **unusual fatty acids**.

Major fatty acids

- The major fatty acids are **saturated or unsaturated** with an unbranched carbon chain.
- The saturated fatty acids are **lauric (dodecanoic), myristic (tetradecanoic), palmitic (hexadecanoic) and stearic (octadecanoic) acid**
- The **unsaturated fatty acids** are **oleic (9-octadecenoic), linoleic (9,12-octadecadienoic) and -linolenic (9,12,15- octadecatrienoic) acid**.
- They are usually found in the lipids from all parts of plants
- The structure of fatty acids are written as a symbol of two numbers separated by a colon: the first number denotes the carbon atoms in the chain and the second number denotes the number of unsaturation centres.
- The positions of double bonds are specified by superscript numbers following (delta).
- Thus 18:2 (^{9, 12}) indicates an eighteen carbon fatty acid with two double bonds between C-9 and C-10, and between C-12 and C-13.
- The double bonds of all naturally occurring unsaturated fatty acids are in **the cis configuration**.
- The non-polar hydrocarbon chain accounts for the poor solubility of fatty acids in water.

Minor fatty acids

The fatty acid composition of cow's and goat's milk are characterised by a high content of short and medium chain saturated fatty acids.

Some minor fatty acids

Common name	Carbon skeleton	Systematic name
Butyric	4:0	Butanoic
Caproic	6:0	Hexanoic
Caprylic	8:0	Octanoic
Capric	10:0	Decanoic

Unusual fatty acids

- ❖ The unusual fatty acids are found only in few individual species or genus or a whole family.
- ❖ Castor bean (*Ricinus communis*) seed oil is rich in **ricinoleic acid** (90%) which is 12-hydroxy oleic acid $\text{CH}_3(\text{CH}_2)_5\text{-CH}(\text{OH})\text{-CH}_2\text{-CH=CH}(\text{CH}_2)_7\text{-COOH}$.
- ❖ Rape seed (*Brassica napus*) is rich in **erucic acid** (cis-13-docosenoic acid $\text{CH}_3(\text{CH}_2)_7\text{-CH=CH}(\text{CH}_2)_{11}\text{-COOH}$).
- ❖ **Hydnocarpic and chaulmoogric acids** are found in chaulmoogra oil which is used in the treatment of leprosy.