

Lipid Metabolism

①

α -oxidation of fatty acids

- This pathway is unique to germinating plant seeds.
- α -carbon atom is oxidized to an aldehyde group at the expense of H_2O_2 and the carboxyl carbon of the fatty acids is lost as CO_2 .
- The reaction is catalyzed by fatty acid peroxidase.
- H_2O_2 required for the reaction is furnished by the direct oxidation of reduced flavoproteins by molecular O_2 .
- The fatty aldehyde formed is oxidized to the corresponding carboxylic acid.
- It is a two-enzyme reaction sequence, which is repeated on the shortened free fatty acids.

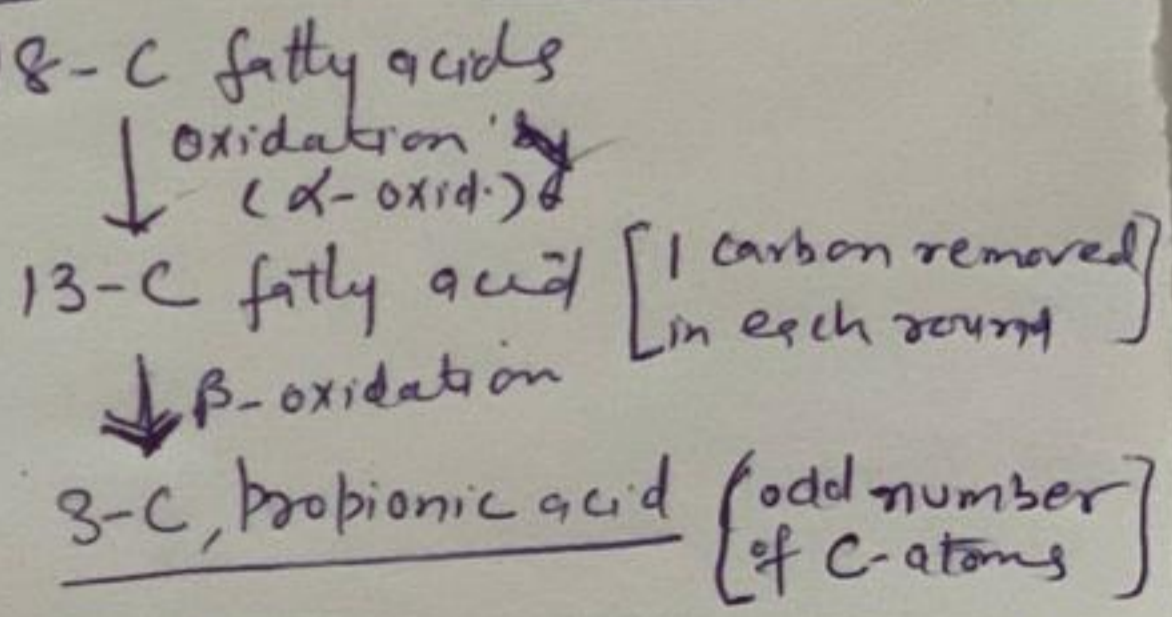
* Figure of α -oxidation pathway attached

-Contd.

- Since fatty acid peroxidase attacks only fatty acids having 13-18 carbon atoms this pathway cannot lead to complete oxidation of long-chain fatty acids.
- The aldehydes produced in this pathway may alternatively undergo reduction to yield long-chain alcohols, which occur in large amounts in waxes.

Significance

1. It is believed that α -oxidation is a means to produce acids with an odd number of Carbon atoms. e.g. 18-C fatty acids



2. α -oxidation may function as a bypass of a substitution group that could prevent the operation of the β -oxidation sequence.

Assignment

(3)

Questions :

1. Short note on α -oxidation
2. Difference between α - and β -oxidation of fatty acids
3. Significance of α -oxidation pathway in plants.
4. Schematic representation of α -oxidation pathway.

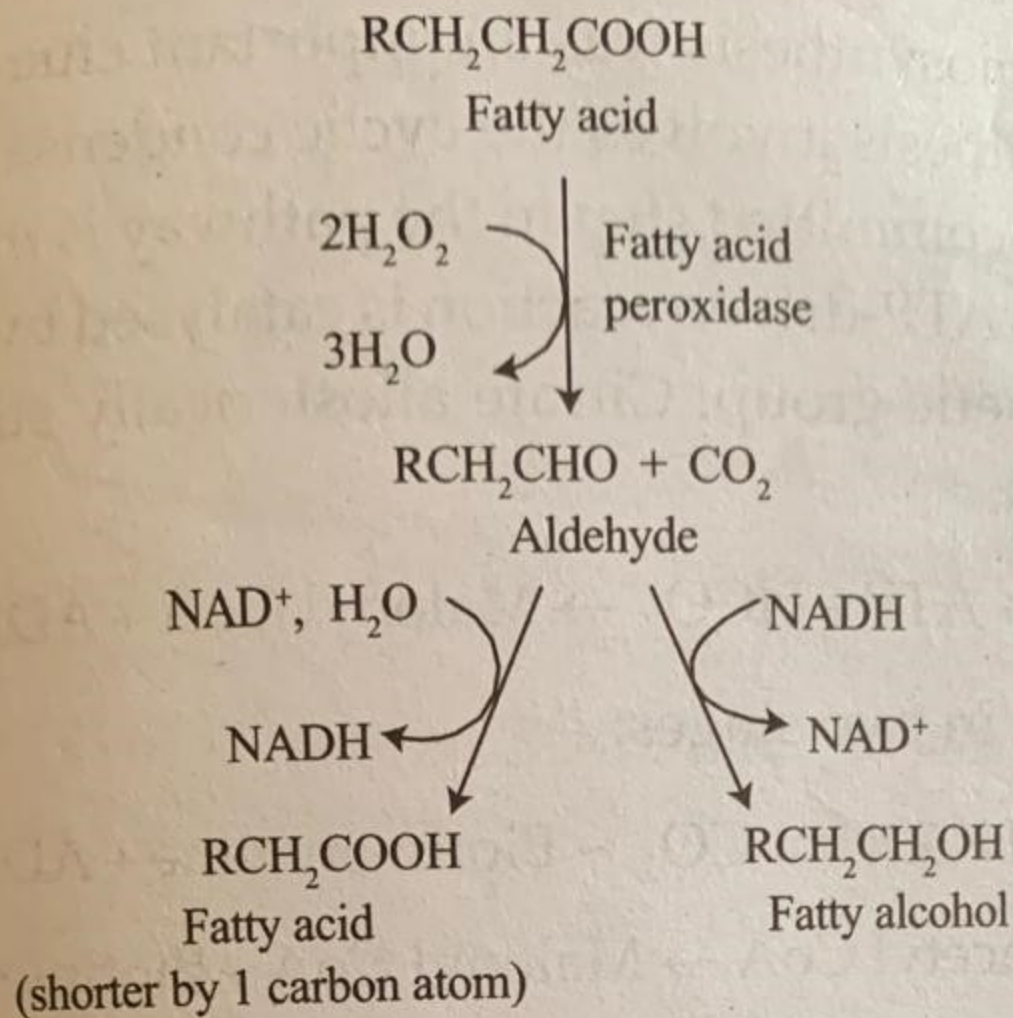


Figure 12.4 The α -oxidation pathway in plants.