RESPIRATION IN PLANTS
AMPHIBOLIC PATHWAY

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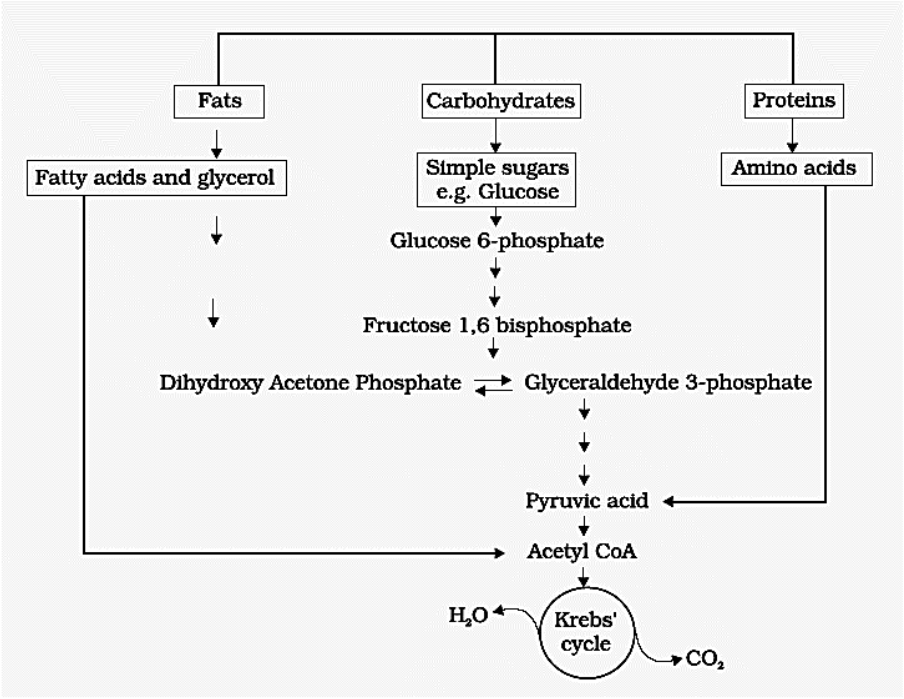
1. Glucose is the favoured substrate for respiration. All carbohydrates are usually first converted into glucose before they are used for respiration. Other substrates can also be respired, but then they do not enter the respiratoty pathway at the first step.
2. Fats would need to be broken down into glycerol and fatty acids first. If fatty acids were to be respired they would first be degraded to acetyl CoA and enter the pathway. Glycerol would enter the pathway after being converted to PGAL.
3. The proteins would be degraded by proteases and the individual·amino acids (after deamination) depending on their structure would enter the pathway at some stage within the Krebs cycle or even as pyruvate or acetyl CoA.
4. Since respiration involves breakdown of substrates, the respiratory process has traditionally been considered a catabolic process and the respiratory pathway as a catabolic pathway. Fatty acids would be broken down to acetyl CoA before entering the respiratory pathway when it is used as a substrate. But when the organism needs to synthesise fatty acids, acetyl CoA would be withdrawn from the respiratory pathway for it, Hence, the respiratory pathway comes into the picture both during breakdown and synthesis of fatty acids. Similarly, during breakdown and synthesis of protein too, respiratory intermediates form the link. Breaking down processes within the living organism is catabolism, and synthesis is anabolism. Because the respiratory pathway is involved in both anabolism and catabolism. it would hence be better to consider the respiratory pathway as an amphibolic pathway rather than as a catabolic one.



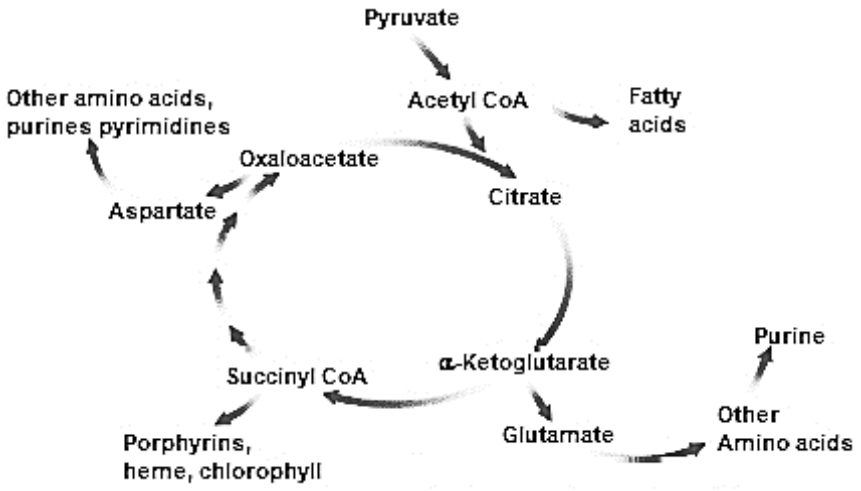


Fig. Interrelationship among metabolic pathways showing respiration mediated Breakdown of different organic molecules to CO_2 and H_2O

5. Glycolysis is also known as oxidative anabolism or catabolic resynthesis, because it links with anabolism of fats and amino acids. An intermediate PGAL is used for the synthesis of glycerol later forms fats or lipid. PGA is used for synthesis of Serine, Glycine, Cysteine, Alanine forms from pyruvate.
6. Acetyl CoA is common meeting point (connecting link) between fat, carbohydrate and protein metabolism.

Amphibolism of Krebs cycle-

(1) Acetyl CoA- Synthesis of fatty acids & GA (Gibberellic acid)

(2) Succinyl CoA- Synthesis of chlorophyll, Cytochromes, Phytochromes

(3) OAA & α-Ketoglutaric acid- Synthesis of Amino acids.

(4) OAA-Synthesis of Alkaloids.