



**COMPLETE CONCEPT**



**B.PHARMA | 5 SEMESTER**

# **PHARMACOGNOSY & PHYTOCHEMISTRY II**

**METABOLIC PATHWAYS IN HIGHER PLANTS &  
THEIR DETERMINATION**

Metabolic Pathways & Formation | Study Of Radioactive Isotopes

## **UNIT-1**



## B. PHARMA 5<sup>TH</sup> SEM ONE SHOT NOTES

### UNIT-1

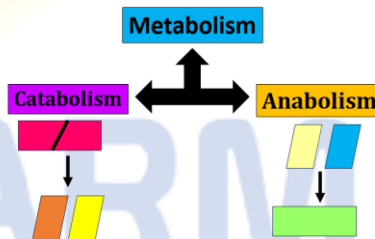
#### METABOLIC PATHWAYS IN HIGHER PLANTS & THEIR DETERMINATION

##### CONTENT

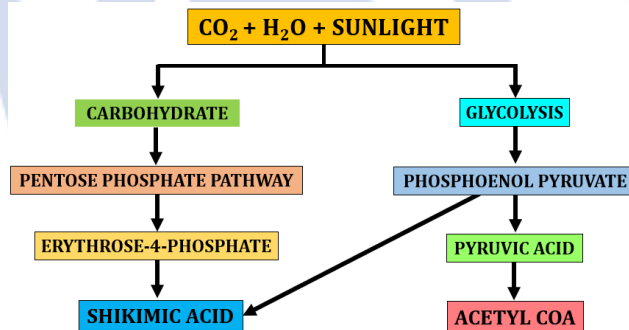
- Basic metabolic pathway
- Shikimic acid pathway, acetate pathways & amino acid pathway
- Utilization of radioactive isotopes in the investigation of biogenetic studies

##### METABOLISM

- Metabolism is a chemical reaction in the body's cells that changes food into energy.

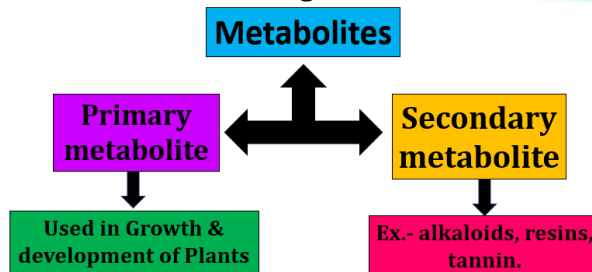


##### Production of primary and secondary metabolites in Plants



##### METABOLITES

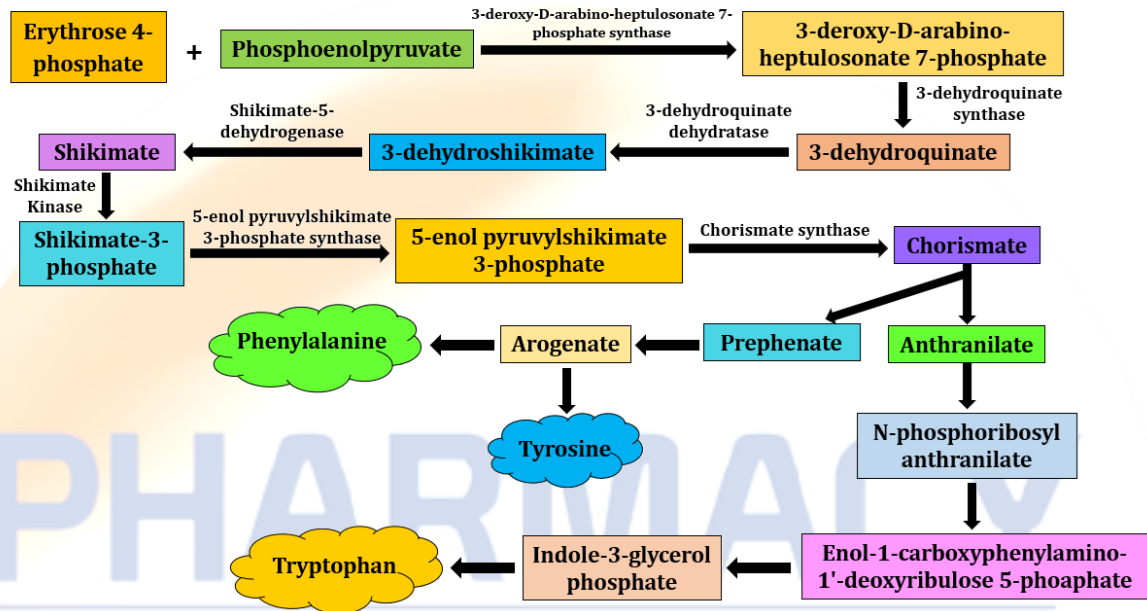
- Products & intermediates that form during metabolism are called metabolites.



##### SHIKIMIC ACID PATHWAY

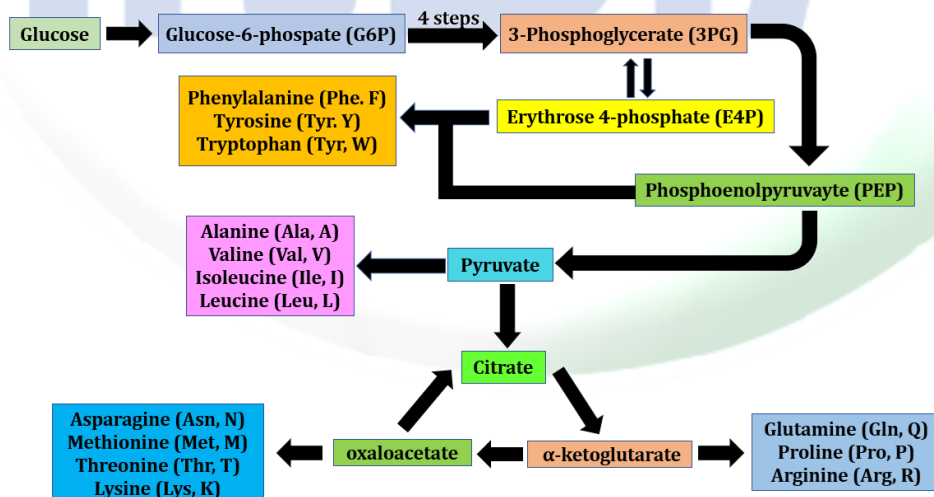
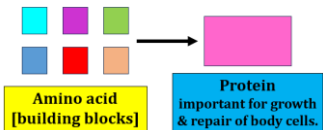
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- It is a metabolic pathway used by bacteria, algae, fungi & plants for the biosynthesis of aromatic amino acids.
- Which is further used in the synthesis of secondary metabolites.
- Shikimic acid is a compound isolated from the plants of illicium species, & is the central intermediate of this pathway.



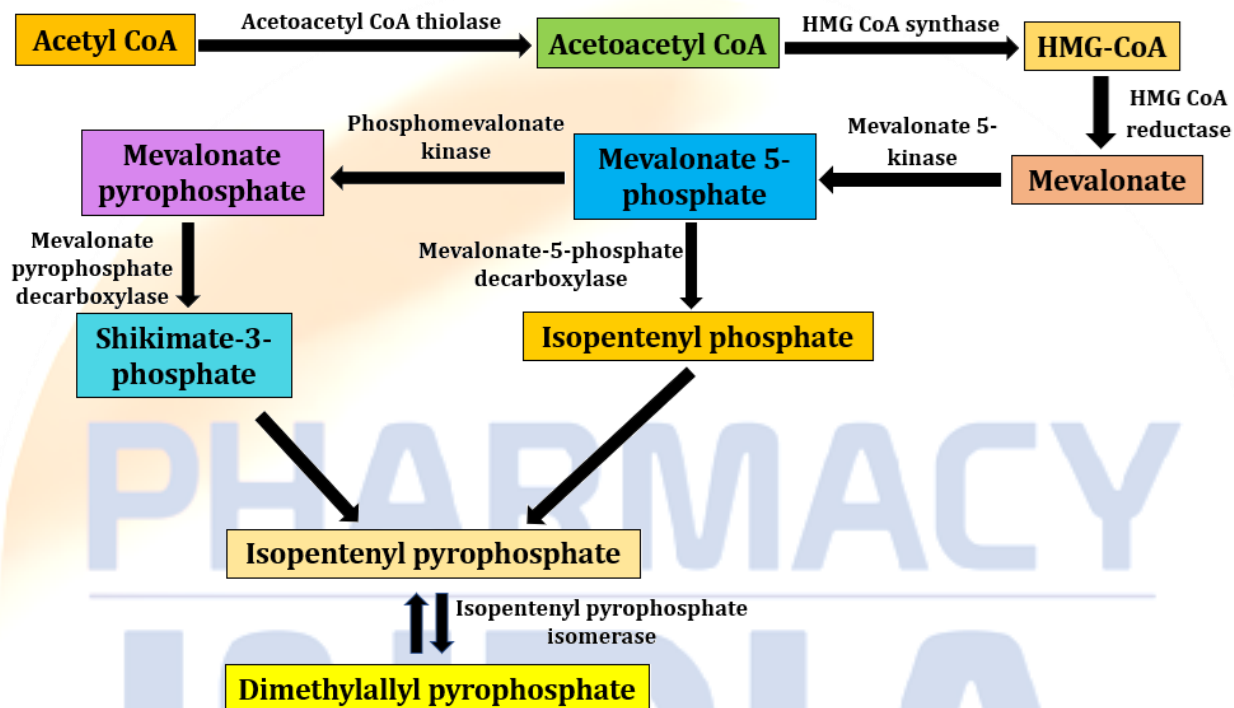
### AMINO ACID PATHWAY

- Amino acid are molecules that combine to form protein.
- Amino acid & proteins are the building blocks of life.
- They are 20 amino acid which needs in our body.



### ACETATE PATHWAY

- Synthesis of fatty acids and aromatic compounds with the help of secondary metabolites.
- With the involvement of acyl carrier protein [ACP].
- The acetate pathway works functionally to produce acyl thioesters of ACP.



### UTILISATION OF RADIOACTIVE ISOTOPES

- Radioactive tracers are radioactive isotopes used in biogenetic studies.
- These are organic compounds whose one or more atoms have been replaced with a radionuclide.
- Due to their property of radioactive decay, the radioactive tracers are used to investigate the mechanism of chemical reactions by tracing the path followed by the radioisotope from reactants to products.

### Tracer Technique

- These radioactive isotopes or tracers are used in tracer techniques for investigating the biosynthetic pathways.
- In these techniques, a labelled compound is used to investigate the different intermediates & various steps in biosynthetic pathways in plants by tracing them at a given rate the time.

### Criteria for Tracer



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- Radioactive isotopes- 1H, 14C, 24Na, 42K, 35S, 35P, and 131 I are the examples of such isotopes.
- Isotope of C and H are used for biological investigation.
- Isotopes of S, P, and alkali and alkaline earth metals are used for metabolic studies.
- Labelled N-atom is used for studying proteins, alkaloids, and amino acids.

### Methods for tracer technique

- **Precursor product sequence**- in this method, the presumed precursor of the plant constituent to be investigated on a labelled form is introduced into the plant
- **Double and multiple labelling** – this method provides evidence for the nature of biochemical incorporation of precursor that give rise to double & triple labelling.
- **Competitive feeding** – this method gives the possible intermediates that are involved during biogenesis.
- **Isotope incorporation** – this method is used to investigate the position of bond cleavage & their formation during reaction.
- **Sequential analysis** – in the method, the plant is allowed to grow in atmosphere of  $^{14}\text{CO}_2$  & then the plant growth at given time interval is analyzed to obtain the sequence in which various correlated compounds become labelled.

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