

SYLLABUS

PLANT PHYSIOLOGY, METABOLISM & BIOCHEMISTRY

Unit 1. Plant water relation, Mineral Nutrition, Transpiration and translocation in phloem

Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation. Criteria of essentiality of elements; Role of essential elements; Symptoms of mineral deficiency in major crops, Transport of ions across cell membrane, active and passive transport, Composition of phloem sap, girdling experiment; Pressure flow model.

Unit 2. Carbon Oxidation

Krebs cycle, Glycolysis, fate of pyruvate- aerobic and anaerobic respiration and fermentation, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of Krebs cycle, mitochondrial electron transport, oxidative phosphorylation, ATP-Synthetase, Chemiosmotic mechanism, P/O ratio, cyanide-resistant respiration, factors affecting respiration

Unit 3. Nitrogen Metabolism

Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes), Physiology and biochemistry of nitrogen fixation, Ammonia assimilation (GS-GOGAT), reductive amination and transamination, amino acid synthesis.

Unit 4. Lipid Metabolism & Photosynthesis

Lipid Metabolism: Synthesis and breakdown of triglycerides, -oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilization of lipids during seed germination, -oxidation. ; Photosynthesis: Pigments, Action spectra and Enhancement effect, Electron transport system and Photophosphorylation, C₃ & C₄ photosynthesis, CAM- Reaction and Significance

Unit 5. Plant Development, Movements, Dormancy & Responses

Developmental roles of Phytohormones (auxins, gibberellins, cytokinins, ABA, ethylene.) autonomic & paratonic movements, Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and farred-light responses on photomorphogenesis, Seed physiology & Dormancy, Vernalization & Senescence

Unit 6. Biomolecules

Carbohydrates : Nomenclature and classification; Role of monosaccharides (glucose, fructose, sugar alcohols – mannitol and sorbitol); Disaccharides (sucrose, maltose, lactose), Oligosaccharides and polysaccharides (structural-cellulose, hemicelluloses, pectin, chitin, mucilage; storage – starch, inulin).

Lipids : Storage lipids: Fatty acids structure and functions, Structural lipids: Phosphoglycerides; Lipid functions: cell signals, cofactors, prostaglandins, Introduction of lipid micelles, monolayers, bilayers

Unit 7.

Proteins : Structure of amino acids; Peptide bonds; Levels of protein structure-primary, secondary, Ramchandran plot, tertiary and quaternary; Isoelectric point; Protein denaturation and biological roles of proteins

Nucleic acids : Structure of nitrogenous bases; Structure and function of nucleic acids, Nucleic acid denaturation & Re-naturation, MiRNA

Unit 8. Enzymes

Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; mechanism of action (activation energy, lock and key hypothesis, induced-fit theory), enzyme inhibition and factors affecting enzyme activity, Allosteric enzymes & Abzymes. Elementary knowledge of Phytonutrients, Nutraceuticals, dietary supplements and antioxidants.



1. Important

1.1 Impo

1.2 Soil

1.3 Wa

1.4 Wil

1.5 Wa

1.6 Pro

2. Water

2.1 W

2.2 Di

2.3 O

2.4 M

2.5 D

2.6 D

2.7 F

2.8 C

2.9 I

2.10

3. Tra

3.1

3.2

3.3

3.4