

OBJECTIVES: To enable the students to

1. Understand the physical aspects of plant physiology.
2. Understand the metabolic processes in plants.
3. Get an insight into growth and developmental aspects of plants.

UNIT – I: PLANT WATER RELATIONS

1. Water relations : Importance of water to plant life; Physical properties of water
2. Diffusion, imbibition and osmosis; concept of water potential - osmotic and pressure Potentials
3. Water absorption and transport of water; Ascent of sap: Mechanism; cohesion-tension theory.
4. Transpiration – Types, Stomata Structure; movements.

UNIT II: MINERAL NUTRITION & ENZYMES

1. Mineral Nutrition – Essential macro and micro nutrients and their role
2. Symptoms of mineral deficiency
3. Mineral Absorption – Passive and active processes.
4. Enzymes: nomenclature, characteristics, brief outline of IUB classification of enzymes ; Mechanism and regulation of enzyme action, factors effecting enzyme action.

UNIT – III: PHOTOSYNTHESIS

1. Photosynthesis: Photosynthetic pigments; Absorption and Action spectra; Red drop and Emerson Enhancement effect;
2. Concept of two Photosystems, Mechanism of Photosynthetic electron transport and evolution of oxygen; Photophosphorylation .
3. Carbon assimilation pathways, Caivin cycle (C₃), C₄ pathway, CAM Cycle.
4. Photorespiration
5. Translocation of organic substances: Mechanism of Phloem transport ; Source-Sink relationship .

UNIT IV: PLANT METABOLISM

1. Respiration : Aerobic & Anaerobic –Glycolysis, Kreb's cycle; Electron transport System ; Oxidative Phosphorylation-Mechanism
Pentose Phosphate Pathway
2. Nitrogen metabolism: Biological Nitrogen fixation ; Nitrate reduction; Ammonium assimilation – Amino acid synthesis .
Protein synthesis
3. Lipid metabolism : Structure & functions of lipids, Fatty acid oxidation; β -oxidaiton ;
Conversion of lipids to carbohydrates – Glyoxylate Cycle

UNIT V: GROWTH AND DEVELOPMENT

1. Growth – Definitions, Phases and Kinetics of growth.
2. Phytohormones – Physiological effects of Auxins, Gibberillins, Cytokinins, ABA, Ethylene and Brassinosteroids.
3. Development: Physiology of flowering – Photoperiodism; Role of phytochrome in flowering, Vernalization.
4. Stress Physiology: Concept and Plant responses to water, salt and temperature stress.
5. Physiology of Scenescence and Ageing.

TEXT BOOK:

K. Ramakrishna & B.R.C Murthy 2006 – A Text Book of Common Core Botany – Vol.IV – Sri Vikas Publications, Guntur.

REFERENCE BOOKS:

1. Nogg;e G.R. & Fritz G.A.- 1996 – Introductory Plant Physiology – Prentice Hall of India Pvt Ltd., New Delhi.
2. Salisbury, F.B.& Ross C.W. – 1992 – Plant Physiology CBS Publishers & Distributors, Delhi.
3. Delvin, R.M.(2000) Plant Physiology. CBS Publishers & Distributors, New Delhi.
4. Srivastava, H.N. – 2004 – Plant Physiology – Pradeep Publications, Jalandhar.
5. Mayer, Anderson & Bonning(1965): Introduction to Plant Physiology D.Van Nostrand . Publishing Co., N.Y.
6. Mukherjee, S. A.K. Ghosh(1998) Plant Physiology ,Tata McGraw Hill Publishers(P) Ltd., New Delhi.

OBJECTIVES : To enable the student to

1. perform experiments, record observations, analyse the results and draw conclusions of different physiological processes.
2. understand the principle of experiments related to plant metabolism, growth & development.

COURSE :

MAJOR EXPERIMENTS

1. Determination of osmotic potential of cell sap of Rhoexo leaves by plasmolytic method.
2. Determination of Relative rates of transpiration by Cobalt Chloride paper method .
3. Determination of Stomatal frequency using epidermal peelings/impressions .
4. Effect of Temperature on membrane permeability by colorimetric method.
5. Photosynthesis –
 - a. Measurement of photosynthesis by Hydrilla – funnel experiment .
 - b. Study of the effect of different factors (CO₂ and Light) on photosynthesis .
6. Separation of Chloroplast pigments using Paper chromatography .
7. Determination of Catalase.
8. Estimation of protein.

MINOR EXPERIMENTS

1. Demonstration of osmosis using egg membrane/ Potato osmoscope.
2. Measurement of transpiration by simple potometer.
3. Demonstration of ascent of sap/Transpiration pull.
4. Study of mineral deficiency symptoms using plant material/photographs.
5. Effect of light intensity on oxygen evolution in photosynthesis using Wilmott' bubbler.
6. Measurement of growth by Arc Auxanometer.

REFERENCE BOOK

Bender, A & Kumar 2005 – Practical Botany – Vol.II – Rastogi Publications, Jalandhar.