Open Elective[§]	M.Sc. Ag. II[nd] semester

Department of Genetics and Plant Breeding
Ch. Charan Singh University, Meerut

Pant Physiology

Credits: 4+0+0
Teaching hours: 50

1. **Cell physiology:** Cell organelles and their physiological functions, structure and physiological functions of cell wall, cell inclusions, cell membrane structure and functions. 4
2. **Water uptake and transport mechanism:** water and its role in plants, water potential of plant cells, mechanism of water uptake by roots-transport in roots, aquaporins, movement of water in plants – Mycorrhizal association on water uptake. **Physiology of water stress in plants:** Influence of water stress at cell, organ, plant and canopy levels. Indices for assessment of drought resistance. 8
3. **Mechanism of transpiration:** Stomata structure and function – mechanism of stomatal movement, anti-transpirants, transpiration mechanism in plant, factors influencing transpiration rate. 4
4. **Role of mineral nutrients in plant metabolism:** Essential elements and their resources, classification based on function of elements in plants, mechanisms of uptake and translocation of minerals in plants, physiological and metabolic functions of mineral elements, critical levels, deficiency symptoms, nutrient deficiency and toxicity, foliar nutrition. 6
5. **Mechanism of photosynthesis:** Photosynthesis and its importance in bio productivity. Photochemical process, photochemical reactions, CO_2 reduction in Calvin cycle, supplementary pathway of C fixation in C_4 and CAM plants and its significance, differences among C_3, C_4 and CAM plants, photorespiration and its relevance, translocation of photosynthates and its importance in sink growth, source-sink relationship. 8
6. **Plant respiration and lipid metabolism:** Mechanism of respiration, glycolysis, Kreb's cycle, electron transport system, growth and maintenance of respiration, cyanide resistant respiration and its significance.
   Storage, protective and structural lipids, biosynthesis of fatty acids, diacyl and triacyl glycerol, fatty acids of storage lipids. Secondary metabolites and their significance in plant defence mechanism. 8
7. **Nitrogen metabolism:** Inorganic nitrogen species (N_2, NO_3 and NH_3) and their reduction to amino acids, protein synthesis and nucleic acids, nitrogen cycle. 4
8. **Plant growth regulators:** Hormonal regulation of growth and differentiation, plant growth hormones and their physiological role, synthetic growth regulators, growth retardants, apical dominance, senescence, fruit growth, abscission. 2

9. **Some stress related enzymes in plants** 2
10. **Photo morphogenesis:** Photoreceptors, phytochrome, cryptochrome. Physiology of flowering: Photoperiodism and vernalization.
11. **Photo morphogenesis:** Photoreceptors, phytochrome, cryptochrome. Physiology of flowering: Photoperiodism and vernalization. 4

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Suggested Readings

(i) Salisbury FB and Ross, CW (1986) Plant Physiology, CBS Publishers & Distributors, New Delhi.
(ii) Taize L and Zeiger E (2006) Plant Physiology. Sinauer Associates, Inc, Publishers, Sunderland, Massachusetts, USA.
(iii) Hopkins WG and Huner NPA (2004) Introduction to Plant Physiology. John Wiley & Sons.
(iv) Oxlade Edwin (2010) Plant Physiology: The Structure of Plants Explained. In-focus: Studymates.