

Course Outcomes:

After successful completion of the course, students will be able to:

- CO 1. Understand the role of various nutrients in plant growth
- CO 2. Comprehend the various concepts of water relation in plants and physiological processes.
- CO 3. Gain in-depth knowledge on photosynthesis and regulatory mechanisms.
- CO 4. Understand role of various growth regulators in plant growth
- CO 5. Gain knowledge on different methods and tools of plant breeding
- CO 6. Understand plant pathology

Unit I (13 hours)

Plant nutrition: Trace elements and their role, major and minor elements in soil and plants; Essentiality of elements- Sand culture, Soil culture, Hydroponics, Aeroponics; Mineral deficiencies and their rectification, nitrogen, phosphorus and sulfur metabolism.

Unit II (13 hours)

Water relations in plants: water requirements, Physical forces involved in water absorption, Osmotic system, Water potential, Site and path of water absorption; Ascent of Sap, mechanism of translocation of water and solutes; Factors affecting water absorption; Transpiration- Types of transpiration, structure and functions of stomata, mechanism of stomatal movement, Factors affecting transpiration, Guttation, anti-transpirants. Photosynthesis: Chloroplast and photosynthetic pigments; Concept of photosynthetic unit; Oxygenic and anoxygenic photosynthesis; Concept of pigment system; Stages of photosynthesis- cyclic and non-cyclic photophosphorylation; Hill reaction, Photorespiration; carbon dioxide fixation in C₃ and C₄ plants, CAM plants; Factors affecting photosynthesis.

Unit III (13 hours)

Plant Growth and Growth Regulators- Plant growth, Growth curve, measurement of growth, Phytohormones: Biosynthesis, Mechanism of action and application of auxins, gibberellins, cytokinins, ethylene, abscisic acid; Vernalin, Florigen, Morphactins; Phytochromes. **Plant breeding**: Objectives – high yield, improved quality, disease and pest resistance, early maturity, photosensitivity, varieties for new seasons, resistant varieties. Breeding in self-pollinated crops. **Methods of breeding**- Selection, Backcross method, Hybridization-objectives, types, procedure. Mutagenesis.

Unit IV (13 hours)

Plant pathology- Plant pathology in relation to important diseases of crop plants. Important plant diseases: Plant diseases caused by viruses, mycoplasma, bacteria, fungi, protozoa, nematodes, parasitic angiosperms - symptoms, etiology, life cycle, transmission etc. Seed borne diseases and transmission: Pollination, fertilization, embryogenesis, morphology and physiology in relation to seed infection. Seed-borne pathogens and their importance - viruses, bacteria, fungi and nematodes; seed infection and contamination.

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