

## **Course: BOT(N)-302**

### **PLANT PHYSIOLOGY AND BIOCHEMISTRY**

**Objective:** To study the plants in relation to water, micro and macro elements, photosynthesis, respiration, nitrogen metabolism, enzymes and various growth hormones in plants

#### **Syllabus:**

- Absorption of water and ascent of sap: Importance of water to plant life; physical properties of water, diffusion and osmosis and absorption of water, ascent of sap
- Water loss in plants: Transport of water, transpiration, structure and functioning of stomata
- Mineral nutrition and absorption of mineral salt: Essential macro- and micro-elements and their role, deficiency symptoms, toxicity symptoms, absorption of mineral salt and mineral uptake
- Organic substances, their transport and translocation: Mechanism of Phloem transport, source-sink relationship and factors affecting translocation
- Photosynthesis I & II: Significance, historical aspects, photosynthetic pigments, concept of two photosystems, photophosphorylation, C<sub>3</sub> pathway (Calvin cycle), C<sub>4</sub> pathway, CAM plants photorespiration
- Respiration: ATP -the biological energy currency, aerobic and anaerobic respiration, Krebs's cycle, electron transport mechanism (chemiosmotic theory) and pentose phosphate pathway
- Nitrogen metabolism: Atmospheric nitrogen fixation, nitrogen cycle, nitrogen assimilation
- Growth and phases of development: Definitions, concept of photoperiodism, physiology of flowering, biological clocks, physiology of senescence, fruit ripening, seed dormancy, seed germination
- Plant growth regulators: Auxins, gibberellins, cytokinins and abscissic acid
- Carbohydrates and Lipids: Classification, properties and biological role
- Amino acids, protein, and vitamins: Classification, properties and biological role
- Enzymes: Discovery, nomenclature, characteristics of enzymes, concept of holoenzyme, apoenzyme, coenzyme and cofactors
- Biochemical techniques

#### **Unit Schedule:**

##### **BLOCK-1: PLANT WATER RELATIONSHIP**

- Unit-01 : Absorption of water and ascent of sap  
Unit-02 : Water loss in plants: Evaporation and transpiration  
Unit-03 : Mineral nutrition and absorption of mineral salts  
Unit-04 : Organic substances: their Transport and Translocation

**BLOCK-2: METABOLISM**

- Unit-05 : Photosynthesis  
Unit-06 : Respiration  
Unit-07 : Nitrogen metabolism  
Unit-08 : Growth and phases of development  
Unit-09 : Plant growth regulators

**BLOCK-3: BIOCHEMISTRY**

- Unit-10 : Carbohydrates and lipids  
Unit-11 : Amino acids, proteins and vitamins  
Unit-12 : Enzymes  
Unit-13 : Biochemical techniques

**Course: BOT(N)-302L****PLANT PHYSIOLOGY AND BIOCHEMISTRY (LABORATORY)**

**Objective:** To conduct experiments to demonstrating the physiological activities of plants.

**Syllabus:**

- To perform endosmosis and exosmosis using potato tuber and egg osmoscope,
- demonstration of imbibitions, plasmolysis and deplasmolysis,
- Study the structure of stomata, their opening and closing, stomatal frequency and comparison of rate of transpiration using four-leaf method, cobalt chloride paper or by different types of photometers under different climatic condition,
- Study the effect of intensity and quality of light on the rate of photosynthesis by Wilmott's bubbler, study of Respiratory Quotient (R.Q.) by Ganong's respirometer in different seeds.
- Demonstration of colour tests and micro chemical tests for carbohydrates, proteins and lipids

**Unit Schedule:**

- Unit -01 : To perform endosmosis and exosmosis  
Unit -02 : To demonstrate the imbibitions, plasmolysis and deplasmolysis  
Unit -03 : To study the structure of stomata, their opening and closing, stomatal frequency and comparison of rate of transpiration  
Unit -04 : To study the effect of intensity and quality of light on the rate of photosynthesis by Wilmott's bubbler and study R.Q. by Ganong's respirometer in different seeds  
Unit -05 : Microchemical tests for carbohydrates, proteins and lipids