

Government Degree College Baramulla (Autonomous)

Semester 7th

Major/Minor Course

Subject: Biochemistry

Course Title: Plant Biochemistry

Course Code: BCHC1724M

Credits: 6 (4Th + 2 Pr)

Contact Hours (64 Th + 64 Pr)

Course Objectives: - A key aspect of the course will be to develop an understanding of the chemical basis and “chemical logic” of metabolic processes in plants particularly photosynthesis, respiration, Electron transport chain, and secondary metabolites.

Course Outcomes:

On successful completion of the course, the student shall be able to:

- Understand the structure of plant cell wall and role of various plant growth regulators.
- Define the biochemical processes and metabolic pathways, including photosynthesis, photorespiration in plants.
- Describe the physiological and biochemical reaction, nitrogen fixation, and assimilation.

UNIT-1: PLANT HORMONES (16 HOURS)

Auxin: Definition, examples, Chemical nature, discovery, elementary idea of biosynthesis, Developmental and Physiological effects

Gibberellins: Definition, examples, Chemical nature, discovery, Effects of Gibberellin on Growth and Development.

Cytokinin's: Definition, examples, Chemical nature, discovery, biological roles of cytokinin.

Abscisic acid: Definition, chemical nature, Developmental and Physiological Effects of ABA.

Ethylene: Developmental and Physiological effects of Ethylene.

Role of PGRs in horticulture and agriculture.

UNIT-2: PHOTOSYNTHESIS (16 HOURS)

Photosynthetic pigments, Red Drop and Enhancement effect, Basic structure of PSI and PSII complexes, Light reaction, Cyclic and non-cyclic photophosphorylation, Calvin cycle (C3 plants), Hatch slack (C4 plants) & CAM pathways of carbon reduction. Factors affecting photosynthesis. Photorespiration and its importance.

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UNIT-3: MINERAL NUTRIENTS AND NITROGEN FIXATION (16 HOURS)

Macronutrients and Micronutrients and their role, biological nitrogen fixation by free living and in symbiotic association, Structure, and function of Nitrogenase. Ammonium assimilation and their incorporation into amino acids, Nitrate assimilation; nitrate reductase and nitrite reductase, Nitrogen cycle.

UNIT-4: PLANT SECONDARY METABOLITES (16 HOURS)

Cutin, wax and suberin, Secondary metabolites and their major groups, Definition, examples, biosynthesis, and biological function of terpenoids, phenolics, alkaloids, Tannins and lignin, Plants defense against pathogens, Some important alkaloids, terpenoid's and phenolics in alternate medicine.

PRACTICALS (2 CREDITS)

1. Separation of photosynthetic pigments by TLC.
2. Extraction and estimation of chlorophyll in plants by using spectrophotometer.
3. Estimation of total phenols in plants.
4. Estimation of total sugars by phenol-sulphuric acid method.
5. Demonstrate the effect of auxins on rooting of stem cuttings.
6. Field visit to IIIM Srinagar/ICAR-Central Institute of Temperate Horticulture or medicinal botanical garden.

BOOKS RECOMMENDED:

1. Fundamentals of Plant Physiology by Lincoln Taiz, Angns Murphy.
2. Plant Biochemistry, Caroline Bowsher, Martin steer, Alyson Tobin, Garland science
3. Plant Biochemistry: Hans-Walter Heldt & Heldt.
4. Plant Biochemistry by P.M Dey and J.B. Harborne.