B.Sc. PLANT BIOLOGY & PLANT BIOTECHNOLGY

Paper 14 a PLANT PHYSIOLOGY AND BIOCHEMISTRY

B.Sc. va (Candidates admitted from the academic year 2008-2009)

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Core Theory

UNIT I

Definition and Scope of Plant Physiology. Water relations in plants, significance of water in plants, water potential, imbibition, diffusion and osmotic relations. Absorption of water and ascent of sap. Transpiration, significance of transpiration. Distribution of stomata, structure, opening and closing of stomata with reference to physiological factors. Factors affecting transpiration.

Key words : Plasmolysis, Osmosis, Apoplast, Symplast, Water potential, Antitranspirants, Guttation.

UNIT II

Mineral Nutrition - General roles of minerals. Specific functions of micro elements and macro elements and their deficiency symptoms. Non-essential elements and their significance. Mechanism of mineral salt absorption. Passive and active processes.

Key words: Chlorosis, Necrosis, Wilting, Trace elements, cation exchange.

UNIT III

Plant hormones and synthetic growth regulators: Biosynthesis and Physiological effects of Auxins, gibberellins, cytokinins, ethylene and ABA. Physiology of flowering and photoperiodism, vernalization and seed dormancy. Role of phytochrome. Movements in plants- Tropic & nastic movements.

Key words : Apical dominance, Phototropism, Bolting, Parthenocarpy, Fruit Ripening, Long-day plant, Short-day plant, Day-neutral plant, Phytochrome, Vernalization.

UNIT IV

Enzymes : Structure, classification and function. Factors affecting enzyme activity.

Key words : Cofactors, Coenzymes, Allosteric enzyme Feed back inhibition, Michaelis constant.

UNIT V

Photosynthesis : Solar energy, Electromagnetic spectrum, Visible Light Spectrum - Interaction of light wave and excitation of pigment molecules. Ultrastructure of chloroplast. Pigments involved in photosynthesis. Absorption spectrum. Emerson enhancement effect and the involvement of PS I and PS II. Photophosphorylation reactions. CO_2 assimilation pathways: C_3, C_4 and CAM photosynthesis. Photorespiration. Factors influencing photosynthesis.

Key words: Absorption spectrum, Action spectrum, Red drop & Emerson effect, Net Compensation Point, Photophosphorylation, Photolysis, Kranz anatomy, RUBISCO.

UNIT VI

Respiration : Aerobic and anaerobic processes. Respiration quotient. Glycolysis, Kreb's cycle and Oxidative phosphorylation reactions and chemiosmotic ATP synthesis.

Nitrogen Metabolism : Sources of nitrogen-nitrate and nitrite reduction. N_2 and ammonia assimilation in higher plants. General properties of amino acids and proteins. Carbohydrates and their classification.

Key words: Anaerobic respiration, Acetyl Co A, Respiratory Quotient, Symbiotic nitrogen fixation, Rhizobium, Reducing sugars and Non-reducing sugars, Isomerism, Zwitterion, β-oxidation.

Suggested Reading

BIDWELL, R.G.S. 1974. Plant Physiology. Macmillan Pub. Co., N.Y.

BONNER, J. AND J.E. VARNER. 1976. Plant Biochemistry. Academic Press.

CONN,E.E., P.K. STUMPF, G. BRUENING AND R.H. DOI. 1987. Outlines of Biochemistry. John Wiley and Sons. New York.

DENNIS, D.T., AND D.H. TURPIN,(Eds.). 1989. Plant Physiology, Biochemistry and Molecular Biology. Longman Scientific and Technical Publishers. U.K.

DEVLIN, R.M. AND F.H. WITHAM. 1983. Plant Physiology. Willard Grant Press. U.S.A.

GALEN, W.E. 1960. Instrumental Methods of Chemical Analysis. 2nd Edition. Mc-Graw Hill Book Company, Inc. Tokyo. Japan.

HALL, D.O. AND K.K. RAO. 1994. Photosynthesis. Fifth Edition. Cambridge University Press. U.K.

LUTTGE, U. AND N. HIGGINBOTHAM. 1979. Transport in Plants. Springer-Verlag. Berlin.

MOORE, T.C. 1979. Biochemistry and Physiology of Plant Hormones. Springer-Verlag. Berlin.

RAMAN, K. 1997. Transport Phenomena in Plants. Narosa Publishing House. New Delhi.

SALISBURY, F.B. AND C. ROSS. 1991. Plant Physiology. Wadsworth Publishing Company. Belmont.

SHROPSHIRE, W. AND H. MOHR. 1983. Photomorphogenesis. Springer-Verlag. Berlin.

TING, I.P. 1982. Plant Physiology. Addison Wesley Pub. Co.. Philippines.