Course Code : PPH 101
Course Title : Introductory Crop Physiology
Credit Hours : 3 (2+1) Full Marks: 75 Theory: 50 Practical: 25

OBJECTIVES

Upon the completion of this course, the student will understand physiological functions taking in the crop plants.

I. SYLLABUS

Introduction, cell physiology, Biophysio- chemical phenomenon, Absorption and translocation of water and minerals, Photosynthesis, Respiration, Translocation of Organic solution, Growth and Development Plant Growth Regulators, Yield Attributing Characters of Crops.

II. COURSE OUTLINE

A. Lecture

S.N.		Topic	No. of Lecture
1	**Introduction**		
	Definition, scope and practical applications of crop physiology		1
2	**Cell physiology**		
	2.1	Definition, types and ultra structure of typical cell	1
	2.2	Structure and functions of cell organelles: mitochondria, chloroplast, endoplasmic reticulum, nucleus, ribosome, microbodies, and cytoskeleton	1
3	**Biophysio-chemical phenomenon**		
	3.1	Laws of thermodynamics	1
	3.2	Diffusion and osmosis	1
	3.3	Concept of water potential	1
4	**Absorption and translocation of water and minerals**		
	4.1	Absorption of water and ascent of sap: concepts, mechanism and factors affecting water absorption and ascent of sap	1
	4.2	Mineral absorption and translocation: site and mechanism (passive and active uptake) of mineral uptake and factors affecting mineral translocation,	1
	4.3	Metabolic utilization of mineral ions and their deficiency symptoms	1
	4.4	Transpiration: concepts, importance, types, mechanism of stomatal movement, and	1
	4.5	Factors affecting transpiration and Guttation	1

5	**Photosynthesis**		
	5.1	Concepts, significance, absorption spectra, photosynthetic pigments, light reaction of photosynthesis (pigment system I and II, cyclic and non-cyclic photophosphorylation)	1
	5.2	Dark reaction: C_3 cycle, C_4 cycle, and distinction between C_3 and C_4 plants,	1
	5.3	Crassulacean acid metabolism, and photorespiration	1
	5.4	Factors affecting rate of photosynthesis	1
6	**Respiration**		
	6.1	Concepts, types, and significance of respiration, respiratory quotient and energy balance in calories	1
	6.2	Mechanism of photometer : Glycolysis and oxidation of pyruvic acid,	1
	6.3	Kreb's cycle and its importance, Electron transport system and oxidative phosphorylation with inhibitory compounds	1
	6.4	Factors affecting the rate of respiration	1
7	**Translocation of organic solutes**		
	7.1	Concept, phloem anatomy, apoplstic and symplastic transport, phloem loading and unloading	1
	7.2	Transport mechanisms: protoplasmic streaming hypothesis, contractile protein hypothesis, mass flow hypothesis. Source sink concept and translocation of solutes	1
8	**Growth and development**		
	8.1	Definition, phases and course of growth and development	1
	8.2	Seed germination: concepts, metabolic changes during germination, factors affecting germination	1
	8.3	Seed dormancy: concepts of primary and secondary dormancy, causes of dormancy, breaking of dormancy	1
	8.4	Photoperiodism: concepts, plant types based on photoperiodic response, mechanisms of photoperiodism in reproduction physiology	1
	8.5	Vernalization: concepts and site of vernalization, and physiological and biochemical changes during vernalization	1
9	**Plant growth regulators**		
	9.1	Definitions, classification, synthesis of Auxin, Gibberellins, Cytokinin, Ethylene, Abscisic acid.	1
	9.2	Role of growth regulators in agriculture	1
10	**Yield attributing characteristics of crops**		1
	10.1	Photosynthesis, respiration, leaf canopy, source and sink, crop species and growth analysis	1
	Total		**30**

B. Practical

S.N.	Topic	No. of Practical
1.	Isolation of cell organelles by centrifugal process	1
2.	Determination of DPD of potato tubers by gravimetric methods/ plasmolytic methods.	1
3.	Study of the structure and distribution of stomata in monocot leaves	1
4.	Study of the structure and distribution of stomata in dicot leaves	1
5.	Study of the process of transpiration with the help of cobalt chloride paper, hotometer, and bell jar	1
6.	Demonstration of photosynthetic pigments by paper chromatography and calorimeter	1
7.	Study the factors affecting the process of photosynthesis	1
8.	Study the process of root pressure by exudation method and transpiration pull method	1
9.	Study the field symptoms of certain essential micro and macro-mineral elements in crop plants	1
10.	Study of the process of aerobic respiration and alcoholic fermentation	1
11.	Study of anatomy of C_3 and C_4 plant leaves	1
12.	To study the measurement of growth (height and weight)	1
13.	Effect of GA on different physiological processes (dormancy,germination, growth and flowering)	1
14.	Field visit for physiological in crop plants	1
15	Field visit to different crop field for studying physiological aspect.	1
	Total	**15**

REFERENCES

Devlin, R. M. and R.H. Witham. 1986. Plant Physiology . CBS Publication and Distribution, New Delhi, India.

Jain, V. K. 1997. Fundamentals of Plant Physiology. S Chand and Co Ltd. New Delhi India

Kimball J. W. Biology. Addison. Wesley Publishing Company. (Chapters. 3, 6, 8, 9, 12 & 23)

Saxena, S. K. 1995. Modern Practical in Plant Physiology and Biochemistry. CBS Publications and Distribution, New Delhi, India.