

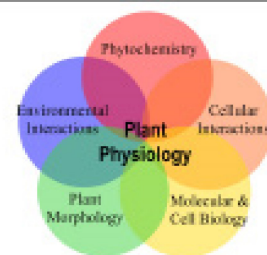
# 21CPHY162 FUNDAMENTALS OF CROP PHYSIOLOGY

Hours Per Week :

L	T	P	C
2	-	2	3

Total Hours :

L	T	P
30	-	30



Source :

[https://en.wikipedia.org/wiki/Plant\\_physiology#/media/File:Plant\\_physiology.png](https://en.wikipedia.org/wiki/Plant_physiology#/media/File:Plant_physiology.png)

## Course Description and Objectives:

This course provides students to the basic concepts and underlying principles of crop growth and development

## Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Acquaint with basic knowledge on various physiological aspects of growth and development including photosynthesis, mineral nutrition, flowering and senescence
2	Understand functions and process related to uptake, assimilation and deficiency symptoms of nutrients and their impact and growth and productivity of plants
3	Gain knowledge about Glycolysis and TCA cycle

## SKILLS:

- ✓ Analyse effect of nutrients on plant growth
- ✓ Identify and differentiate nutrient deficiency symptoms and suggest control measures
- ✓ Record data regarding physiological parameters of crop plants

**ACTIVITIES:**

- o *Preparation of solutions in different concentrations*
- o *Conduct seed viability and vigor tests*
- o *Demonstrate Leaf anatomy of C3 and C4 plants*
- o *Experiment on effect of plant growth regulators on plant growth*
- o *Measurement of photosynthesis by IRGA*

**UNIT - 1**

**Introduction:** Crop physiology and its importance in Agriculture; Plant cell: an Overview; Seed physiology: seed structures, seed development, viability and vigour, Physiological maturity, seed germination

**UNIT - 2**

**Physiological aspects of growth and development:** Growth analysis. Diffusion and osmosis; Absorption of water, Ascent of sap, Water Potential, Uptake of water, transpiration and Stomatal complex; Water use efficiency, Overall view of solute transport, Mineral nutrition of Plants: Essential mineral elements, functions, deficiency and toxicity symptoms, nutrient uptake mechanisms; assimilation of mineral nutrients: nitrate, ammonia, sulphur- Hydroponics, Aeroponics - Biological nitrogen fixation

**UNIT - 3**

**Photosynthesis:** Leaf pigments, PAR, Light and Dark reactions, C3, C4 and CAM types of C assimilation, Photorespiration, Photosynthetic efficiency and Crop productivity, Source - Sink relationship; Respiration: energy balance, OPPP pathway, significance. Growth and Maintenance Respiration; Lipids: Biosynthesis and functions, Glyoxylate pathway, significance in plant metabolism

**UNIT - 4**

**Physiology of flowering:** Vegetative to reproductive transition, Photoperiodism, importance, classification of plants based on photoperiodism, Phytochrome, Vernalization importance. Biological clocks and Circadian rhythms. Plant growth regulators: Promoters, Inhibitors and Retardants, biosynthesis, occurrence, transport, Mode of action, Physiological roles and commercial uses in agriculture

**UNIT-5**

**Senescence and abscission:** definition, types, changes that occur during senescence, Process of abscission, abscission versus senescence. Role of nutrition, PGRs and stress in senescence and abscission, Post harvest physiology: dormancy, fruit ripening, physiology of cut flowers, applied aspects

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## LABORATORY EXPERIMENTS

### LIST OF EXPERIMENTS

1. Preparation of Solutions
2. Seed vigour and viability tests
3. Optimum conditions for seed germination
4. Leaf area measurement
5. Growth analysis of crops
6. Measurement of water status in plants
7. Measurement of plant water potential
8. Measurement of stomatal frequency, index and aperture
9. Absorption spectrum of chlorophyll
10. Leaf anatomy of C3 and C4 plants
11. Measurement of photosynthesis by Hill's reaction
12. Measurement of photosynthesis by IRGA
13. Effect of plant growth regulator on modulation of Plant growth
14. Effect of ABA on regulation of stomatal movement
15. Diagnosis of nutrient deficiency symptoms in crops; Yield and yield structure analysis

### REFERENCES:

1. Taiz, L. and Zeiger, E. 2010. *Plant Physiology* 5<sup>th</sup> edition, Sinauer Associates, Sunderland, MA, USA
2. Gardner, F.P., Pearce, R.B., and Mitchell, R.L. 1985. *Physiology of Crop Plants*. Scientific Publishers, Jodhpur
3. Noggle, G.R. and Fritz, G.J., 1983. *Introductory Plant Physiology*. 2<sup>nd</sup> Edition. Prentice Hall Publishers, New Jersey, USA

