

## LESSON PLAN- THEORY

### ASPH 1201-FUNDAMENTALS OF CROP PHYSIOLOGY (2+1)

1. **Introduction** – definition of crop physiology – importance in agriculture and horticulture.
2. **Seed physiology** – seed structures – development of embryo, endosperm, perisperm and seed coat – morphological, physiological and biochemical changes during seed development.
3. **Seed physiology** – physiological maturity – morphological and physiological changes associated with physiological maturity in crops with examples – harvestable maturity – seed viability and vigor – factors affecting seed viability and vigor.
4. **Seed physiology** – methods of testing seed viability and vigor – germination –utilization of seed reserves (carbohydrates, fats and proteins) during seed germination – morphological, physiological and biochemical changes during seed germination – factors affecting seed germination.
5. **Growth and development** – definition – types of growth – determinate and indeterminate growth – monocarpic and polycarpic species with examples – initiation and development of vegetative and reproductive structures.
6. **Growth and development** – measurement of growth – growth analysis – growth characteristics – definitions and mathematical formulae.
7. **Crop water relations** – physiological importance of water to plants – water potential and its components-Importance of water potential-Active and passive uptake of water-measurement of water status in plants.
8. **Crop water relations** – transpiration – definition – significance – structure of stomatal complex in monocots and dicots – role of stomata in transpiration – transpiration in relation to crop productivity – Water Use Efficiency (WUE) – WUE in C3, C4 and Crassulacean Acid Metabolism (CAM) plants – WUE of major field crops – factors affecting WUE.
9. **Photosynthesis** – energy synthesis – Cyclic and Non-cyclic photo phosphorylation- carbon dioxide fixation – C3 pathway.
10. **Photosynthesis** – carbon dioxide fixation – C4 and CAM pathways – methods of measuring photosynthesis.

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11. **Photosynthesis** – photorespiration & its significance – factors affecting photosynthesis (light, carbon dioxide, temperature, water)
12. **Photosynthesis** – photosynthetic efficiency – significance of C3, C4 and CAM pathways – relationship of photosynthesis and crop productivity.
13. **Translocation of assimilates** – phloem loading – apoplastic and symplastic transport of assimilates – mechanism of phloem transport – phloem unloading
14. **Source and sink concept** – dry matter partitioning – harvest index of crops.
15. Respiration and its significance – importance of Glycolysis, Tricarboxylic Acid (TCA) cycle & ETS - Pentose Phosphate Pathway and its significance.
16. **Respiration** – interrelationship of respiration and photosynthesis – growth respiration and maintenance respiration – alternate respiration – salt respiration – wound respiration – measurement of respiration.
17. **Nutriophysiology** – definition – essential elements – criteria of essentiality of nutrient elements – classification of plant nutrients based on their Biochemical role and physiological function.
18. **Nutriophysiology** – physiology of nutrient uptake – active and passive uptake of nutrients – functions of N, P, K, Ca, Mg and S
19. **Nutriophysiology** – functions of Fe, Zn, Mn, Cu, B, Mo, Cl, Na and Si – their mobility in phloem
20. **Nutriophysiology** – Deficiency and toxicity symptoms of plant nutrients
21. **Nutriophysiology** – foliar nutrition – hydroponics – solution and sand culture
22. **Photoperiodism and flowering** – importance of photoperiodism – classification of plants based on photoperiodic responses – perception of photoperiodic stimulus – Biological clock.
23. **Photoperiodism** – phytochrome and mechanism of action – flowering hormones – vernalization and flowering – importance of vernalization in relation to crop productivity.
24. **Plant growth regulators** – occurrence, biosynthesis, mode of action and physiological role of auxins
25. **Plant growth regulators** – occurrence, biosynthesis, mode of action and physiological role of gibberellins

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26. **Plant growth regulators** – occurrence, biosynthesis, mode of action and physiological role of cytokinins
27. **Plant growth regulators** – occurrence, biosynthesis, mode of action and physiological role of Abscisic Acid (ABA)
28. **Plant growth regulators** – occurrence, biosynthesis, mode of action and physiological role and ill effects of ethylene
29. **Plant growth regulators** – novel plant growth regulators – commercial application of plant growth regulators in agriculture and horticulture
30. **Senescence and abscission** – definition – classification – theories of mechanism and control of senescence – physiological and biochemical changes and its significance – abscission and its relationship with senescence.
31. **Post harvest physiology** – seed dormancy – definition – types of seed dormancy – advantages and disadvantages of seed dormancy – causes and remedial measures for breaking seed dormancy with examples – optimum conditions of seed storage – factors influencing seed storage- International Seed Testing Association (ISTA) standards
32. **Post harvest physiology** – fruit ripening – metabolic changes during fruit ripening – climacteric and non-climacteric fruits – hormonal regulation of fruit ripening (with ethrel, Chloro Choline Chloride (CCC), polaris and paclobutrazol) – use of hormones in increasing vase life of flowers