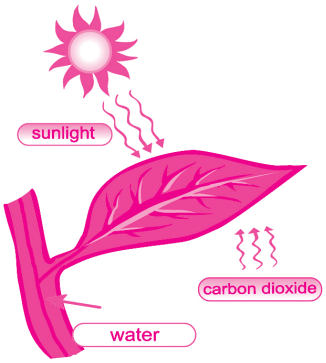

UNIT IV : PLANT PHYSIOLOGY

8. PHOTOSYNTHESIS IN HIGHER PLANTS

1 OMQ +1 VSAQ + 1 SAQ [1 M + 2 M + 4M = 7 M]

ROOT POINTS

1. **Photosynthesis** is process of taking Carbondioxide from the atmosphere by the green plants.
2. **Main contents of this chapter:** i) Photosynthesis ii) Pigments iii) Light reaction iv) Electron transport v) ATP, NADPH vi) C_4 pathway vii) Photo respiration
3. During this process **carbondioxide** from the atmosphere is **taken in** by leaves through stomata.
4. During photosynthesis **plants use light energy** and synthesise carbohydrates.
5. Ultimately all living organisms on the earth **depend on plants either directly or indirectly.**
6. Photosynthesis provides food to all, as well it **releases oxygen** into the atmosphere.
7. **Joseph Priestley** in 1770 performed a series of experiments that revealed the essential role of air in the growth of green plants. [FIB]
8. **Oxygen** is discovered by **Joseph Priestly** . [MCQ]
9. **Chloroplast** is Double membrane bound organelle. [MCQ]
10. **Chloroplasts** present in mesophyll cells of leaves are responsible for **CO_2 fixation**.
11. **Components of ATPase enzyme are** 1)F_0(Stalk) 2)F_1(Head) [VSAQ]
12. During photosynthesis the O_2 is released in **Lumen of thylakoid** [MCQ]
13. In chloroplast dark reaction take place in **Stroma** [VSAQ]
14. Photolysis of H_2O occurs in lumen of **thylakoid.** [VSAQ]
15. In chloroplast light reaction take place in **Grana or Thylakoids** [OWQ]
16. **Pigments** present in chloroplasts are Chl 'a', Chl 'b', xanthophylls and carotenoids.
17. The most abundant plant pigment in the world is **Chlorophyll a** [MCQ]
18. There are two photosystems in Chl 'a'. (i) PSI (ii) PSII.
19. In PS-I, the reaction centre chlorophyll-a has an absorption peak at **700** nm. [FIB]
20. The splitting of water is associated with the **PS II** [FIB]
21. Maximum absorption by chlorophyll a occurs in **blue & red region** [MCQ]
22. **Action spectrum** is the graph showing the 'rate of photosynthesis' at different wave lengths of light. [VSAQ]
23. **Absorption spectrum** is the graph showing the 'absorption of light' by pigments at different wave lengths of light. [VSAQ]
24. **Cyclic photophosphorylation** involves PS I only, and it forms only **ATP.** [SAQ]
25. **Non-cyclic photophosphorylation** involves both PS I and PSII, and it forms both **ATP** and **NADPH**. [SAQ]
26. **Assimilatory power** is generated in ATP and NADPH during photochemical reaction.

27. Chemiosmosis is helpful for the synthesis of **ATP** [FIB]
28. **Photorespiration** results in increasing the intra cellular concentration of CO_2. [SAQ]
29. First stable compound in Calvin cycle is **PGA** (a C_3 compound). [MCQ]
30. Calvin cycle includes **carboxylation, reduction and regeneration.** [LAQ]
31. The most crucial step of Calvin cycle is **Carboxylation.** [MCQ]
32. The first enzyme that is involved in the carboxylation process in C_3 Plants is **RUBISCO** [OWQ], [NEET 2025]
33. **3-PGA (Phospho Glyceric acid)** is the first stable compound in Calvin cycle. [VSAQ]
34. **18 ATPs** are required for synthesis of one glucose in C_3 plants. [OWQ]
35. C_4 cycle operates in two photosynthetic cells-**Mesophyll** and **bundle sheath cells**.
36. **First stable product** in Hatch and Slack pathway is **OAA** (a C_4 compound). [MCQ]
37. 'Kranz' anatomy is a characteristic feature of **C_4** plants. [FIB]
38. Primary acceptor of CO_2 in C_4 plants is **PEP.** [OWQ]
39. **PEP Carboxylase** is an enzyme which can catalyse carboxylation of Phosphoenol pyruvic acid (PEP) in C_4 pathway. [VSAQ]
40. **PEP(Phospho enol pyruvic acid)** is the primary acceptor of CO_2 in C_4 plants. [VSAQ] [NEET 2017]
41. C_4 pathway operates in two photosynthetic cells- **mesophyll cells and bundle sheath cells.** [SAQ]
42. **Photorespiration** does not occur because C_4 plants have a mechanism that increases the concentration of CO_2 at enzyme site. [SAQ]
43. **C_3 Cycle** occurs mostly in Temperate plants **where as C_4 Cycle** occurs only in Tropical plants. [SAQ]
44. In C_3 plants, transpiration is more **where as** in C_4 plants, transpiration is less. [SAQ]
45. **Blackmann** proposed the **law of limiting factors** in photosynthesis. [OWQ]
46. **Law of limiting factors:** If a chemical process is affected by more than one factor, then its rate will be determined by the factor which is nearest to its minimal value. [VSAQ]
47. **CO_2** is the major **limiting factor** for photosynthesis. [FIB]
48. Chromatophores take part in **photosynthesis.** [NEET-2015]
49. In photosynthesis, the light-independent reactions take place at **stromal matrix**. [NEET-2015]
50. The process which makes major difference between C_3 and C_4 plants is **glycolysis.** [2016]
51. Water soluble pigments found in plant cell vacuoles are **anthocyanins**. [NEET-2016]
52. In a chloroplast, the highest number of protons are found in **lumen of thylokoids**. [2016]
53. **Manganese** is essential for photolysis of water. [2016 PMT]
54. In light reaction, Plastoquinone facilitates the transfer of electrons from PS-II to $Cytb_6f$complex. [NEET-2020]
55. Role of **Bundle sheath cells** in C_4 plants is to increase number of chloroplast for calvin cycle. [NEET-2022]
56. **3 molecules of ATP & 2 molecules of NADPH** are required for every molecule of CO_2 fixed in the calvin cycle . [NEET-2024]