CHAPTER 9

# Photosynthesis in Higher Plants

## Experiments of Photosynthesis

**1.** Anoxygenic photosynthesis is characteristic of: **[OS]** *(2014)*

a. *Ulva* b. *Rhodospirillum*
c. *Spirogyra* d. *Chlamydomonas*

## Location & Pigments of Photosynthesis

**2.** Which of the following statements is incorrect? *(2021)*

a. Stroma lamellae have PS I only and lack NADP reductase.
b. Grana lamellae have both PS I and PS II.
c. Cyclic photophosphorylation involves both PS I and PS II.
d. Both ATP and NADPH + $H^+$ are synthesized during non-cyclic photophosphorylation.

**3.** Phytochrome is a: *(2016 - II)*

a. Lipoprotein b. Chromoprotein
c. Flavoprotein d. Glycoprotein

**4.** In a chloroplast the highest number of protons are found in: *(2016 - I)*

a. Stroma b. Lumen of thylakoid
c. Inter membranal space d. Antennae complex

**5.** Water soluble pigments found in plant cell vacuoles are: *(2016 - I)*

a. Xanthophylls b. Chlorophylls
c. Carotenoids d. Anthocyanins

**6.** Emerson's enhancement effect and Red drop have been instrumental in the discovery of: **[OS]** *(2016 - I)*

a. Photophosphorylation and non-cyclic electron transport
b. Two photosystem operating simultaneously
c. Photophosphorylation and cyclic electron transport
d. Oxidative phosphorylation

**7.** In photosynthesis, the light-independent reactions take place at: *(2015 Re)*

a. Photosystem-I b. Photosystem-II
c. Stromal matrix d. Thylakoid lumen

## Light Reaction & Electron Transport

**8.** Which one of the following is **not true** regarding the release of energy during ATP synthesis through chemiosmosis? It involves: *(2022)*

a. Reduction of NADP to $NADPH_2$ on the stroma side of the membrane
b. Breakdown of proton gradient
c. Breakdown of electron gradient
d. Movement of protons across the membrane to the stroma

**9.** In light reaction, plastoquinone facilitates the transfer of electrons from: *(2020)*

a. $Cytb_6f$ complex to PS-I b. PS-I to $NADP^+$
c. PS-I to ATP synthase d. PS-II to $Cytb_6f$ complex

**10.** During non-cyclic photophosphorylation, when electrons are lost from the reaction centre at PS II, what is the source which replaces these electrons? *(2020-Covid)*

a. Water b. Carbon dioxide
c. Light d. Oxygen

## Where are ATP & NADPH Used?

**11.** Which of the following is **not** a product of light reaction of photosynthesis? *(2018)*

a. ATP b. NADH
c. NADPH d. Oxygen

## $C_4$ Pathway & Photorespiration

**12.** What is the role of large bundle shealth cells found around the vascular bundles in $C_4$ plants? *(2022)*

a. To protect the vascular tissue from high light intensity
b. To provide the site for photorespiratory pathway
c. To increase the number of chloroplast for the operation of Calvin cycle
d. To enable the plant to tolerate high temperature

**13.** Given below are two statements: *(2022)*

**Statement-I:** The primary $CO_2$ acceptor in $C_4$ plants is phosphoenolpyruvate and is found in the mesophyll cells.

**Statement-II:** Mesophyll cells of $C_4$ plants lack RuBisCO enzyme

In the light of the above statements, choose the correct answer from the options given below.

a. Statement I is incorrect but Statement II is correct
b. Both Statement I and Statement II are correct
c. Both statement I and statement II are incorrect
d. Statement I is correct but Statement II is incorrect

**14.** The first stable product of $CO_2$ fixation in *Sorghum* is: *(2021)*

a. Oxaloacetic acid
b. Succinic acid
c. Phosphoglyceric acid
d. Pyruvic acid

**15.** The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of: *(2020)*

a. 1 molecule of 3-C compound
b. 1 molecule of 6-C compound
c. 1 molecule of 4-C compound and 1 molecule of 2-C compound
d. 2 molecules of 3-C compound

**16.** Which of the following statements is incorrect? *(2020-Covid)*

a. In $C_4$ plants, the site of RuBisCO activity is mesophyll cell
b. The substrate molecule for RuBisCO activity is a 5-carbon compound
c. RuBisCO action requires ATP and NADPH
d. RuBisCO is a bifunctional enzyme

**17.** Phosphoenol pyruvate (PEP) is the primary $CO_2$ acceptor in: *(2017-Delhi)*

a. $C_3$ plants
b. $C_4$ plants
d. $C_2$ plants
d. $C_3$ and $C_4$ plants

**18.** The process which makes major difference between $C_3$ and $C_4$ plants is: *(2016 - II)*

a. Photorespiration
b. Respiration
c. Glycolysis
d. Calvin cycle

**19.** A plant in your garden avoids photorespiratory losses, has improved water use efficiency, shows high rates of photosynthesis at high temperatures and has improved efficiency of nitrogen utilisation. In which of the following physiological groups would you assign this plant? *(2016 - I)*

a. $C_3$
b. $C_4$
c. CAM
d. Nitrogen fixer

## Factors Affecting Photosynthesis

**20.** With reference to factors affecting the rate of photosynthesis, which of the following statements is **not** correct? *(2017-Delhi)*

a. Light saturation for $CO_2$ fixation occurs at 10% of full sunlight
b. Increasing atmospheric $CO_2$ concentration upto 0.05% can enhance $CO_2$ fixation rate
c. $C_3$ plants responds to higher temperatures with enhanced photosynthesis while $C_4$ plants have much lower temperature optimum
d. Tomato is a greenhouse crop which can be grown in $CO_2$-enriched atmosphere for higher yield

## Answer Key

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b | c | b | b | d | b | c | c | d | a | b | c | b | a | a | a | b |

| 18 | 19 | 20 |
|---|---|---|
| a | b | c |