DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : BIOLOGY
DPP No. : 4

Topic :- Photosynthesis in Higher Plants

1 **(c)**
A-Tropical, B-Temperate. Tropical plants have a higher temperature optimum than the plants adopted to temperate climate

2 **(d)**
Ancient plants were like cyanobacteria. These plants used hydrogen source other than water and, therefore, did not release oxygen from photolysis of water.

3 **(d)**
Photorespiration (C_2cycle) is a special type of respiration shown by many green plants (C_3 plants) when they are exposed to light. It is a light dependent process during which oxygen is used and carbon dioxide is released. The process of photorespiration takes place only in chlorophyllous tissues of plants. Therefore, the main site for photorespiration is chloroplast. But mitochondria and peroxisomes are peroxisomes are also required to complete the process.

4 **(a)**
Electrons are transferred to hydrogen carrier, which is located towards the outer side of the membrane

5 **(a)**
Hill reaction also called light reaction is a photochemical reaction. In this, reduced enzymes and phosphate bond energy (ATP) are produced.

6 **(d)**
In chloroplast, the light reaction occurs in grana and dark reaction in stroma

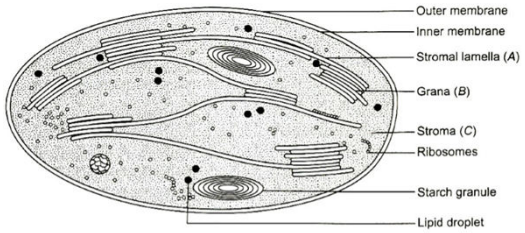
7 **(b)**
PS-II absorbs maximum 680 nm wavelength of light, thus reaction centreis P_{680}.P_{680} (PS-II) extracts an electron from water, returning to its unexcited state because hydrolysis of water occurs in PS-II. Oxygen evolved in PS-II comes from water.

8 **(d)**
Cyclic-photophosphorylation involves only pigment system-I. When the photons activate PS-I, a pair of electrons are raised to higher energy level. They are captured by primary acceptor, which passes them on to ferredoxin, plastoquinone, cytochrome complex, plastocyanin and finally back to reaction centre of PS-I, *i.e.,*P_{700}. At each step of electron transfer, the electrons lose potential energy. Their trip down hill is caused by the transport chain to pump H^+ across the thylakoids membrane. The proton gradient thus established is responsible for forming ATP (2 molecules). But no reduction of NADP to NADPH+H^+

takes place.

9 **(b)**

A-Stroma lamella, B-Grana, C-Stroma



Diagrammatic representation of chloroplast

10 **(a)**

A-680 nm, B-electron donor, C-cytochromes

11 **(d)**

C_4-plants show Kranz anatomy. In these plants, the primary carbon dioxide acceptor in mesophyll cells is phosphoenol pyruvate (PEP).

In light reaction of photosynthesis, PS-II absorbs energy at or just below 680 nm, while PS-I absorbs energy at 700 nm.

12 **(a)**

In C_4-plants, the PEP case is present in mesophyll cells (C_4-cycle) and RuBisCo is present bundle sheath cells (c_3-cycle)

13 **(b)**

C_4-pathway occurs in some tropical plants having Kranz anatomy (undifferentiated mesophyll around vascular bundles with chloroplast containing bundle sheath). The final C O_2 fixation occurs in bundle sheath cells.

14 **(b)**

The correct equation that would represent the overall process of photosynthesis is

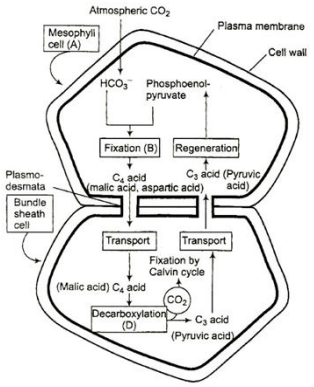
$$6CO_2 + 12H_2O \xrightarrow{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2$$

15 **(a)**

The site for photorespiration is chloroplast. Peroxisomes and mitochondria are required for completing the process. This happens at high temperature and high oxygen concentration. Lysosome are not involved in photorespiration

16 **(a)**

In the hatch and Slack pathway (C_4-cycle), the first stable compound is C_4 organic acid called oxaloacetic acid



17 **(b)**

Englemann studied the effect of different region of the visible spectrum on the rate of photosynthesis of different algae. The amount of oxygen release was found to be maximum in blue and red absorption bands of chlorophyll.

18 **(b)**

The empirical formula of chlorophyll-a is $C_{55}H_{72}O_5N_4Mg$.

19 **(b)**

Oxygen, which is liberated during photosynthesis comes from water.

$4H_2O \rightleftharpoons 4H^+ + 4OH^-$

$4OH^- \xrightarrow{Mn^+, Cl^-} 2H_2O + O_2\uparrow + 4e^-$

20 **(a)**

It is estimated that photosynthetic organism remove 100×1015 grams (.1015 + tonn) of carbon/year (Houghton and Wood well 1990)

ANSWER-KEY										
Q.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A.	**C**	**D**	**D**	**A**	**A**	**D**	**B**	**D**	**B**	**A**
Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A.	**D**	**A**	**B**	**B**	**A**	**A**	**B**	**B**	**B**	**A**