DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : BIOLOGY
DPP No. : 1

Topic :- Photosynthesis in Higher Plants

1 **(b)**

Only on factor, which is close to the minimal value.

Law of limiting factor was proposed by F. F. Blackman. (1905). It stated that when a process is conditioned as to its rapidly by number of separate factors, the rate of the process is limited by the pace of the slowest factor (*i.e.*, the factor present in minimum amount)

2 **(a)**

The external factors would include the availability of sunlight, temperature, CO_2 concentration and water. As a plant photosynthesises, all these factors will simultaneously affect its rate.

Hence, through several factors interact and simultaneously affect photosynthesis or CO_2 fixation, usually one factor is the major cause or is the one that limits the rate. Hence, at any point the rate will be determined by the factor available at sub-optimal levels

3 **(b)**

Reduce $NADP^+$.

Light reaction begins with the PS-II. In photosystem-II the reaction centre chlorophyll-*a* absorb 680 nm. wavelength of red light causing electrons to become excited and jump into orbit further from the nucleus. These electrons are picked up by an electron acceptor, which passes them to an electron system consisting of cytochromes.

The movement of electrons in ETS of photosynthesis is down hill in terms of oxidation reduction or redox potential scale. The electrons are not used up as they pass through the electron transport chain, but they passed on the pigments of photosystem I.

Simultaneously, electrons in the reaction centre of PS-I are also excited, when they receive red light of wavelength 700 nm and are transferred to another acceptor molecule that has greater redox potential. These electrons than are moved down hill again this time to a molecule of energy rich $NADP^+$. The addition of these electrons reduces the $NADP^+$ to $NADPH + H^+$

4 **(d)**

The detailed study of C_4-cycle was introduced by **M D Hatch** and **C R Slack** (1966).

5 **(c)**

In stroma, the fixing of CO_2 takes place by expanding $NADPH_2$ and ATP formed by light reaction. So, scientist should have supplied $NADPH_2$ and ATP to intact stroma for CO_2 fixation

6 **(d)**

CAM plants are mostly succulent xerophytes. The stomata in these plants remain closed during the day. They help to check the transpiration. In this way, water is conserved.

7 **(a)**

PEP (Phosphoenol pyruvate) present in mesophyll cell

8 **(d)**

Absorption spectrum of chlorophyll explain the green colour of chlorophyll. It is approximate to action spectrum of photosynthesis and the rate is different at different colour.

9 **(d)**

The use of radioactive ^{14}C by Melvin Calvin in algal (*Chlorella*) photosynthesis studies led to the discovery that the first carbon dioxide fixation product was a 3-carbon organic acid. The first product identified was 3-phosphoglyceric acid (PGA).

10 **(d)**

The first step or Calvin Cycle or C_3-pathway is Carboxylation in which a 5 C sugar RuBP acts as carbon dioxide acceptor in the presence of enzyme RUBISCO and produces 6C unstable compound. This unstable 6C compound splits into molecules of 3-phosphoglyceric acid (3C-compound), which is the first stable product of this pathway.

11 **(c)**

H_2O.

Electron excited by PS-I used in the formation of $NADPH + H^+$. These electrons come ultimately from H_2O through photosynthesis

12 **(d)**

A chromatographic separation of the leaf pigment shows that the colour that we see in leaves is not due to the single pigment but due to four pigments. They are Chlorophyll-*a* (bright or blue green in chromatogram),
Chlorophyll-*b* (yellow green),
Xanthophyll (yellow)
Carotenoids (yellow to yellow orange)

13 **(d)**

Quantasomes are present on inner membrance of thylakoids. Each quantasomehave 230 molecules of chlorophyll.

14 **(a)**

In C_4-plants, leaf shows Kranz anatomy. In these plants, the carbon dioxide first accepted in the mesophyll cells by **PEP** (phosphoenol pyruvate) and form a four carbon compound oxaloacetic acid.

15 **(a)**

Carboxylation of one molecule of RuBP leads to the formation of 2 molecules of PGA

$RuBP + CO_2 \xrightarrow[\text{carboxylase}]{\text{RuBP}} 2 - \text{carboxyl 3-keto 1-5, bisphosphoribotol.}$

2-carboxyl 3-Keto 1-5-bisphosphoribotol $+ H_2O \rightarrow 2PGA$

16 **(c)**

CAM-pathway (Crassulacean Acid Metabolism) is a mechanism of photosynthesis involving

double fixation of carbon dioxide, which occurs in succulents belonging to Crassulaceae, cacti, euphorbias and some other plants of dry habitats where the stomata remain closed during the daytime and open only at night.

17 **(c)**

A-Close, B-CO_2. Water stress causes the stomata to close hence, reducing the CO_2 availability

18 **(a)**

Assimilatory power, i.e., ATP and $NADPH_2$ should produced during light reaction of photosynthesis.

19 **(b)**

Grana are the stacks of thylakoids which contain photosynthetic pigments. Therefore, grana are the sites of light reaction.

20 **(d)**

In bundle sheath cell C_3-cycle performed. So, these cells have high number of RuBisCo as compared to other cells

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