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Examrace 339K

Biology Class 11 NCERT Solutions: Chapter 13 Photosynthesis in Higher Plants Part 2

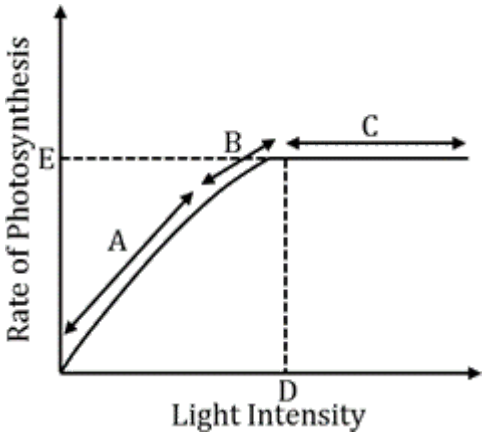
Q: 8. Figure 13.10 shows the effect of light on the rate of photosynthesis. Based on the graph, answer the following questions:

(A) At which point/s **(A, B or C)** in the curve is light a limiting factor?

(B) What could be the limiting factor/s in region A?

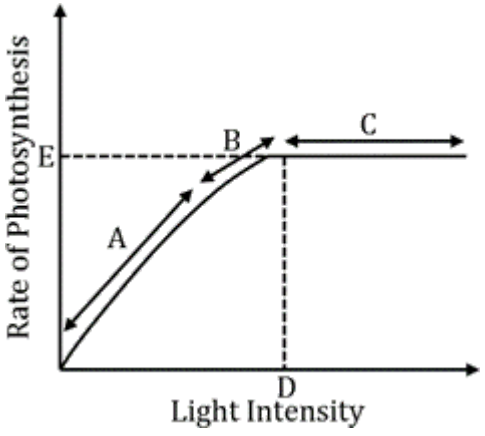
(C) What do C and D represent on the curve?

Figure 13.10



Photosynthesis vs Light Intensity Question

Answer:



Photosynthesis vs Light Intensity

(A) Generally, light is not a limiting factor. It becomes a limiting factor for plants growing in shade or under tree canopies. In the given graph, light is a limiting factor at the point where photosynthesis is the minimum. The least value for photosynthesis is in region A. Hence, light is a limiting factor in this region.

(B) Light is a limiting factor in region A. Water, temperature, and the concentration of carbon dioxide could also be limiting factors in this region.

(C) Point D represents the optimum point and gives the light intensity at which the maximum photosynthesis is recorded. The rate of photosynthesis remains constant after this point, even though the intensity of light

Q: 9. Give comparison between the following:

(A) C_3 and C_4 pathways

(B) Cyclic and non-cyclic photophosphorylation

(C) Anatomy of leaf in C_3 and C_4 plants

Answer:

(A) C_3 and C_4 pathways

C_3 Pathways	C_4 Pathways
1. The primary acceptor of CO_2 is RUBP – a six-carbon compound.	1. The primary acceptor of CO_2 is phosphoenol pyruvate - a three-carbon compound.
2. The first stable product is 3 phosphoglycerate.	2. The first stable product is oxaloacetic acid.
3. It occurs only in the mesophyll cells of the leaves.	3. It occurs in the mesophyll and bundle-sheath cells of the leaves.
4. It is a slower process of carbon fixation and photo-respiratory losses are high.	4. It is a faster process of carbon fixation and photo-respiratory losses are low.
5.	5.

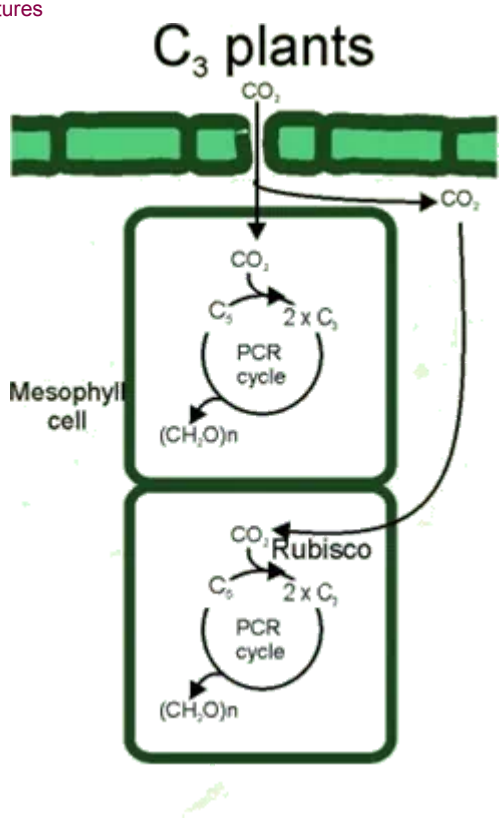


Image Shows the c3 Pathways

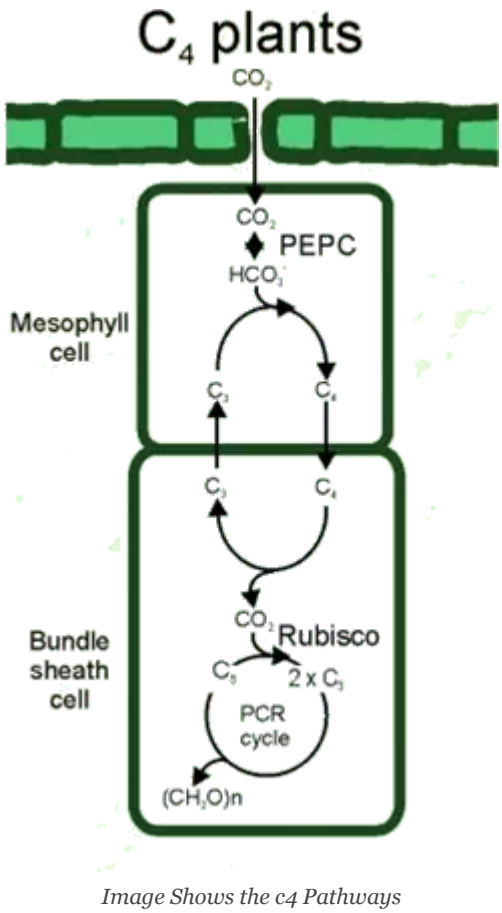


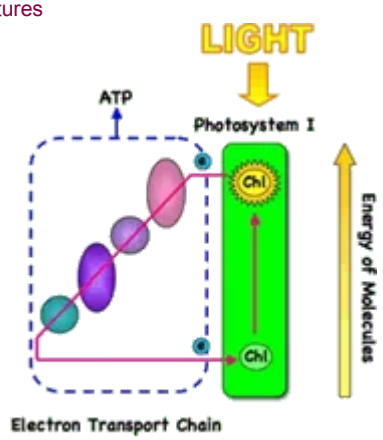
Image Shows the c4 Pathways

Q_9_A_Table of C3 and C4 Pathways

(B) Cyclic and non-cyclic photophosphorylations

Cyclic photophosphorylation	non-cyclic photophosphorylation
1. It occurs only in photosystem I.	1. It occurs in photosystems I and II.
2. It involves only the synthesis of ATP.	2. It involves the synthesis of ATP and $NADPH_2$
3. In this process, photolysis of water does not occur. Therefore, oxygen is not produced.	3. In this process, photolysis of water takes place and oxygen is liberated.
4. In this process, electrons move in a closed circle.	4. In this process, electrons do not move in a closed circle.

5.



Cyclic Photophosphorylation

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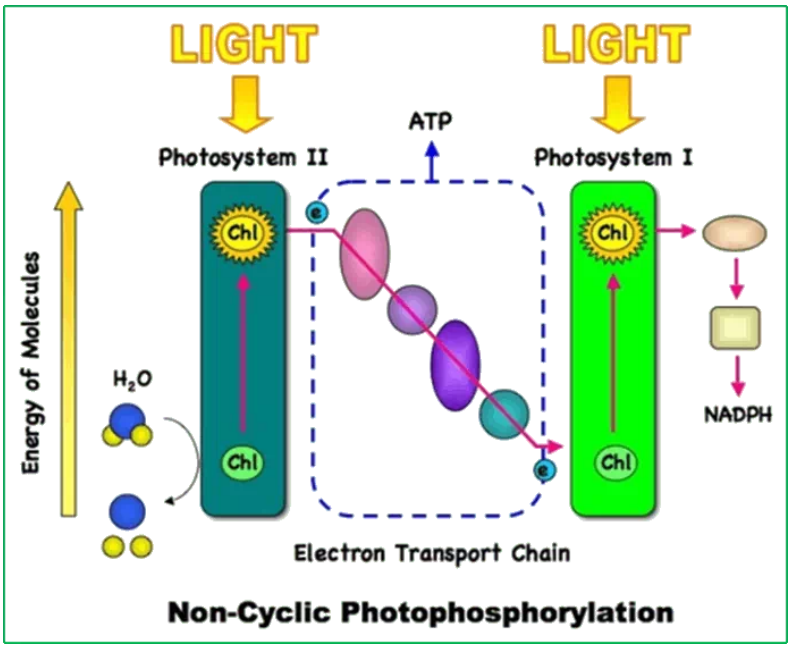


Non-Cyclic Photophosphorylation

Q_9_B_Table of Cyclic and Non-Cyclic Photophosphosphorylations

Cyclic Photophosphorylation	Non-Cyclic Photophosphorylation
Only PS I is involved	PS I and PS II are both involved
Water is not required	Photolysis of water is required
Oxygen is not evolved	Oxygen is evolved
NADPH is not synthesized	NADPH is synthesized
Used to produce additional ATP in order to meet cell energy demands	Products can be used for the light independent reactions

Cyclic and Non-Cyclic Photophosphorylations

(C) Anatomy of the leaves in C_3 and C_4 plants

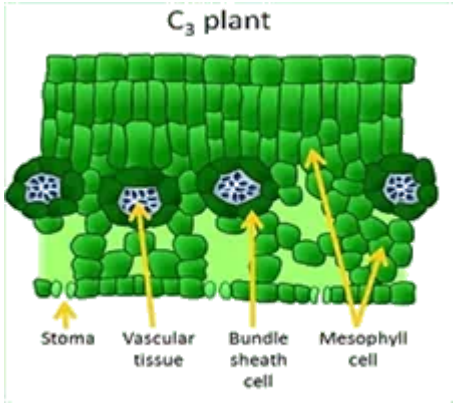
C_3 leaves

1. Bundle-sheath cells are absent
2. **RuBisCo** is present in the mesophyll cells.
3. The first stable compound produced is 3-phosphoglycerate -a three-carbon compound.
4. Photorespiration occurs

C_4 leaves

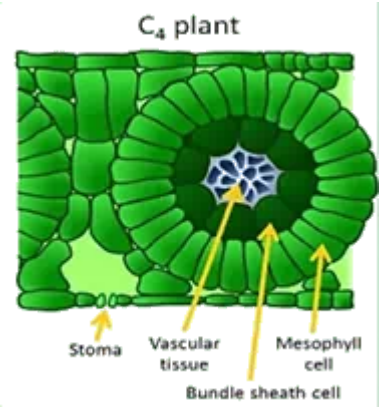
1. Bundle-sheath cells are present
2. **RuBisCo** is present in the bundle-sheath cells.
3. The first stable compound produced is oxaloacetic acid - a four-carbon compound.
4. Photorespiration does not occur

5.



Anatomy of the Leaves in C3 Plants

5.



Anatomy of the Leaves in C4 Plants

Q_9_C_Table of Anatomy of the Leaves C3 and C4 Plants