

M.Sc. BOTANY ii yr Semester-iii

Paper-II

CARBON ASSIMILATION AND CROP PRODUCTIVITY

I. Multiple choice questions

1. carbon assimilation means (B)

A. taking in air B. taking in CO_2 and making food C. taking in oxygen D. giving out water

2. the first product formed when CO_2 is fixed in C_3 plants (B)

A. sugar B. 3PGA C. 4-carbonic acid D. oxygen

3. which enzyme helps fix CO_2 in C_3 plants is (A)

A. Rubisco B. PEP carboxylase C. ATP synthase D. amylase

4. In C_4 plants CO_2 is first fixed in which part of the leaf (B)

A. bundle sheath cell B. mesophyll cell C. guard cells D. roots

5. The Hatch-Slack pathway is also called as (B)

A. C_3 cycle B. C_4 cycle C. CAM pathway D. Krebs cycle

6. CAM plants take CO_2 mostly during (B)

A. day time B. nighttime C. morning D. evening

7. crop productivity mainly depends on (A)

A. leaf size & photosynthesis rate B. seed color C. soil type D. root shape

8. C_4 plants grow best in (B)

A. cold and wet areas B. hot and dry areas C. shady forests D. snowy places

9. the main site of photosynthesis in plants is (C)

A. roots B. stem C. leaves D. flowers

10. the green pigment that helps capture light energy is (C)

A. carotene B. xanthophyll C. chlorophyll D. anthocyanin

11. which of the following increases the rate of carbon assimilation (A)

A. more sunlight B. less CO_2 C. low temperature D. lack of chlorophyll

12. The calvin cycle occurs in which part of the chloroplast (C)
A.granaB.thylakoid membrane C.stromaD.nucleus
13. the light dependent reactions of photosynthesis takes place in the (C)
A.mitochondriaB.stromaC.granaD.cytoplasm
14. the main sugar formed in photosynthesis is (B)
A.fructoseB.glucoseC.sucroseD.maltose
15. the main enzyme that fixes co₂ in c₄ plants (B)
A.Rubisco B.PEP carboxylase C.ATP synthase D.NADP reductase
- 16.CAM plants are commonly found in (A)
A.Desertareas B.cold forests C.marshy land D.mountains
17. which of the following crops is a c₄ plant (C)
A.wheatB.riceC.maizeD.barley
18. which of the following crops is a c₃ plant (C)
A. sugarcane B.maizeC.wheatD.sorghum
- 19.crop yield is highest when (A)
A.photosynthesis>respiration B.respiration>photosynthesis C. transpiration is zero
D.sunlight is absent
- 20.increasing co₂ concentration in the air generally (C)
A.decreasesphotosynthesis B.has no effect C.Increase photosynthesis D.stops growth

II. fill in the blanks

- 1.In C₄ plants carbon dioxide is initially fixed into a four carbon compound called
Oxalo acetic acid
- 2.C₄ plants show higher photosynthetic efficiency than c₃ plants
- 3.Conversion of photosynthates into economic yield is termed as crop productivity
- 4.Carbon assimilation provides the organic carbon base for all plant growth and productivity
- 5.The enzyme initially fixes CO₂ in to a 4 carbon compound is PEP carboxylase
- 6.The process by which plants release CO₂ back into the atmosphere is called photorespiration

- 7.The radioactive isotope used to study the C3 cycle is carbon 14
- 8.The stack of thylakoids is called grana
- 9.CAM stands for Crassulacean Acid Metabolism
- 10.Photorespiration is also called as C2 cycle
- 11.Rubisco stands for Ribulose bis phosphate carboxylase oxygenase
- 12.C3 and C4 cycles are the examples of dark reactions
- 13.calvin cycle is also called as photosynthetic carbon reduction pathway
- 14.calvin was awarded nobel prize for his efforts in 1961
- 15.photosynthetic carbon oxidation cycle is also known as photorespiration
- 16.C4 plants exhibit division of labour
- 17.CAM pathway was observed in cactus by the scientist De Saussure
- 18.In C3 plants 18 ATPs are required to produce one glucose molecule
- 19.In C4 plants 30 ATPs are required to produce one glucose molecule
20. C3 cycle is confined to the cells of bundle sheath

III. one word answers

1.What are the cell organelles involved in photo respiration?

A: Peroxisomes, chloroplast and mitochondria

2.What is kranz anatomy?

A: The arrangement of mesophyll cells and bundle sheath cells in C4 plants

3..what is the reducing power in carbon fixation?

A: Nicotinamide Adenine Dinucleotide Phosphate Hydrogen (NADPH)

4.What is photorespiration?

A: The process of consuming o₂ and release co₂

5.What are the three steps involved in c3 cycle?

A: Carboxylation, reduction, regeneration

6.What is the full form of Rubisco?

A: Ribulose 1,5 biphosphate carboxylase or oxygenase

7. What is carbon assimilation?

A: The process by which plants convert inorganic CO_2 into organic compounds

8. Write the overall chemical equation for photosynthesis?

A: $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{light/chlorophyll}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

9. What are the first stable products in C_3 and C_4 pathway?

A: In C_3 cycle the first stable product is PGA

In C_4 cycle the first stable product is OAA

10. Write the parts of stomata?

A: Epidermal cells, guard cells, subsidiary cells and stoma