

In Class Questions:

1. (a) Define photorespiration.

Rubisco binds oxygen instead of CO₂ - leads to the removal of a PGA from the Calvin cycle.

- (b) What gas can compete with CO₂ for the binding site of the enzyme rubisco?

oxygen

- (c) Under normal conditions, what proportion of fixed carbon is affected by photorespiration in C₃ plants?

~20% of fixed carbon is lost to photorespiration

- (d) Compare the end products of photosynthesis and photorespiration.

Photosynthesis = O₂ & carbohydrate

Photorespiration = CO₂

2. How does temperature affect the relative amounts of photosynthesis and photorespiration that occur in C₃ plants?

Increased temperature increases photorespiration because as stomata close less CO₂ can enter plant for Calvin cycle and O₂ from light reactions is trapped inside.

3. (a) Label A, B, C, D, and E in Figure 5.

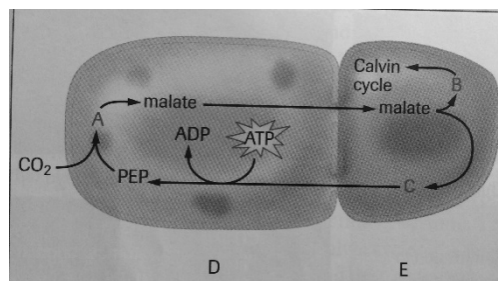
A – Oxaloacetate

B – CO₂

C – pyruvate

D – mesophyll cell

E – bundle sheath cell



- (b) What type of cell–cell connection do malate and pyruvate go through to move from one cell into the other?

4. (a) What is the main difference between the ideal environments of C₄ plants and CAM plants?

C₄ – warm day temp, cooler nights, short drought, intense sun

CAM – hot & dry, low soil moisture (increased stressful conditions)

- (b) Name two C₄ plants and two CAM plants.

C₄ – crabgrass, corn, sugar cane

CAM – cactus, pineapple, sedum

6. (a) At what time of the day would you expect to find the most malate in CAM plants? **Night – make it at night**

- (b) When would you find the least amount of malate in CAM plants? **Day – breaking down during day**

- (c) Why do plants that use CAM photosynthetic pathways close their stomata during the day? **Conserve water**

- (d) During the cool of evening, CAM plants open their stomata. What gas is preferentially absorbed at this time? **CO₂**

- (e) Explain how this gas is stored for daytime use. **CO₂ + PEP → malic acid stored in vacuole**