Biology lecture: Q2 W5

evaluate how photosynthesis can

help reduce carbon dioxide levels in the environment

HOW PHOTOSYNTHESIS REDUCES CO2?

***Carbon Sinks: Plants and algae act as carbon sinks, removing vast amounts of CO2 from the atmosphere.***

**carbon sink** is anything that absorbs more carbon (in the form of carbon dioxide, CO₂) from the atmosphere than it releases.

🌱 **Plants and algae** are major natural carbon sinks because:

1. **Photosynthesis** – They take in CO₂ from the air (or water, in the case of algae) and use it along with sunlight to produce glucose (sugar) and oxygen.

6CO2+6H2O+sunlight→C6H12O6+6O26CO₂ + 6H₂O + sunlight → C₆H₁₂O₆ + 6O₂6CO2​+6H2​O+sunlight→C6​H12​O6​+6O2​

1. **Carbon Storage** – The carbon from CO₂ gets stored in their bodies as carbohydrates, proteins, fats, and other organic molecules. Trees, for example, store large amounts of carbon in their wood and roots.
2. **Algae’s Role** – In oceans, microscopic algae (phytoplankton) not only absorb CO₂ but also form the base of marine food chains. Some of the carbon they capture eventually sinks to the ocean floor when they die, locking it away for centuries.

🌍 **Why this matters:**

* By removing vast amounts of CO₂, plants and algae help regulate Earth’s climate and reduce the greenhouse effect.
* Forests (like the Amazon) and oceans are often called the “lungs of the Earth” because they play such a big role in balancing atmospheric CO₂.

👉 In short: Plants and algae **act as carbon sinks by absorbing CO₂ during photosynthesis and storing it in their biomass and ecosystems**, helping slow down climate change.

***Organic Matter: The fixed carbon is stored in the plant's tissues (like leaves, stems, and roots), transforming atmospheric carbon dioxide into organic matter.***

**Organic Matter** refers to the carbon-based compounds that make up living things (like sugars, starches, proteins, and fats).

🌱 How plants create it:

During photosynthesis, plants take in carbon dioxide (CO₂) from the atmosphere.

They convert this carbon into glucose (C₆H₁₂O₆), a simple sugar.

From glucose, plants build more complex compounds such as cellulose (for cell walls), starch (for energy storage), and proteins (for growth).

📌 Where it’s stored:

Leaves → photosynthesis factories; store sugars and other compounds.

Stems and trunks → store cellulose and lignin (long-term carbon storage).

Roots → store starch and pass carbon into the soil through root secretions.

🌍 Why it matters:

This process transforms atmospheric CO₂ into solid organic matter, keeping the carbon “locked up” inside living tissues instead of floating in the air as a greenhouse gas.

When plants die, this organic matter can enter the soil, enriching it and potentially storing carbon long-term.

👉 In short: Plants turn invisible carbon dioxide gas into visible organic matter (leaves, wood, roots, etc.), effectively trapping atmospheric carbon inside their bodies.

***Climate Regulation: By drawing down CO2 levels, photosynthesis helps regulate Earth's atmosphere and mitigates climate change.***

🌍 **Climate Regulation through Photosynthesis**

1. **CO₂ as a Greenhouse Gas** – Carbon dioxide traps heat in Earth’s atmosphere. Too much of it leads to global warming and climate change.
2. **Photosynthesis Removes CO₂** – Plants, trees, and algae absorb carbon dioxide during photosynthesis, using it to produce food (glucose) and releasing oxygen.
   * This process lowers the amount of CO₂ in the atmosphere.
3. **Regulating Earth’s Atmosphere** – By reducing CO₂, photosynthesis helps keep Earth’s temperature stable, maintaining conditions suitable for life.
4. **Mitigating Climate Change** –
   * Forests (like the Amazon) and oceans (with algae and phytoplankton) act as **carbon sinks**, offsetting some of the CO₂ released from human activities (like burning fossil fuels).
   * Without this natural CO₂ removal, climate change would accelerate much faster.

👉 **In short:** Photosynthesis isn’t just about making food for plants—it also **balances atmospheric gases**. By pulling CO₂ out of the air, plants and algae **help regulate Earth’s climate and slow global warming.**