

ENERGY IN THE ECOSYSTEM

LESSON 1: PLANT PHOTOSYNTHESIS: AN OVERVIEW

INTRODUCTION TO THE LESSON

Bot: Hello, SCI-learner!

Welcome to another science adventure here in Roxas City, where rice fields, mangroves, and backyard plants turn sunlight into life-sustaining energy.

Bot: Have you ever wondered how plants grow tall even though they don't eat like humans do?

Bot: Today's lesson is about photosynthesis, the process that powers plants and supports all life in the ecosystem, including us.

Bot: Ready to follow the path of energy from the Sun to living things?

User:

- ▶ Yes, let's start!
- ▶ I'm ready!

Fa-SCI-nate

Bot: Imagine this...

You walk past a rice field in Capiz at noon. The Sun is bright, and the leaves are wide open.

Bot: What do you think plants are doing under the sunlight?

User:

- ▶ Making food
- ▶ Resting
- ▶ Just absorbing heat

Branching Response:

Bot (Correct – Making food): Correct! Plants use sunlight to make their own food through photosynthesis.

Bot (Incorrect): Not quite. Plants don't just absorb heat—they use light energy to produce food.

Goal SCI-tting

Bot:

By the end of this lesson, you will be able to:

1. Describe the cell structures involved in photosynthesis
2. Differentiate light-dependent and light-independent reactions
3. Explain how some plants adapt to hot and dry environments
4. Explain why photosynthesis is important to other organisms

Bot: These goals will help you understand where energy in the ecosystem begins.

User:

Continue

Pre-SCI-ntation

Bot: Not all organisms get energy the same way.

Bot: **Autotrophs** (like plants) make their own food.

Heterotrophs (like humans and animals) depend on other organisms.

Bot: Photosynthesis happens only in photoautotrophs, such as green plants.

Bot: Without photosynthesis, there would be no food and no oxygen for life on Earth.

Inve-SCI-tigation

Part 1: Where Photosynthesis Happens

Bot: Photosynthesis mainly occurs in the leaves of plants.

Bot: Inside leaf cells are organelles called chloroplasts.

Bot: Which structure is the site of photosynthesis?

User:

Mitochondria
 Chloroplast
 Nucleus

Bot: Correct! Chloroplasts are the site of photosynthesis.

Part 2: Chloroplast Structure

Bot: Inside the chloroplast are important parts:

- **Thylakoids** – where light-dependent reactions occur
- **Grana** – stacks of thylakoids
- **Stroma** – where light-independent reactions occur
- **Chlorophyll** – the green pigment that traps sunlight

Bot: Where do light-dependent reactions occur?

User:

Stroma
 Thylakoid

Bot: Correct! Light-dependent reactions occur in the thylakoids.

Part 3: Two Stages of Photosynthesis

Bot: Photosynthesis has **two stages**:

1 Light-dependent reactions

- Require sunlight
- Produce ATP, NADPH, and oxygen

2 Light-independent reactions (Calvin-Benson Cycle)

- Occur in the stroma
- Use ATP and NADPH to produce glucose

Bot: Which stage produces glucose?

User:

- Light-dependent reactions
- Light-independent reactions

Bot: Correct! Glucose is produced in the light-independent reactions.

Part 4: Light and Pigments

Bot: Light is a form of electromagnetic energy.

Bot: Chlorophyll absorbs red and violet light and reflects green—this is why leaves look green.

Bot: Why do leaves appear green?

User:

- Because they absorb green light
- Because they reflect green light

Bot: Correct! Leaves appear green because they reflect green light.

Part 5: Plant Adaptations (C₄ and CAM)

Bot: In hot and dry places, plants may lose too much water.

Bot: Some plants adapt using special pathways:

C₄ plants (corn, sugarcane)

CAM plants (cactus, pineapple)

Bot: CAM plants open their stomata during the night to conserve water.

Bot: Which plants open stomata at night?

User:

- ▶ C₄ plants
- ▶ CAM plants

Bot: Correct! CAM plants open stomata at night.

Self-A-SCI-ssment

Bot: Let's check your understanding!

Bot:

1. What are the two stages of photosynthesis?
2. What is the role of chlorophyll?
3. Why are C₄ and CAM plants adapted to hot environments?

User:

- ▶ To reduce water loss
- ▶ To absorb more oxygen

Bot: Correct!

These adaptations help plants reduce water loss.

SCI-pplementary

Bot: Did you know? Photosynthesis is the foundation of all food chains.

Bot: The rice you eat, the fish you enjoy, and even the oxygen you breathe—all depend on photosynthesis.

Bot: Protecting plants means protecting life in Roxas City and beyond.

CLOSING

Bot: Great job, SCI-learner! You've learned how plants capture sunlight and turn it into energy.

Bot: Next, we'll explore how is energy harnessed by animals from plants.

Bot: Padayon sa pagtu-on sa SCI-ensiya! See you in the next lesson!