



# How Plants Grow?

For first year agriculture engineers

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# Contents

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01

**Photosynthesis**

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02

**Plant organisation**

---

03

**Stages of Growth**

---





**What the plant needs to live**

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# What the plant needs to live?

## Water



- Transport nutrients,
- Photosynthesis,
- Regulating temperature (transpiration)

## Gases



- CO<sub>2</sub>,
- O<sub>2</sub>.

## Nutrients



- N,
- P,
- K.

## Temperature



- Extreme temperatures (too hot or too cold) can inhibit growth or cause damage



**Why it is so important to  
study how plants grow**

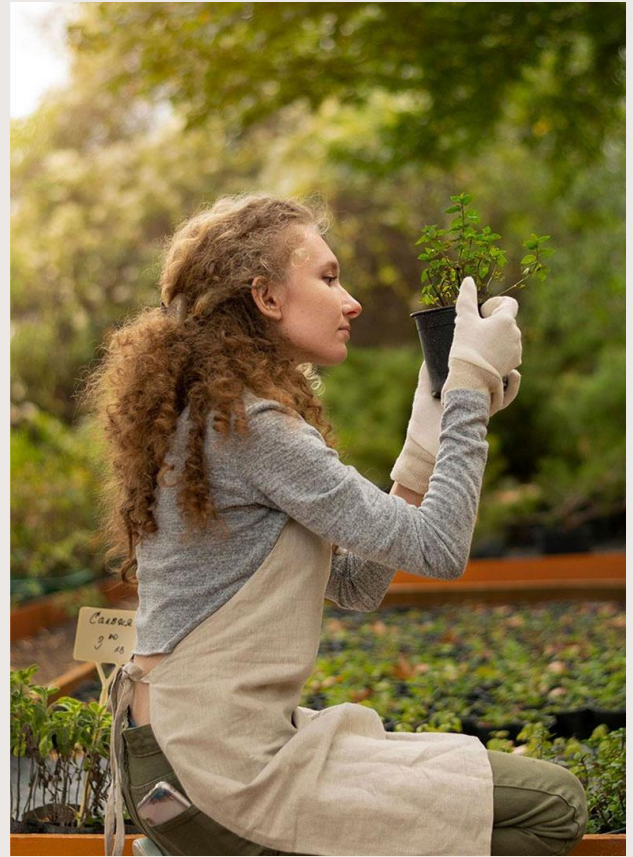
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Understanding how plants grow helps us take care of them better and produce more food



# 01

## Photosynthesis

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# Introduction

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Photosynthesis is the process by which green plants, algae, and some bacteria convert light energy into chemical energy, storing it as glucose (a sugar).



This process not only fuels the plant's growth but also produces oxygen, which is vital for life on Earth.





# The Basic Photosynthesis Equation

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The overall simplified chemical equation for photosynthesis can be represented as:





- **CO<sub>2</sub> (carbon dioxide):** Taken from the air by the plant's stomata.
- 
- **H<sub>2</sub>O (water):** Absorbed by the roots from the soil.





- **Light energy:** Captured by the chlorophyll in the plant's leaves.
- **Glucose ( $C_6H_{12}O_6$ ):** A sugar produced as food for the plant.
- **$O_2$  (oxygen):** Released as a byproduct into the air.

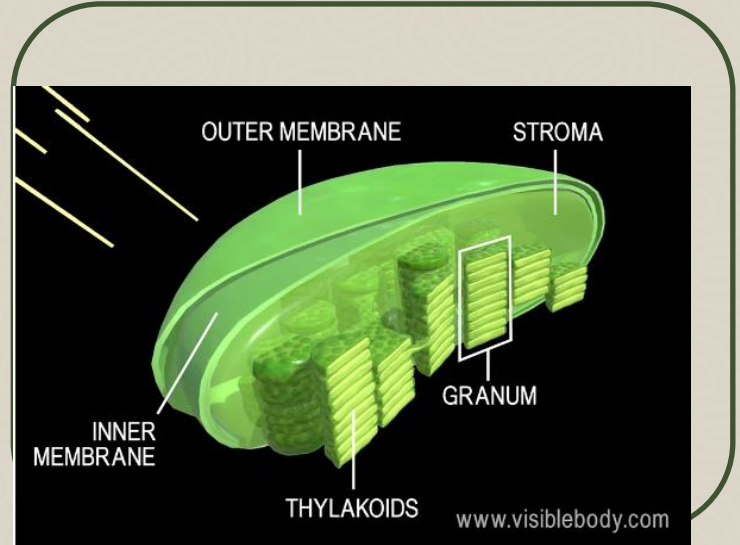


# The Two Main Stages of Photosynthesis

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## 1- Light-Dependent Reactions (First Stage):


- These reactions happen in the thylakoid membranes of the chloroplasts.



# The Two Main Stages of Photosynthesis

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## 1- Light-Dependent Reactions (First Stage):



- The plant uses sunlight to split water molecules into oxygen, hydrogen ions, and electrons.

- This creates ATP and NADPH (nicotinamide adenine dinucleotide phosphate), two chemical energy-rich molecules that power the next stage.

# The Two Main Stages of Photosynthesis

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## 2- Light-Independent Reactions (Calvin Cycle or Second Stage):



**These reactions happen in the stroma of the chloroplasts.**

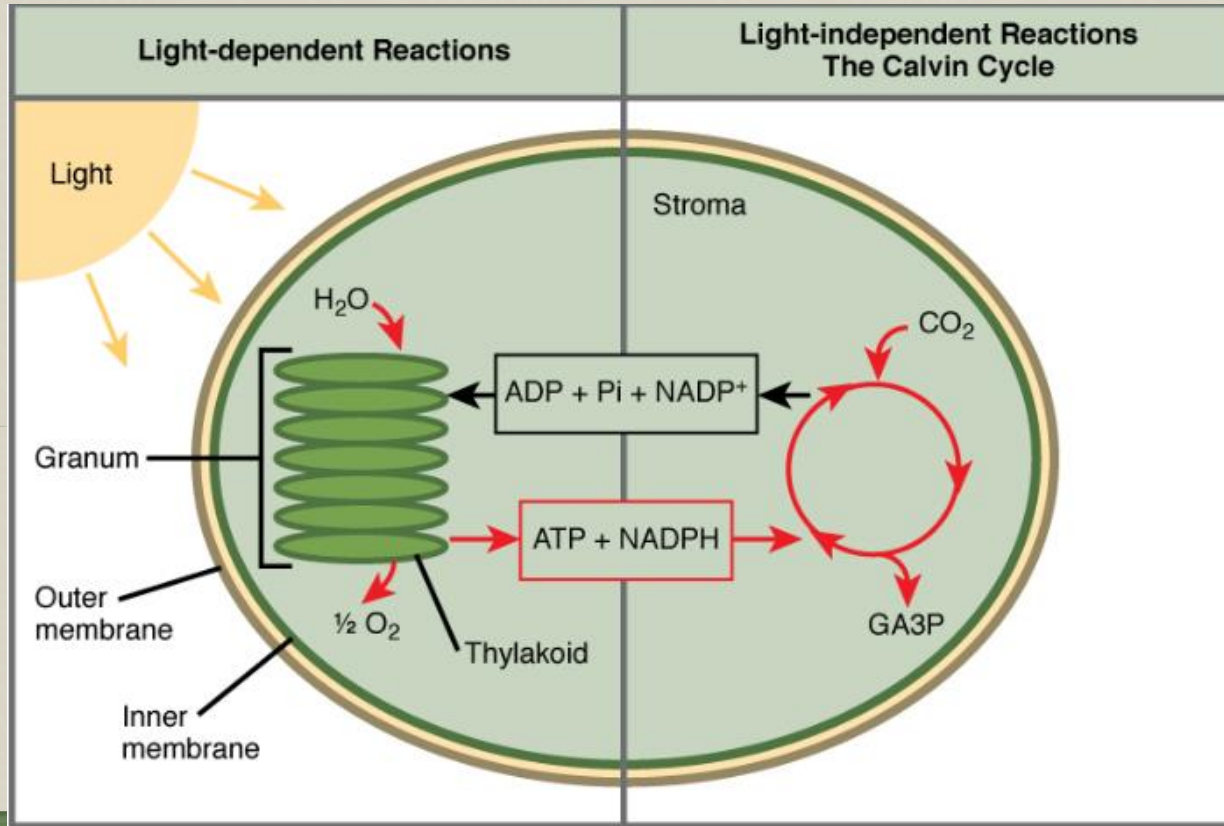


**The plant uses CO<sub>2</sub>, along with the energy from ATP and NADPH, to create glucose.**



**Glucose is stored or used by the plant for growth and energy.**

# The Two Main Stages of Photosynthesis



# 02

## Plant organisation

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**To be continued**

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