# **Respiration in Plants**

## Introduction

Plants, like all living organisms, undergo respiration to generate energy.

Unlike animals, plants do not have specialized respiratory organs.

Every part of a plant (leaves, stems, roots) respires independently by absorbing oxygen and releasing carbon dioxide.

## **Mechanism of Respiration in Plants**

Plants utilize glucose ( $C_6H_{12}O_6$ ) and oxygen ( $O_2$ ) to produce carbon dioxide ( $CO_2$ ), water ( $H_2O$ ), and energy (ATP).

During the day:

- Photosynthesis occurs, where carbon dioxide is absorbed, and oxygen is released.
- Oxygen produced during photosynthesis is used for respiration.
- Hence, plants do not take in extra oxygen from the environment during the day.

# **During the night:**

- Photosynthesis does not occur due to the absence of sunlight.
- Plants take in oxygen from the air and release carbon dioxide.

# **Key Features of Plant Respiration**

- Plants do not have respiratory organs.
- Each part of a plant respires independently.
- Gas exchange (O<sub>2</sub> & CO<sub>2</sub>) occurs through diffusion a slow process.
- Different plant parts have different methods of oxygen absorption and CO<sub>2</sub> release.

# **Respiration in Different Parts of a Plant**

### **Respiration in Leaves**

The exchange of gases occurs through tiny pores called stomata present on leaf surfaces.

#### Process of gas exchange in leaves:

- Oxygen from the air enters the leaf through stomata.
- Oxygen reaches all leaf cells by diffusion.
- Cellular respiration occurs, using oxygen and releasing carbon dioxide.
- The produced carbon dioxide exits the leaf via stomata.

### **Stomatal Behavior:**

#### Daytime:

- Stomata open for photosynthesis (CO<sub>2</sub> intake).
- Oxygen produced is used for respiration.

#### Nighttime:

- Stomata mainly facilitate oxygen intake for respiration.
- Carbon dioxide is released.

# **Respiration in Roots**

Root hairs absorb oxygen from the air present between soil particles.

### Process of gas exchange in roots:

- Oxygen present in air spaces between soil particles diffuses into root hairs.
- Oxygen is transported to all root cells for respiration.
- Carbon dioxide produced diffuses out into the soil.

### **Effect of Overwatering:**

- Excess water fills the air spaces in the soil.
- This prevents oxygen absorption by roots.
- Lack of oxygen leads to root suffocation, causing plant death.

# **Summary of Plant Respiration**

| Aspect                 | Respiration in Leaves    | Respiration in Roots       |
|------------------------|--------------------------|----------------------------|
| Gas Exchange           | Through stomata          | Through root hairs         |
| Oxygen Intake          | From the air via stomata | From air in soil particles |
| Carbon Dioxide Release | Through stomata into air | Diffuses into soil         |
| Process                | Diffusion                | Diffusion                  |

| Aspect                                | Respiration in Leaves                        | Respiration in Roots                   |
|---------------------------------------|--|--|
| Importance                            | Essential for photosynthesis<br>and survival | Essential for root function and growth |
| Effect of Environmental<br>Conditions | Stomata open/close based on need             | Waterlogging can cause suffocation     |

### Conclusion

- Respiration is essential for energy production in plants.
- Leaves use stomata, while roots use root hairs for gas exchange.
- The process occurs continuously, but gas exchange varies during day and night.
- Overwatering can harm plant respiration by blocking oxygen supply to roots.