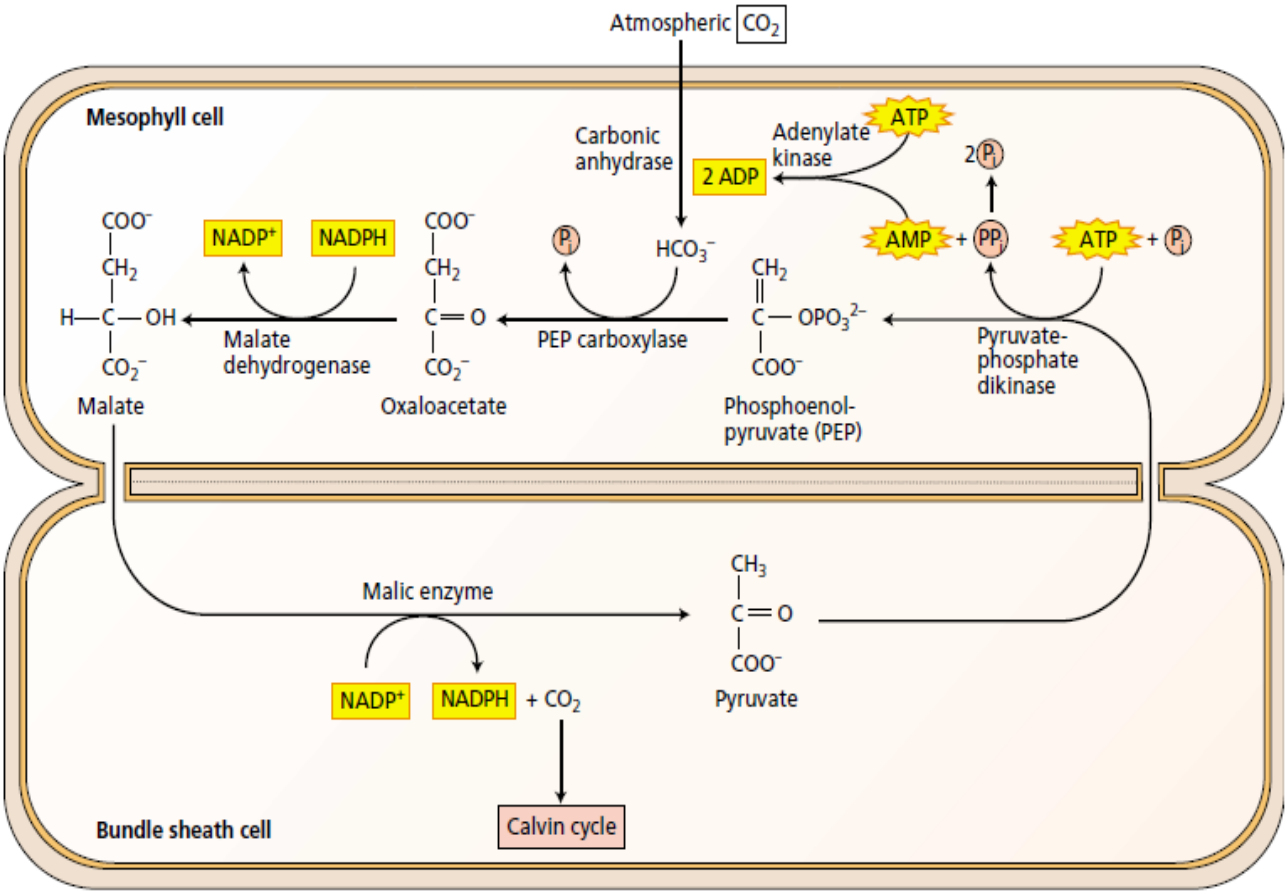
C4 plant group (C4-plant four-carbon plants)

It is so named because the first compound formed after the fixation of CO2 is a four-carbon compound, oxaloacetate (OAA) acid; its carbon fixation pathway is known as the Hag – slack Hatch – slack pathway.

This pathway occurs in some plants – especially tropical or subtropical origin, such as white and yellow corn, sugar cane and others, and the first product of the reaction is a compound of four carbon atoms. This group includes approximately 1,500 species distributed among approximately 18 seed-bearing plant families (15 of them dicotyledonous and 3 monocotyledonous).



Factors affecting photosynthesis

The process of photosynthesis is one of the most important vital processes that take place on the surface of the globe, and this process has many necessary conditions to be met in the external and internal environment of the plant in order to carry out the photosynthesis process.

There are also several determinants of the rate at which photosynthesis occurs

A-External factors

1. lighting intensity

The intensity of illumination in the external environment of the plant and the duration of its exposure to light has an impact on the photosynthesis process and its rate of occurrence .when the intensity of illumination is low, the speed of the photosynthesis process is directly proportional to it, as the rate of photosynthesis increases with increasing light intensity. However, if the intensity of illumination increases significantly, and the plant is exposed to normal light for a long time, this leads to a decrease in photosynthetic activity.

2. concentration of carbon dioxide

Increasing the concentration of carbon dioxide leads to an increase in the speed of the photosynthesis process and if the concentration of carbon dioxide in the external environment increases to a high degree, the speed of the photosynthesis process decreases due to its toxic effect on the plant and closing its holes to protect itself from this effect.

3.:Temperature .

The enzymes of the photosynthesis cycles are affected by increasing and decreasing temperatures, where the increase in temperature accelerates the occurrence of the photosynthesis process, but with an excessive increase in temperature, this leads to a decrease in the rate of photosynthesis and thus the process is affected.

4. The water

It was found that the amount of water necessary for the continuation of the photosynthesis process is estimated at only about 1% of the total water absorbed by the plant. It has been observed that the rate of photosynthesis increases if there is a slight drought in the leaves (15% water loss), but this rate decreases completely if there is a severe drought in these leaves (45% water loss), as water loss leads to shrinkage in the cells and thus closing the stomata.

5-The effect of nutrients

The lack of some elements leads to a low rate of photosynthesis because they are auxiliary factors for some enzymes for dark reactions or because they are necessary to complete the light reaction process, such as chlorine, whose deficiency leads to the inability to transfer electrons from water to chlorophyll, and the lack of an element may affect the construction of chlorophyll itself, as in the case of a lack of iron, nitrogen or magnesium, and others, and it enters as a reaction material during dark reactions.

B-internal factors

1. Enzymes

The process of photosynthesis depends on the availability of its own enzymes, its efficiency, and the occurrence of any defect in it that leads to an impact on the rate of the process

2. Accumulation of products

The accumulation of carbohydrate products resulting from photosynthesis in the leaves leads to a slow process, as the efficiency of the process depends on the internal structure of the Leaf, which differs in dicotyledons from dicotyledons.

Aspects of comparison between C3 and C4

Aspects of comparison	c3 plant	c4 plant	
Photorespiration	yes	NO	
Light energy	Variable	Fixed	
Transpiration	High	Low	
Light saturation	High	Do not saturate	
The first receptor compound	Ribulose 1,5 diphosphate RUDP	(PEP)	
The first product compound	3-PGA	OAA	
example	Wheat, rice and soybeans	Corn and sugar cane	

Respiration

It is a vital process that occurs as a result of the release of energy during the breakdown and decomposition of complex substances contained inside the cells into simple substances that are easy for the plant to use in its various vital functions.

This process is usually accompanied by the absorption of oxygen and the release of co2

Respiration includes all the processes that lead to the release of energy, whether as a result of gas exchange between the organism and the environment or sometimes as a result of interactions that do not include gas exchange.

The common type of breathing is in which energy is released as a result of the oxidation of organic substances such as carbohydrates, fatty and protein substances, and this requires the use of atmospheric oxygen, so this type of breathing is known as aerobic . respiration, as it is the normal means of respiration of plants

. This type of breathing requires the absorption of oxygen and the exit of carbon dioxide

Energy may be released from other processes other than the previous Type, the most important of which is anaerobic respiration is the decomposition of carbohydrates into alcohol and CO2 without the use of atmospheric oxygen, and this process is known as anaerobic respiration

Respiration: It is the set of processes occurring inside the cell according to which complex nutrients are converted into less complex compounds into compositions with the release of potential energy to those substances in batches

The food substances that are used for breathing are starch, sucrose, glucose, other sugar, .as well as fatty substances and organic acids

The released energy is converted into thermal energy, which is often transferred to the surrounding atmosphere by radiation or conduction and may cause some lighting and raising the temperature of the plant or fabric. The other part of the energy that the plant benefits from is converted into chemical energy stored in some compounds in the form of energy-rich phosphate bonds, including (adenosine triphosphate), which has the ability to receive or receive energy from other reactions and transfer this energy to conduct . another reaction and build cellular components

This process of respiration is the process of oxidation of nutrients and reduction of oxygen to form water.

$$1-\text{Starch} + \text{many } H2O \xrightarrow{\text{amylasesenzyme}} \text{many glucose}$$

$$\text{Starch} + Pi \xrightarrow{\text{phosporylaseenzyme}} \text{many glucose} - 1 - P$$

$$2-\text{Fructans} + H2O \xrightarrow{\text{fructan-exohydrolases}} \text{Sereal Frutose} + \text{one sucrose}$$

$$3-\text{Sucrose} + H2O \xrightarrow{\text{invertaseenzyme}} \text{Glucose} + \text{fructose}$$

Respiratory functions :

1-ATP production.

2. have many compounds that enter into the construction of plant tissues.

In the first stage, glucose sugar is converted into parvic acids.Oxygen is not absorbed and the release OFCO2

In the second stage, CO2 is released as a result of the breakdown of bar acids in you

As all CO2 released comes from the Krebs cycle

In the last stage (electron transfer), energy is produced, where 2/3 of this energy is lost in the form of heat, and only 1/3 of this energy is captured in the form of TP(full-energy phosphorus compound)

-Before entering the sugars in the first stage (glycolysis), there must be several and two sugars (starch) - sucrose

It has been hydrolyzed by some enzymes with the property of converting into monosaccharides to be hydrolyzed.

This stage is called introductory reactions.

(RG) Respiratory Guotien

Respirator, respiratory ratio

It is a measure of the ratio of CO2 release to O2 consumption in the breathing process

$$RQ = \frac{CO_2}{O_2}$$

Factors affecting the Respiratory process

1. Temperature:

Temperature has a noticeable effect on the breathing process. Plants respond to high temperature in the breathing process like any other vital process. The breathing rate increases with increasing temperature to a certain extent. A decrease in temperature may cause a decrease in the breathing process, depending on the type of plant and the environment in which it lives.

2. O2 concentration:

The respiratory rate increases with an increase in the concentration of oxygen, as well as the lack of oxygen causes a decrease in the respiratory rate .in general, aerobic respiration requires the presence of oxygen, that is, in the absence of oxygen, breathing will be anaerobic.

3-concentration of CO2 :

It is believed that an increase in the concentration of CO2 produced by the final product in the breathing process may inhibit the breathing process, but these concentrations that inhibit breathing are also high, as mentioned earlier, an increase in the concentration of CO2 in plant tissues may cause stomata to close and then affect gas exchange and thus inhibit breathing