

## CO2 - The material of life

Photosynthesis: with light-energy as a motor and water as a fuel, plants realize photosynthesis. This was the theme in the last Highlife. The energy of the combustion of the water is used to transform the basis of the photosynthesis, the CO<sub>2</sub> into organic material.

### What is in the air?

99% of the air exists of nitrogen (78 vol%) and oxygen (21 vol%). In the remaining 1% air only a small part of it is CO<sub>2</sub>-gas. The air contains only 0.03 vol% carbon-dioxide-gas. In spite of this low concentration, CO<sub>2</sub> is the basis of life. All organic material (from the sugars till animal protein, hairs, skin, eyes, just everything) is finally created by the CO<sub>2</sub> in the air. The animals and human beings do nothing else than eating the plants and transforming the materials of the plants and finally breath it out again (CO<sub>2</sub>).

### The basis CO<sub>2</sub> for sugar and amyllum

Rudely put, the first step of photosynthesis is the sticking together of two parts of carbon-dioxide. After this step the first organic molecule is created. Three of these units are 1 sugar molecule. Shortly said are 6 CO<sub>2</sub>-molecules one sugar (1 C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>). More sugars attached to each other (poly-sugars) are called amyllum. By forming sugar chains the plant stores the energy of the sun. This all is done by in a plant in the daytime with light as a motor and water as a fuel.



### How does CO<sub>2</sub> gety into the plant?

A leaf has pores, which can be actively opened and closed by the plant. By these pores water evaporates and is thereby keeping a constant stream from the roots to the leaves (Highlife June99 and Oct99). Through these pores the air comes in and spreads itself more or less unhindered in the plant. Gas (like CO<sub>2</sub>) on the contrary, is not dependent on special pores like water and it flows by leaf cells or can be transported with the perspiration water. By using CO<sub>2</sub> in the plant, an underpressure of CO<sub>2</sub> is found in the leaf pores and around the plant, that can be immediately be compensated by the endless amount of air. That is why the photosynthesis is daily on full speed, in spite of the small concentration of CO<sub>2</sub>.



The penetration of CO<sub>2</sub> into the plant depends on the leaf pores. During the night the pores are closed. If the sun rises or the lights are turned on, the plant opens its pores, the water begins to flow and photosynthesis starts. Sometimes a plant closes its pores in the daytime. In free nature this happens often in the afternoon because of the heat, if the sun gives so much power that the products of the photosynthesis (sugars and amyllum) are produced in too big numbers. These can not be transported away and pile up. This is a sign for the plant to close the pores to stop the supply of CO<sub>2</sub>. When the jam of photosynthesis is over, the leaves open their pores again and a healthy photosynthesis starts again. Another reason for the plant to close the pores during the daytime (and prevent the penetration of CO<sub>2</sub>) is a massive lack of water (certainly when the plants limp) and a too high temperature. The plant closes in both cases to avoid a loss of water.

In a closed room is another problem possible. A lack of CO<sub>2</sub> by letting in too little fresh air. This could never happen outside, because the endless treasure of CO<sub>2</sub>-gas is always guaranteed at a constant concentration of 0.03%.

Deficiencies can happen if the intake of the air is not good calculated and there is not often enough refreshment. Take care that the intake and the outlet of the air is optimal, too much is better than too less, so the concentration of the CO<sub>2</sub> is always on air-level.

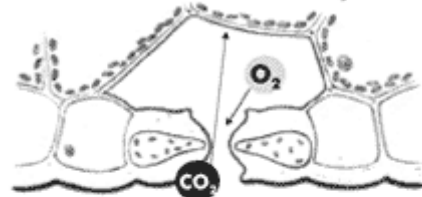
### The activity of the photosynthesis depends on the light intensity.

The more light, the more CO<sub>2</sub> gas the plant can process, but only if the other parameters (temperature, water and nutrition) are optimal. If it is constantly too hot or the nutrition in the water is too less, also chemical fertilizing with CO<sub>2</sub>-gas can give no increase, because if the pores are closed and nothing will come in. If you want to fertilize with CO<sub>2</sub> gas, do it properly. It means an optimal climate in the room and a high quality CO<sub>2</sub> installation. This will increase the CO<sub>2</sub> concentration of the air precisely and measures and regulates permanently the inlet of the gas, because too less gives no better crop and too much is dangerous. The specialist in this area (for instance BTT) will give you skilled information and advice.

In the small growing room, the CO<sub>2</sub> quantity can also fall by too less ventilation. Enough ventilation and enough mixing of the air in the room are good for the hemp plant. A hemp plant loves light and wind. The leaves are hairy and the buds have resin glands, this makes it resistant to light. Supposed is this a reason why the plant produces resin, because the production of resin increases when the intensity of the light increases.

The light that falls on the surface is reflected by a protective layer of resin and lead away again. Not only the intake of light but also the intake of air is prevented by the hairs and strong ventilation on the plant is necessary. Not only the air around the plants is refreshed, also too high temperatures are blown away and softened. Hemp-plants can bear an enormous lot of wind and the movement by wind stimulates a thick stable stem. Plants that are grown in not ventilated rooms or in a windless summer are during the blooming period often lying on the ground.

### CO<sub>2</sub> - gas bereikt via de bladporiën de binnenkant van de plant



Hier wordt CO<sub>2</sub> gebonden en 6 aan elkaar gehecht, zodat er een suiker (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>). De 12 H levert de brandstof water (H<sub>2</sub>O) en de overtollige zuurstof wordt uitgeademd.



Zijn de poriën gesloten, kan de plant niet ademen en geen suiker opbouwen ondanks voldoende licht. De plant sluit de poriën als ze watergebrek heeft of de temperaturen te hoog worden, om waterverlies door transpiratie te onderbreken - en natuurlijk in de nacht.