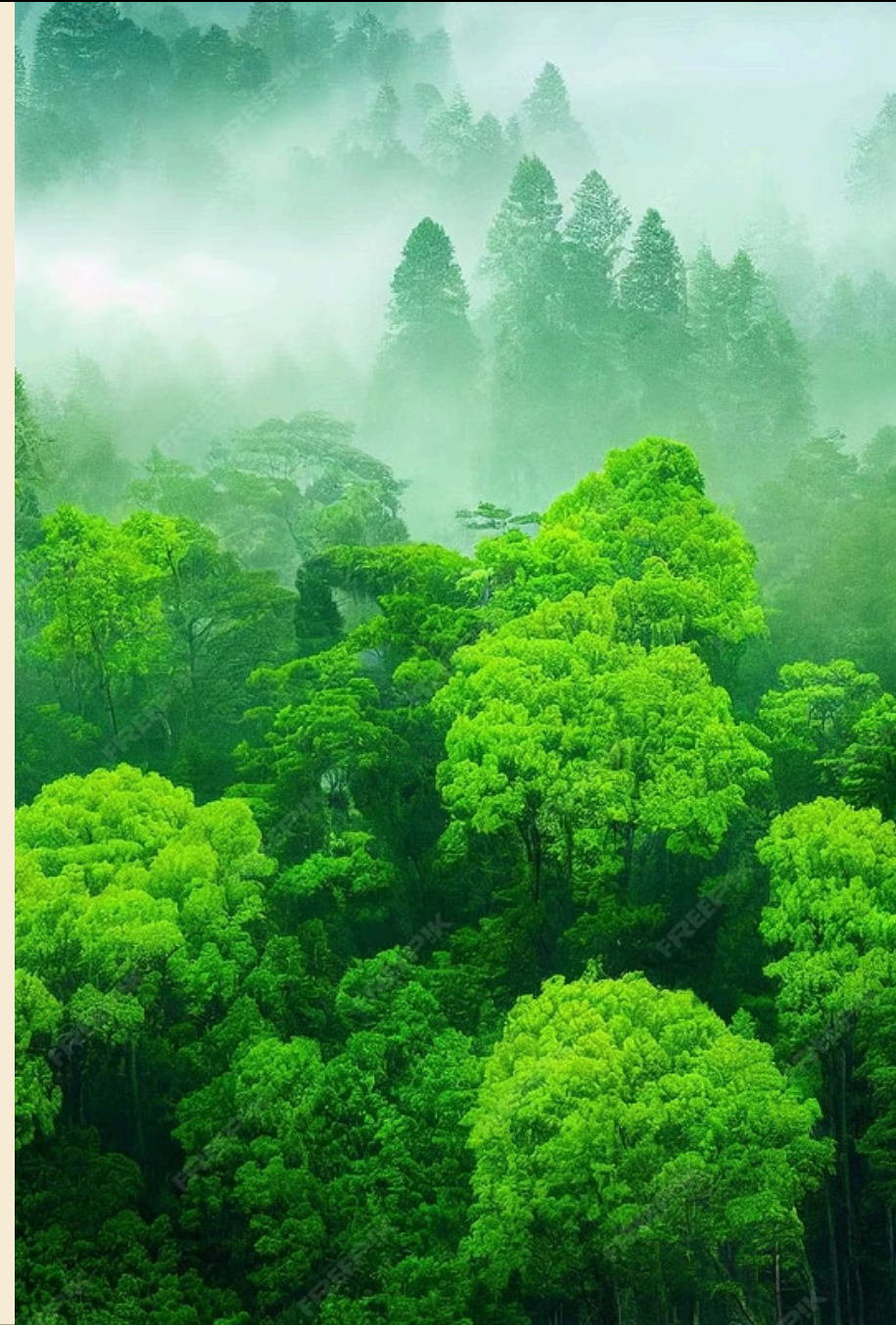


Photosynthesis

Good morning everyone, I'm Nicola Palmieri from the Natural Planet association, partner of the European project WAVE approved by the Erasmus+ KA 210 program. Today we delve into the process of photosynthesis and the fundamental role of CO₂ in life on Earth.





An Extraordinary Process

At the base of every form of life on our planet is an extraordinary process: photosynthesis. Through this chemical reaction, six molecules of carbon dioxide and six molecules of water, thanks to solar energy, are transformed into one molecule of glucose and six molecules of oxygen.

Total Dependence

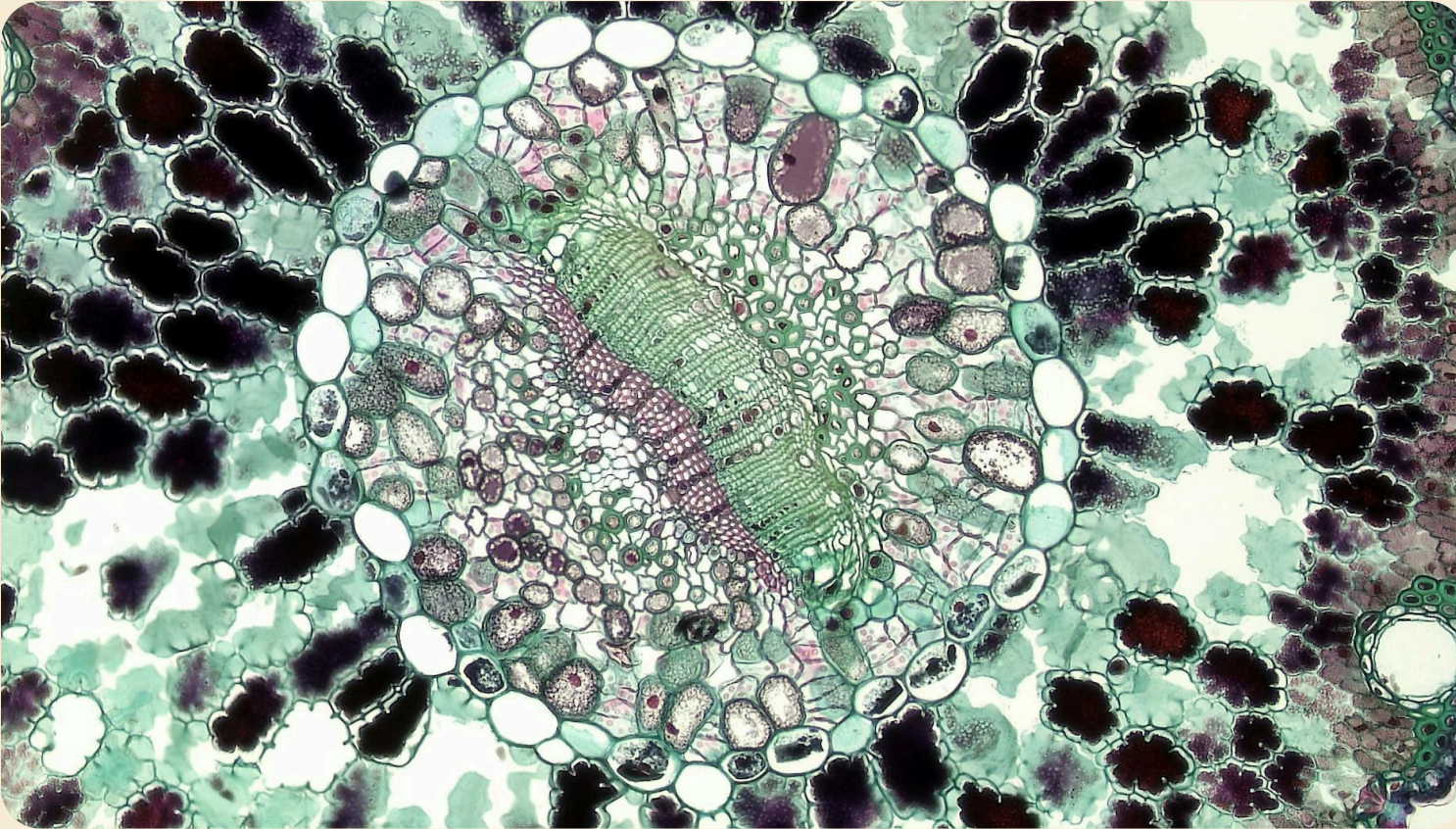
And this is why every form of life on Earth totally depends on plants: all organisms depend on autotrophs - cyanobacteria, plants, algae - but autotrophs do not depend on anyone for their basic existence.





Plants are the only link in the chain that doesn't need the previous link

The Miracle at the **Molecular** Level



But how does this miracle of nature work at the molecular level? Inside plant cells, we find chloroplasts, structures that contain chlorophyll, capable of absorbing blue and red light and reflecting green light - which is why we see plants in that characteristic color.

The Two Phases of Photosynthesis



Light-Dependent Phase

Solar energy splits water molecules, releasing oxygen and creating two precious energy molecules: ATP and NADPH.

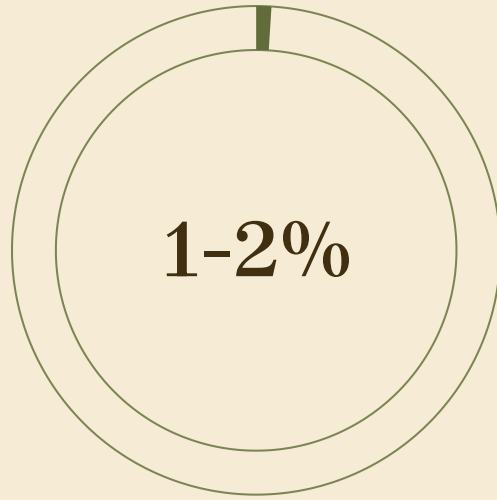


Light-Independent Phase

Also known as the Calvin Cycle - carbon dioxide is captured and converted into glucose, using the ATP and NADPH produced in the previous phase.

The process is divided into two distinct phases. During the light-dependent phase, solar energy splits water molecules, releasing oxygen and creating two precious energy molecules: ATP and NADPH.

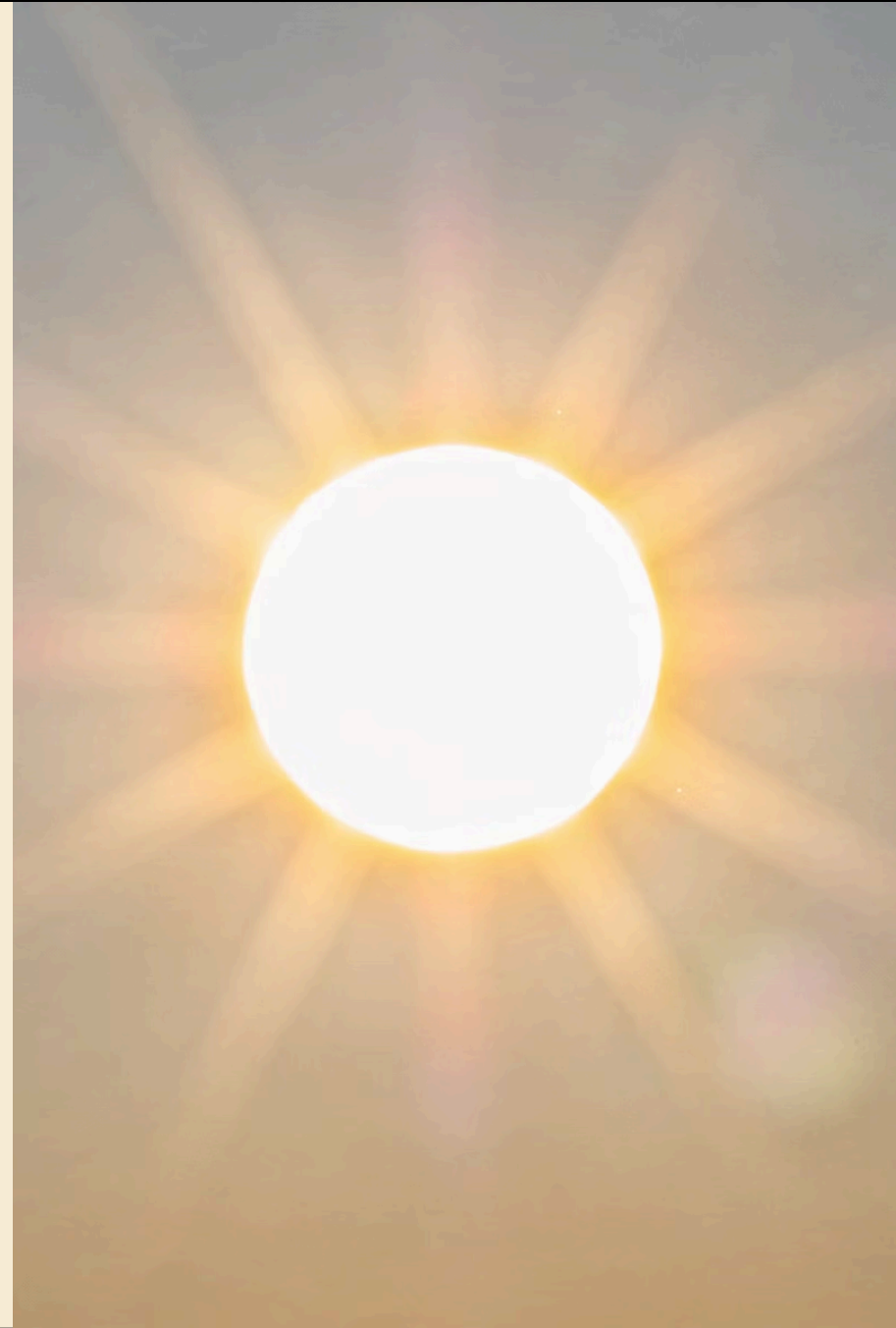
Subsequently, in the light-independent phase - also known as the Calvin Cycle - carbon dioxide is captured and converted into glucose, using the ATP and NADPH produced in the previous phase.



Energy Converted

Of solar energy is converted into plant biomass

A surprising fact: only 1-2% of solar energy is converted into plant biomass under real conditions, yet this small percentage is enough to sustain all terrestrial life!



A great misunderstanding about CO₂

Contrary to what is often thought, CO₂ is not a "pollutant" in itself, but is the essential raw material for life on Earth. It is a natural and vital component of the atmosphere.

The misunderstanding arises when one does not distinguish between CO₂ as an integral part of natural life cycles and the excess carbon dioxide released by human activities, which alters the climatic balance. It is the alteration of the natural carbon cycle, not CO₂ as such, that represents an environmental concern.

Without Carbon Dioxide

Without carbon dioxide, food chains would not exist:

CO₂ feeds plants, which convert solar energy into biomass.

This biomass (plant nourishment) is essential for all living organisms: first for herbivores, then for the carnivores that feed on them and finally for decomposers that recycle organic matter



The Fundamental Role of CO₂

Food Chains

Herbivores, carnivores and decomposers feed directly or indirectly on plants

Fossil Fuels

CO₂ stored by prehistoric plants over millions of years

Atmospheric Oxygen

The "waste product" of the photosynthesis process that we breathe



Fossil Fuels

Without CO₂, we would not have fossil fuels. These are the result of the transformation of prehistoric plant biomass, which grew thanks to photosynthesis converting CO₂ into organic matter. Over millions of years, this biomass transformed into coal, oil, and natural gas.