

How Plants Work

Whether we think about it or not we all enjoy and depend on plants for many things.

A few of them that come to my mind are oxygen which we need to breathe, all the food that we eat whether we get it directly or indirectly comes from plants, wood for our houses, medicines, even the paper you are reading this comes from plants.

As the extension forester for this county I am often asked how best to take care of trees. The problem is that many people don't even have a basic idea on how trees work. Without this basic information it is difficult to understand and help these living things.

So, how do plants live?

Unlike us, plants create their own food. No, fertilizer is not food for plants but instead plants are able to capture the sun's energy and use it to help create sugars which then basically drive the production of all the things that we get from plants. This process is called photosynthesis. The simple equation $CO_2 + H_2O \xrightarrow{\text{energy}} CH_2O + H_2O + O_2$ describes how plants take carbon dioxide and water and with the sun's energy convert these molecules to sugars, water and oxygen. This gives us humans two things, sugar (food) and oxygen which we breathe when we carry on respiration.

Respiration is the process where we humans and plants break down the sugars created by photosynthesis back into energy. The chemical equation for respiration is basically the opposite of photosynthesis $CH_2O + H_2O + O_2 \xrightarrow{\text{energy}} CO_2 + H_2O$. Plants carry on respiration in all their living cells except those actively carrying on photosynthesis. If respiration stops in a cell that cell will die. If enough cells can't get food, oxygen or water respiration stops and a whole plant can die. This occurs in us as well. If you don't believe me just stop breathing and taking in oxygen.

The leaves are where the plants absorb the sun's energy to carry on photosynthesis. This is light energy. The green light is the least useful so the plant reflects that light away and absorbs the red and blue light energy. Also through the leaves, the plants absorb and release oxygen and carbon dioxide.

The roots of the plant not only anchor the plant but also absorb water and essential elements. Essential elements are often described as food for the plant. This is incorrect because they supply no energy to the plant. Instead they are essential to the plant for metabolic processes and as part of the building blocks of plants. For instance iron is used in photosynthesis and respiration, nitrogen is a basic building block for proteins and calcium is used in cell walls and cell membranes.

The other main part of most land plants are their stems which of course elevate the leaves and transport food, water and essential elements up and down the plant. Remember the words xylem and phloem. The xylem moves the essential elements and water and the phloem moves the sugars (food).

Plants are more complicated than this brief description, but it is always good to take a moment and reflect on how they work. Then we can better manage our plants to keep getting the things that they provide for us.

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