

The blood of plants

During the Highlife-edition of 1999 we followed the way of the nutrition water from the plant medium through the roots and stem to the leaves.

Step 1:

The water with the solved nutrition is passively (without using energy) in the outer roots region, the composition of the water and nutrition are the same as in the plant medium (directly controllable)

Step 2:

The water passes the root cell through the cell wall, the nutrition particles are preselected, some may get through and others are actively let outside. Here we also can support the plant, by giving it a good nutrition in the right concentration so it has less sorting to do. Making the selection itself costs energy.

Step 3:

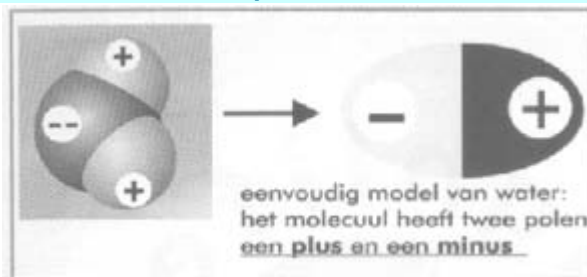
The water and the selected nutrition particles flow to the central cylinder in the stem (the highway up) through the root cells.

Step 4:

The motor of the constant flow up is the evaporation (and so the disappearance) of the water through the leaves. So up there is a lack of water (a low pressure area) and this is compensated immediately by pumping up water out of a lower level. Because also in a normal climate, water is always evaporating and lead by the roots, the plant-juices are permanently in movement.



Water, the blood of plants



At first sight the flow in the plants looks like the blood circulation in human beings and animals. In us there is also a constant stream of live juices flowing, the blood and the nutrition of the intestine region also flows to all parts of the body. The flow never stops, as long as you are alive and healthy. Like in the central cylinder of the plant the blood flows in a closed blood vessel and also in one direction. We say a plant is bleeding (for instance an injured tree) if the plant-juices leak outside. But

there are clear differences visible. We have a complete other motor than the plants. Instead of evaporation, we need a permanent pumping muscle, the heart. This is necessary because we move, lay down or even stand on our heads. But the principle of the plant is just as effective, surprisingly simple and energy saving in use. Blood exists of many fixed elements, which are also coloured. The stem juice on the other hand exists mainly out of water and solved nutrition salts. It sounds very simple, but it is more complex then what it seems now.

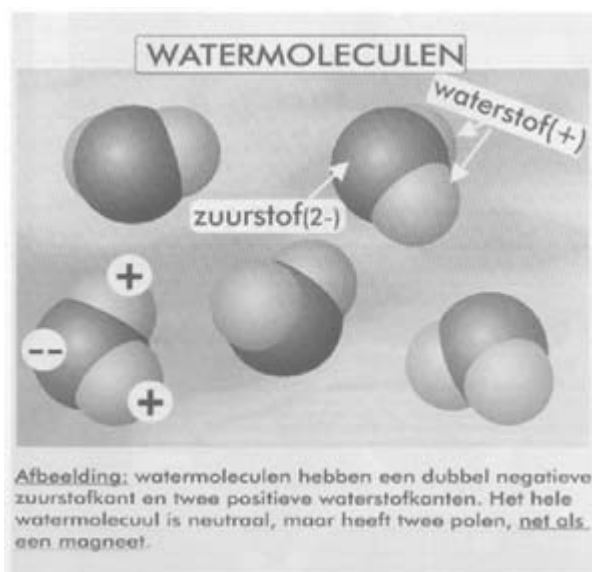
Because water's not just water.

Water in the stem juice has four functions and can take shapes that change the qualities for 100%. The water in the plant is indeed comparable with the complex functions of the blood of humans and animals.

Water as a matter of transport.

Transport is the most important function of the water. It is a matter of transport, an organ, to keep the life-flow fluid (evaporation - roots sucking power - continuing).

Water as a factor of stability



Water is also a factor which gives stability in the plant. We all know the phenomenon that if the plants have a short time lack of water, they go limp. We can imagine the plant as a model with thousands of balloons, filled with water. If the plant gets a shortage of water, it uses the stabilisation water from the balloons, because it can be missed before the plant gets damaged. The water what keeps the flow going can not be missed for a second. If there is enough water, the plant fills the balloons (the cells) again. A shortage of water of a short length is reversible by this system and the plant has a water-buffer and an extra surviving-factor build in. Also in our bodies, not only the bones keep it stable, but especially the cells filled with high water pressure. All our cells diminish during the years and we will get wrinkles.

Water as raw material for metabolism.

A part of the water on its way up, is used in the metabolism of the cells for the construction of matters like sugar. A part of the flow is constantly lost on its way.

Water as a solvent for nutrition and other salts.

If we solve salts in water they disappear in the fluid and are not visible. All salt exists out of a positive and a negative part. If the salt solves in water, the water molecules go around the salt particle and protect it on the outside.

That is why the plus and minus parts swim divided of each other in the water. Water can be seen as a big accumulation of little magnets, with a plus and a minus pole. If salts solve in water, the water molecules turn their minus poles in the direction of the positive salt particles and the plus poles in the direction of the negative salt particles. These are surrounded by a circle of water magnets and are for others not visible any more and they do not feel the force of attraction of other salt particles.

The water molecules that surround a salt particle are connected to this salt and are not available for transport and metabolism. This binding water can also not evaporate and not freeze and does not have the properties of common water. Some winter hardy plants use this phenomenon to, in spite of very low temperatures in winter, prevent freezing. During the wintertime they increase the concentration of for instance glycerine in the plant juice, so all water is used for this. Because all water is used, the juice cannot freeze. The antifreeze in our cars works in the same way.

Consequences for the grower

If we give a plant too much nutrition, it gets damaged. That is because all water molecules are used to solve the nutrition. The water is linked and can not perform its functions like transport, metabolism and stability. Maybe it is getting clear why a plant that had too much (or wrong) nutrition limps. We say, it is burned, and this is right, because the plant has no water left anymore.

To keep a plant healthy, we have to support the perspiration (the heart of the flow) optimal by keeping the conditions of the climate in the right level (warm, but not over 30 Celsius, give warm water, and not iccold tapwater, give nutrition regularly). React directly if a plant is showing symptoms of dehydration. Think if you might give the plant too much nutrition. All matters the plant does not need (like sodium or chloride) use the valuable transportwater in the stem, without having a function for the plant. Think if the plants are constantly not growing well, if the tap water has a lot of matters you do not need (like sulphate etc.), is this so then mix the tapwater with osmoses water. Think of pH-corrections, these bring many salts into the nutrition barrel. Measure the EC only if all matters are in it. The younger a plant is, the less it can bear an excess of salt, the highways are not very broad and a lack of water starts easily. The better the flow and perspiration in the plant is functioning, the more light and nutrition it can use. But a little too much is always more dangerous than a little too less.