



TREELIUM

T-Sonik GH





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T-Sonik GH is a device that works on the principle of hydrodynamic activation and is indicated for field and greenhouse irrigation, since it facilitates and increases growth in tree and shrub cultivations. The passage of the fluid inside of the activator, thanks to the geometry and the delivery pressure, generates high frequency mechanical oscillations thus producing ultrasounds. The particular frequency generated, has a direct effect on the water providing the following benefits:

1

WATER OXYGENATION

2

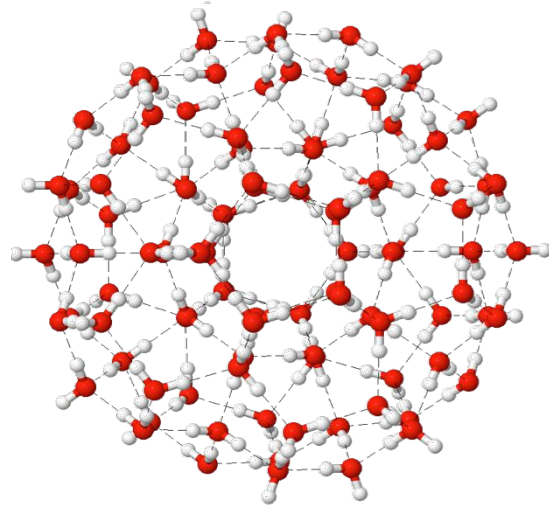
HIGHER SPEED OF
NUTRIENT SOLUBILITY

3

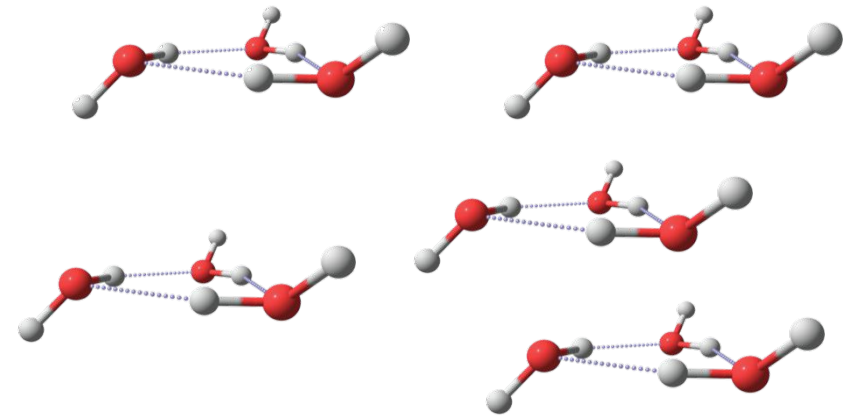
REDUCTION OF
VISCOSITY



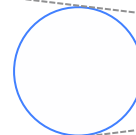
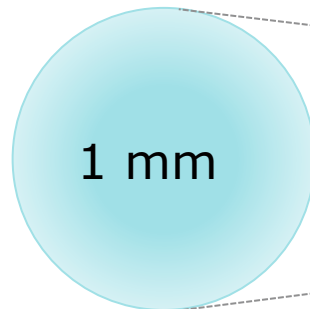
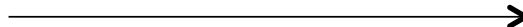
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ACTIVATION



MICRO NANO BUBBLES



Micro nano bubbles 0.1 μm



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1

WATER OXYGENATION

Water contains dissolved oxygen (O_2) that constitutes one of the natural contaminants. Aquatic animals, such as fish and zooplankton, breathe precisely by using up the dissolved oxygen.



The dissolved oxygen, usually abbreviated SO_2 , is a chemical parameter that is used to characterize the suitability for life and the level of pollution of a water system. The hypertrophication and the establishment of certain redox equilibria are the main causes of a decrease in dissolved oxygen. The solubility of oxygen depends on several factors, of which especially noteworthy are: Henry's law, the amount of salts in the solution and the temperature.

At a temperature of 20 ° C and atmospheric pressure, an oxygen concentration in fresh water of 9.1 mg / L corresponds to 100% saturation; values below 75% are an indication of pollution. At higher temperatures, the maximum possible concentration decreases.



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1

WATER OXYGENATION



Plants can undergo various types of stress.

Among the most harmful and dangerous is definitely root asphyxia due to waterlogging, caused by an abundance of rain that has saturated the soil, by an upshift of groundwater from beneath or by incorrect irrigation.

Root suffocation, which can be partial (hypoxia) or total (anoxia), manifests itself as a lack of oxygen in the soil. In conditions of stagnant water in the soil, it is the water that occupies the spaces previously filled with air: oxygen therefore remains present only in the first few top layers of the soil.

In particular, the concentration of air depends on various factors, among which the texture of the soil and its drainage capacity. Moreover, where the water stagnation extends for a long time, you could also verify an increase in the concentrations of some potentially toxic substances (sulphide, methane, ethane, aldehydes ...) produced by anaerobic bacteria.

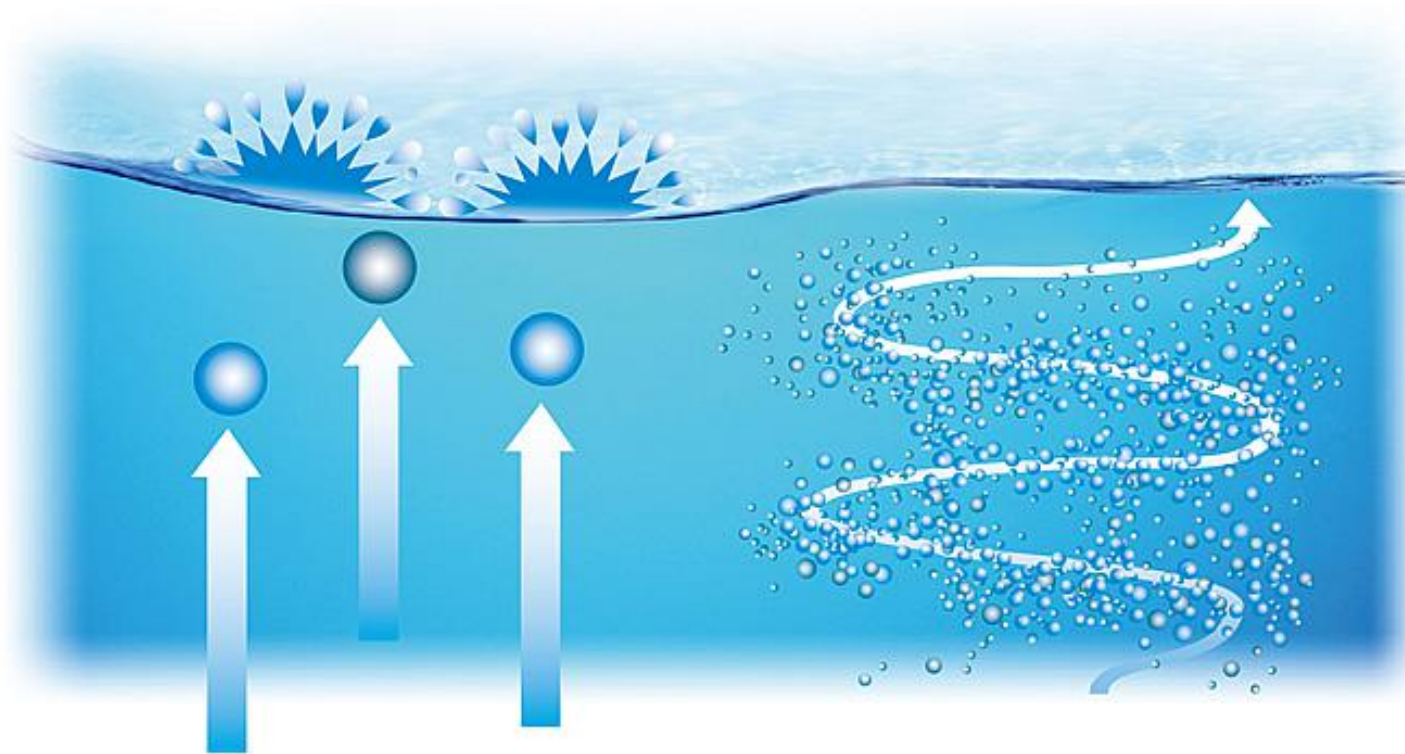
In this hostile environment the apical roots initiate processes of anaerobic respiration and accumulate acetaldehyde and ethanol in the tissues and in the rhizosphere; abscisic acid and ethylene are synthesized thus causing the stomata of the leaves to close and a significant reduction in photosynthesis.



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1 WATER OXYGENATION

T-Sonik GH is able to produce micro and nano bubbles of air that due to their size and negative surface charge do not coalesce, and they then dissolve in the water instead of degasifying on the liquid's surface.



Ascent rate: 25 cm / s

Ascent rate: 0.1 cm / s

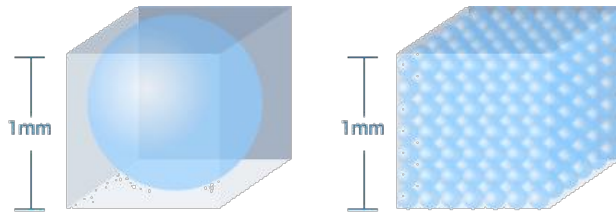
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1 WATER OXYGENATION

Micro nano bubbles are air bubbles with a size of less than 50 μm . Their generation allows the size reduction of normal air bubbles up to dimensions that modify the fluid's properties, giving it characteristics that are quite different compared to its original form.



The main characteristics that define the micro and nano bubbles are:

- Size from 50 to 0.1 μm .
- Slow ascent in a liquid.
- High gas-liquid exchange surface.
- Negatively charged surface.

Thanks to the above mentioned characteristics the micro and nano air bubbles have a high stability in the liquid, allowing them a greater permanence time and a dissolution which completely takes place in the water and not on the liquid-air interface. The water will have a slow release supply of oxygen which eliminates potential problems with root asphyxia.

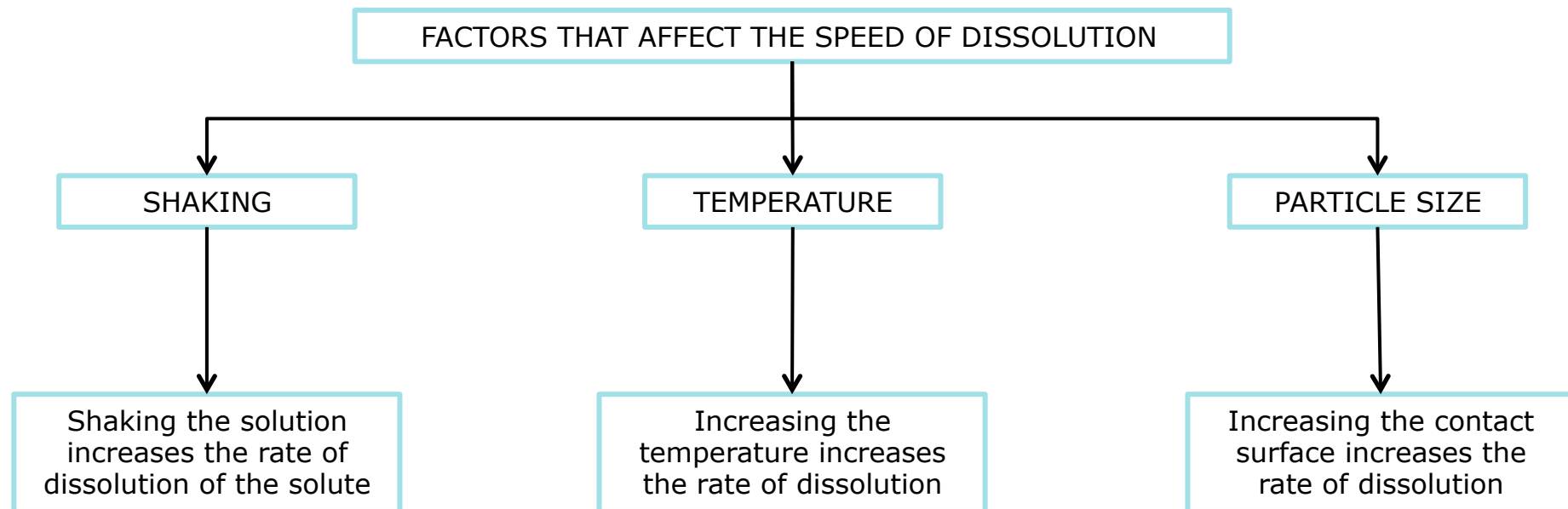


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2

HIGHER SPEED OF NUTRIENT SOLUBILITY

The plant absorption rate of a nutrient depends on its rate of dissolution in water and its rate of diffusion through the membranes.



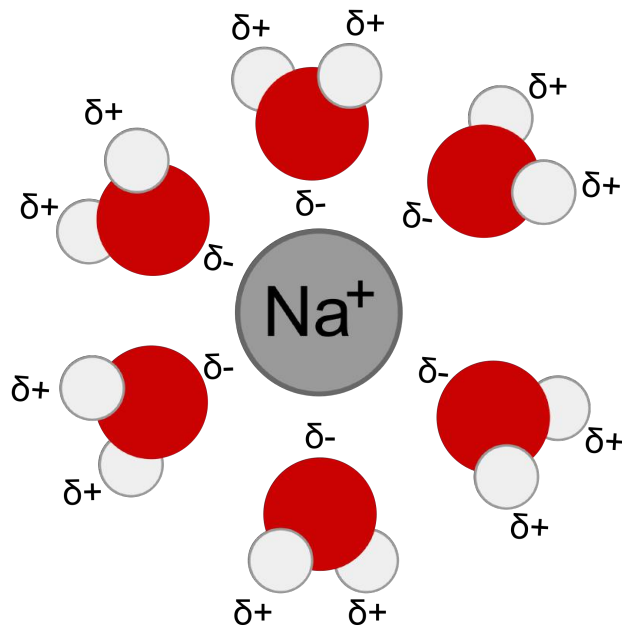


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2

HIGHER SPEED OF NUTRIENT SOLUBILITY

A solution is a homogeneous mixture in which one or more substances are contained in a liquid, solid or gaseous phase that contain different mixed, and uniformly distributed, particles in the available space so that each volume of solution has the same composition of the others.



The water molecule has polar characteristics, in other words it has areas of partial negative charge and areas of partial positive charge. So water can interact with polar molecules, thus managing to disrupt the crystalline build.

In the case of ionic compounds, the polar molecules of the solvent surround the salt crystals that are transferred in the form of solvated ions.

For polar solutes, the phenomenon of dissolution takes place because of the mutual attraction between the opposite charges of the dipoles of the solute and solvent molecules.



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2 HIGHER SPEED OF NUTRIENT SOLUBILITY

The mathematical models used to describe the process of dissolution (the reverse of crystallization), are based on the equation found in 1897 by Noyes and Whitney:

$$\frac{dq}{dt} = K S_s (C_s - C)$$



where:

q = amount of solid released in time t ;

k = proportionality coefficient;

SS = specific surface of the particles dissolved;

CS = maximum saturation concentration (solubility of the active ingredient);

C = concentration of the solid in the biological fluid (between 0 and CS).

The equation shows that whilst the solubility of a solid form remains constant, the diffusion rate can be varied considerably by increasing the breakdown of the solid into smaller particles. More specifically, if the dimensions of the particles have an order of magnitude of micrometers, there is also an increase in solubility (linked to the increase of solid-liquid interactions).



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2

HIGHER SPEED OF NUTRIENT SOLUBILITY

Thanks to the activation process, T-Sonik GH manages to obtain many groups with a lower number of solvent molecules thus increasing the specific surface area between water and nutrients.

To increase the speed of solubility one normally tries to pulverize the solid phase as much as possible; in this case one increases the exchange surface by acting directly on the solvent.
During irrigation, this allows the solution salts to be distributed much faster and make them available for plants in the shortest time.

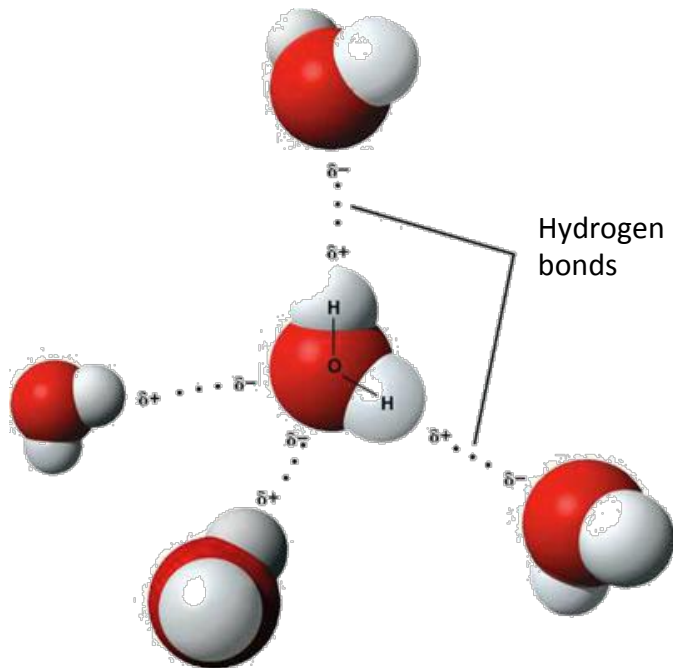




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3 REDUCTION OF VISCOSITY

A water molecule is an electric dipole. This electric dipole is large enough to allow water to orientate in an external electric field. For reasons linked to the distribution of electrons around the atom of oxygen the water molecule cannot take a linear form.



Due to the polarity, the water molecules tend to unite with the so called hydrogen bridge bonds with the possibility of forming 4 bonds with the same number of water molecules.

From here on they start forming "clusters" which can rotate between themselves around the bridge bonds, determining various spatial configurations.

The phenomena and characteristic properties of water, that make it so different from all other liquids existing in nature, are explained precisely with the hydrogen bridge.

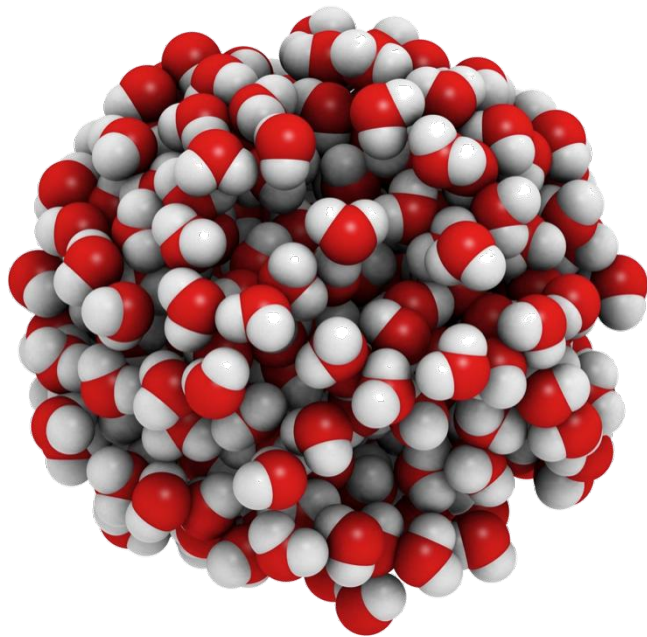


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REDUCTION OF VISCOSITY

The hydrogen bond is weaker than the covalent one but it allows more water molecules to join together via dipole-dipole interactions. This phenomenon, through an extensive network of bonds, generates different crystalline forms called **CLUSTERS**.



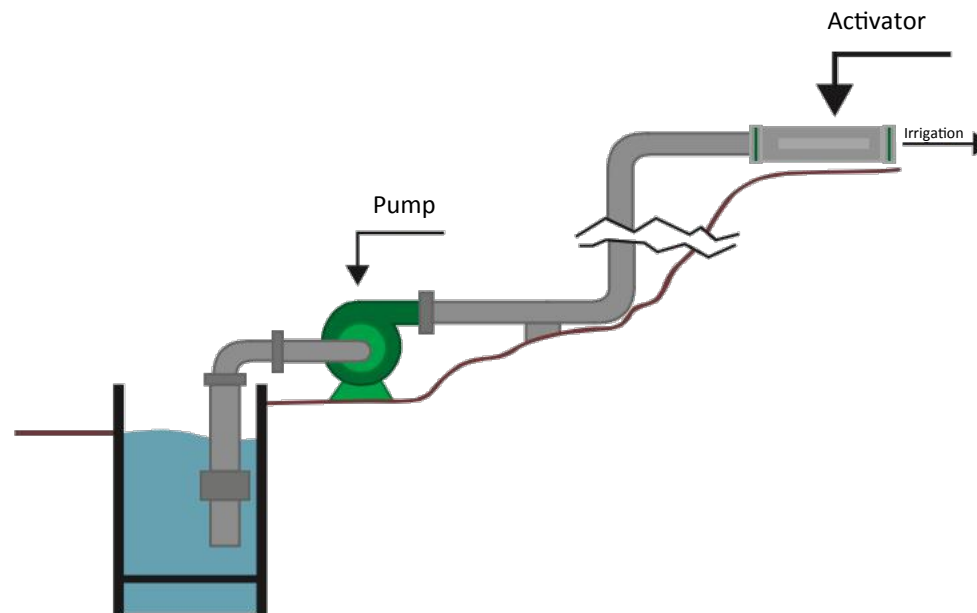
This cluster structure is the main cause of the physical characteristics of water, like viscosity and surface tension. The activation determines the breakdown of the crystalline form, simplifying the structure and consequently reducing the forces responsible for the physical parameters. The lower viscosity allows the roots to absorb water more easily, facilitating the delivery of nutrients to the aerial organs.



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INSTALLATION AND MAINTENANCE

T-SONIK GH must be inserted on the irrigation piping.



It requires no regular maintenance nor replacement of parts.
T-Sonik GH does not change the original chemical composition of water.



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T-SONIK GH DEVICES

Type	L (mm)	D (mm)	G (inches)	Min flow rate required (l / min)	Max Pressure (bar)
GH 1"	365	33.7	1	9	50
GH 2"	590	60.3	2	19	50
GH 3"	850	88.9	3	30	50

The minimum flow rate required is an indispensable condition to guarantee the water activation by the device.

All T-Sonik GH devices are made entirely of AISI 304 or 316 stainless steel



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KEY BENEFITS T-SONIK GH

1 WATER OXYGENATION

Oxygenation of water with the input of micro and nano bubbles that completely dissolve in the liquid removing its root suffocation.

2 HIGHER SPEED OF NUTRIENT SOLUBILITY

Easier to dissolve nutrients, making them quickly available to roots and aerial organs.

3 REDUCTION OF VISCOSITY

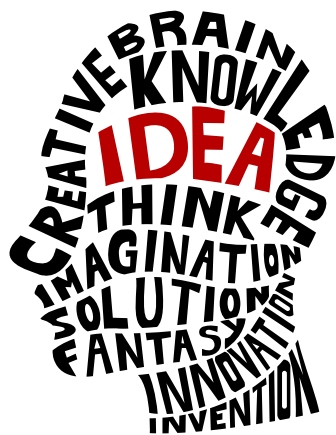
Lowering the viscosity allows the roots to absorb the solution of water and nutrient more easily, making it readily available to all organs.

These conditions allow crops and trees to grow faster ensuring a quicker maturity and a higher yield.



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T-Sonik GH is a product patented by TREELIUM SA and certified by internationally accredited laboratories.



TREELIUM continues to invest in Research & Development both in terms of human and economic resources to find new areas of application for existing products and develop new ones for the future.

Our mission is to increase productivity by optimizing processes, reducing consumption and protecting the environment.

TREELIUM is on the market as an ideal partner for the supply of systems and applications in a global market where continuous technological innovation is the basis for sustainable economic development.

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*"Agriculture is an alliance between man and earth
in which water balances the donor and the
recipient "*

