

# Hydrogel:

An efficient tool  
to achieve high  
productivity



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A close-up photograph of a white, porous, and irregularly shaped hydrogel material.

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# What are Superabsorbent Polymers?

## Definition

### Polymers

- Polymers are macromolecules formed from smaller structural units (monomers).
- Monomers are molecules of low molecular mass which, from the polymerization reactions, come to generate the polymeric macromolecule.

### Superabsorbent Polymers

- The superabsorbent polymer can absorb and retain extremely high quantities of a liquid in relation to its own mass.
- Polymers that absorb water, which are classified as hydrogels. They absorb aqueous solutions by bonding hydrogen with water molecules.

Source: Ma, X., Wen, G. 2020. Journal of Polymer Research 27:136. doi: 10.1007/s10965-020-02097-2 | Vandenberg, E. J. 2012. Contemporary Topics in Polymer Science. Vol. 5. New York: Springer Science



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# What are Superabsorbent Polymers?

Absorbent vs. Superabsorbent



## Absorbent Fiber

- The liquid is often kept mainly on the surface or in cavities/empty spaces
- The liquid is released when pressure or high temperatures are applied
- Poor stability



## Superabsorbent

### STOCKOSORB® 660

Absorbs and releases water to plants

- The liquid is mainly kept within its molecular structure
- Does not release the liquid under pressure
- It is designed to release water to plants
- Stability (absorption and desorption cycles)



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# What are Superabsorbent Polymers?

Applications (examples)



## Absorbent

- Sponge
- Paper
- Plantation fiber
- Cellulose fiber
- Cotton
- Towel



## Superabsorbent

- Water retention for plant supply
- Controlled release of insecticides and herbicides
- Fire retardant
- Dust control on dirt roads
- Artificial Snow
- Diapers



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# Why use Superabsorbent Polymers in the planting of different crops?



Decrease in plant mortality rate



Plants hydrated for a longer period



Greater root development

Plants with a better development, consequently higher productive potential

With **STOCKOSORB®**



Without **STOCKOSORB®**



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# Why use Superabsorbent Polymers in the planting of different crops?

Possibilities of applications

### Pre-Hydrated



### Via Irrigation



### 3<sup>rd</sup> Planter Box



### Mix with Fertilizer



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# Why use Superabsorbent Polymers?

## Water Stress

- Less resistance to drought
  - Difficulty of development
- Plant more susceptible to attacks of pests and diseases
- Lower production potential
  - Shallow roots
- Lower formation and development of secondary roots



## High Productivity

- Drought resistant plant
- Sturdy plant
- Higher resistance to pest and disease attack
- Greater production potential
- Greater development of roots and deeper roots
- Greater formation and development of secondary roots



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## Hydrogel:

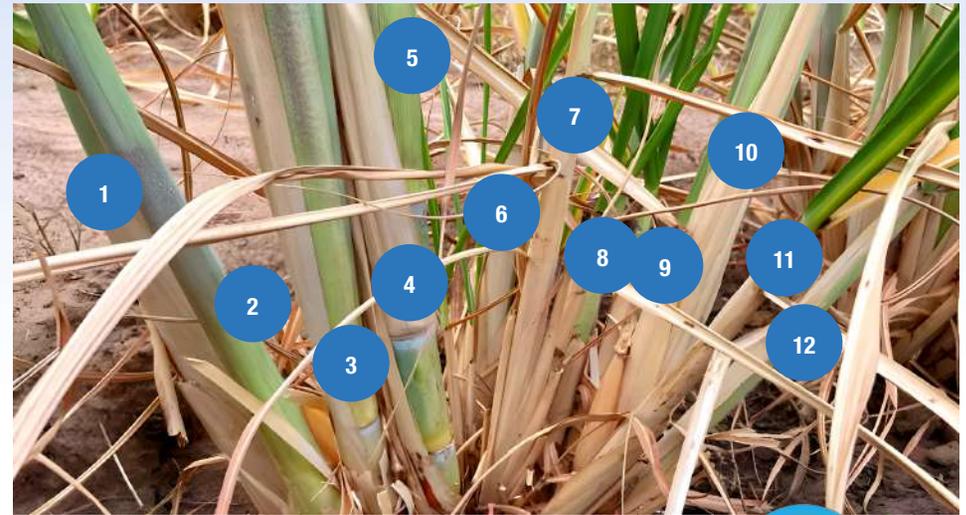
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# Evaluation 186 Days After Planting

Without **STOCKOSORB®** Medium



With **STOCKOSORB®** 660 Medium



*Increase of 71% in the number of tillers!*



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# Evaluation **186 Days** After Planting



With **STOCKOSORB® 660**



With **STOCKOSORB® 660**



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# STOCKOSORB® 660

## Description

**STOCKOSORB® 660** - Is a homopolymer based on acrylic acid and potassium (does not contain acrylamide). It is a water-insoluble superabsorbent, cross-linked and partially neutralized with potassium. This product has been specially designed for use in agriculture

**STOCKOSORB® 660** - Is a soil conditioner specifically designed and developed for water and nutrient retention in soil

The water absorption capacity of **STOCKOSORB® 660** is determined by the quality of the water and the type of soil. Therefore, the water holding capacity in the soil varies between **150 to 300 times its weight**.

Dry SAP  
Particle



Water



Hydrated  
"Swollen" SAP

**SAP** = Super Absorber Polymer  
with microscopic ducts  
in the whole particle



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# STOCKOSORB<sup>®</sup> 660

## Applications

Agriculture



Horticulture  
Fruits, Veggies



Landscaping  
and  
Gardening



Forestry



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# STOCKOSORB<sup>®</sup> 660

## Top 10 Benefits



1. Improves water and nutrient storage capacity in the soil
2. Increases the availability of water and nutrients for plants
3. Enables reducing the frequency of irrigation
4. Improves water infiltration and decreases runoff
5. Reduces soil erosion and fertilizer leaching
6. Improves the survival rate of plants
7. Promotes uniform plant growth and development
8. Promotes greater root growth
9. Greater stability in production
10. Higher productivity



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# STOCKOSORB® 660

## Particle Sizes

**STOCKOSORB® 660** is available in different particle sizes for recommended applications and available equipment:

Product	Particle Size (mm)	Recommended for
<b>STOCKOSORB® 660 XL</b>	2.0 - 4.0	E.g. in combination with granular fertilizer
<b>STOCKOSORB® 660 (Medium)</b>	1.0 - 2.5	E.g. landscaping (grass), direct application on soil, soil amendment
<b>STOCKOSORB® 660 (Micro)</b>	0.1 - 1.0	E.g. forestry
<b>STOCKOSORB® 660 (Powder)</b>	< 0.2	E.g. bare root plants



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# STOCKOSORB® 660

Ecotoxicology



**STOCKOSORB® 660** is environmentally safe

Ecotoxicological tests were performed in laboratories certified according to the rules of “Good Laboratory Practices (GLP)”.

There is no evidence of adverse effects of **STOCKOSORB® 660** on animals, plants, soil or groundwater.

Thus, **STOCKOSORB® 660** is *non-toxic* and environmentally safe, as it will not contaminate plants, soil or groundwater.



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# STOCKOSORB® 660

Ecotoxicology



**STOCKOSORB® 660** is susceptible to mechanical, physical, chemical and biological degradation

Will be degraded to safe products such as: potassium oxide, carbon dioxide and water

The degradation occurs without any negative or toxic effect to the soil and/or microorganisms.



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## Positive Effects

Increases the survival rate during the establishment of crops

Reduces surface water runoff and soil erosion

Enables reducing the frequency of irrigation and consequently the costs with irrigation

Enables strong and healthy growth of plants and roots, growth under hot and dry conditions

Prevents loss of water and nutrients by deep percolation and nutrient leaching

Increases the quality and quantity of the crop production

It has available potassium for the plant (~20% K<sub>2</sub>O)

Improves soil structure, water retention capacity available in the plant, aeration balance and soil structure

Increase of CEC (Cation Exchange Capacity) in the micro-region where it is applied (3.100 – 5.100  $\mu\text{cm}^2$ )



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