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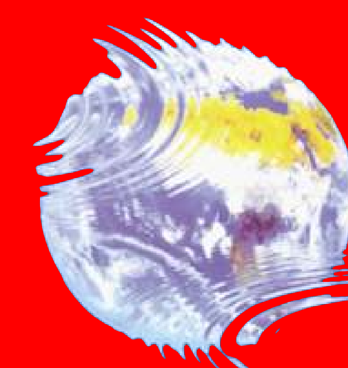
AQUASORB™

Water retainers for Soils and Substrates



AQUASORB™ *Water retainers for Soils and Substrates*

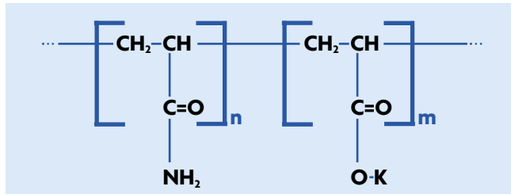
Human activities require more and more resources - among them water is certainly the most precious. Modern agriculture consumes almost two thirds of the waters pumped worldwide. For this reason, more and more people are seeking ways to conserve it.

AQUASORB is a water retainer that, when incorporated into a soil or a substrate, absorbs and retains large quantities of water and nutrients. Unlike most products that become hydrated, **AQUASORB** has the property of easily releasing the absorbed water and nutrients, thereby allowing the plant to have water and nutrients available at will as a function of the absorption - release cycles.

AQUASORB:

- Increases the Water Holding Capacity of soils for several years. Irrigation frequency may be reduced by 50%.
- Limits losses of water and nutrient due to leaching.
- Reduces evaporation from the soil.
- Improves the physical properties of compact soils through good aeration.
- Enhances plant growth. Water and nutrients are continuously available in the root zone for optimal absorption by plants.
- Protects the environment against drought and groundwater pollution.

COMPOSITION



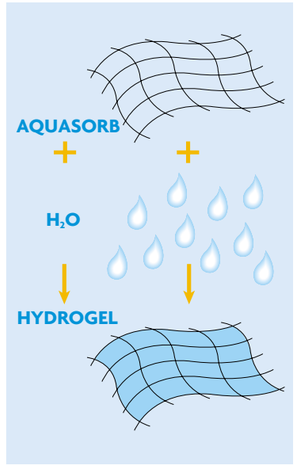
AQUASORB is a range of superabsorbent anionic polyacrylamide polymers. They are crosslinked copolymers of acrylamide and potassium acrylate that are water insoluble.

AQUASORB products have the property of absorbing up to 500 times their weight in distilled water and they become gels.

HOW IT WORKS

The polymer consists of a set of polymeric chains that are parallel to each other and regularly linked to each other by cross-linking agents, thus forming a network. When water comes into contact with one of these chains, it is drawn into the molecule by osmosis. Water rapidly migrates into the interior of the polymer network where it is stored. As the soil dries out, the polymer releases up to 95% of the absorbed water into the soil.

The quantity of cross-linking agent enables modification of the polymer network:



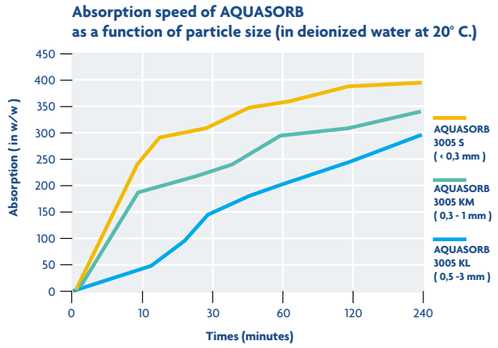
- The more the polymer is cross-linked, the tighter the network. Thus absorption capacity decreases but the polymer remains more stable over time.
- Conversely, the less cross-linking there is, the looser the network. Absorption volume increases, but stability is reduced.

PERFORMANCES AND ADVANTAGES

AQUASORB is offered in different particle sizes of which the absorption and release capacities vary depending on the conditions in the soil environment.

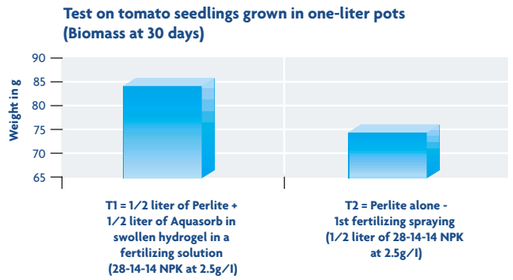
An outstanding absorption capacity

In general, the finer the particle size of the polymer, the greater its absorption capacity and speed.



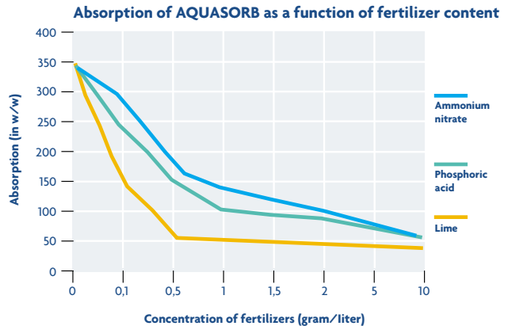
A buffering effect on the availability of fertilizers

AQUASORB significantly reduces the leaching of fertilizers because they are stored in the network. The fertilizers are available to plants for a longer time due to a delay effect on their release.



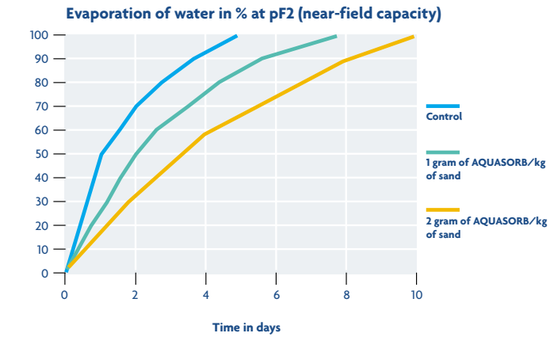
The influence of salts

The presence of electrolytes in the aqueous medium significantly diminishes the absorption capacity of **AQUASORB**. This explains the fact that the water holding capacity of **AQUASORB** in a substrate varies around 100-150 times its weight.



The wilting point is delayed

AQUASORB makes it possible to increase the Water Holding Capacity of soils and to delay the wilting point. A sandy soil treated with 2 grams of **AQUASORB** per kg of soil holds water twice as long as untreated soil.



ARBORICULTURE

AQUASORB is effective in the planting of trees, bushes, and samplings. It makes it possible to reduce the mortality rate due to transplanting shock and to enhance root development and therefore bring about more rapid growth and production.

- Dig a hole about three times the volume of the root system.
- Mix 1 to 2 kg of **AQUASORB** per m^3 into the earth fill.
- The polymer must be evenly mixed into the excavated soil. A small amount of untreated soil must be set aside.
- Place the root ball of the plant at the bottom of the hole and fill in the hole with the treated soil. Make sure that the product is distributed evenly around the roots. Then cover the surface with 5 cm of untreated soil to prevent degradation of the polymer by ultraviolet rays and stagnation of water on the surface.
- Be especially careful not to put unmixed dry product at the bottom of the hole. After hydration, the product would destabilize the plant.

Recommended SNF products:

AQUASORB 3005KM in coarse soils
AQUASORB 3005KL in fine soils
Dosage: 1 to 2 kg/m^3 of soil

LAWNS AND SOD

Water retainers are very easily used throughout the growth cycle of lawns and sod. They ensure good germination, faster root development, and regular and even growth of lawns. The rooting of sod is also faster. They are widely used in landscaping for golf courses and grass in parks and gardens.

- Work, break up, and level the soil to be planted with grass.
- Spread **AQUASORB** on the surface of the soil. The polymer may be broadcast or applied with a fertilizer spreader for a more even distribution.
- Work **AQUASORB** into the soil to a maximum depth of 10 cm. This can be done by hand with a spade or mechanically with a disk plow or a rototiller.
- Seed the lawn or lay the sod. Roll the soil to compact it.
- Use fertilizers if needed.

Recommended SNF product:

AQUASORB 3005KM
Dosage: 20 to 50 g/m^2

HYDROSEEDING

AQUASORB is commonly used in hydroseeding to stabilize newly graded soils. Mixed with or without cellulose mulch, it makes it possible to maintain a minimum of surface water, which permits rapid sprouting of seedlings even in dry areas. The vegetation cover develops uniformly and rapidly over the whole treated surface. There are no dry spots without grass.

The other advantage of **AQUASORB** is that it prevents cellulose mulch from becoming hardpan during a dry spell. The mulch remains aerated and allows the seeds to sprout quickly. **AQUASORB** also makes it possible to reduce the amount of mulch.

- **AQUASORB** must be added last to the hydroseeder tank, after the other components: seeds, fertilizers, mulch, etc.
- Stir at least 15 minutes before spreading.

The following components will normally be required to treat one hectare:	
Water	6000 to 10000 liters
Seeds	200 kg
NPK	200 - 500 kg
Colloidal fixative (FLOBOND A30)	3 - 5 kg
Cellulose mulch and/or AQUASORB	400 - 1200 kg 10-15 kg

Amounts are to be adjusted based on soil type, slope of the terrain, plant needs, weather conditions, etc.

Recommended SNF products:

Aquasorb 3005KM or KC
Flobond A30

BARE ROOT DIPPING

AQUASORB can be used for root dipping in order to prevent the desiccation of the roots of seedlings during transplanting or transport over a long distance.

The dressing is prepared as follows:

- Mix 1 kg of **AQUASORB** in 150-200 liters of water. Amounts vary depending on the salinity of the water.
- Slowly pour in the product while stirring the water to obtain a dressing without dumping of particles.
- Let the dressing stand for 15 minutes, the time needed for **AQUASORB** to reach its maximum absorption. It is important to obtain a dressing that will adhere completely to the roots. The longer the maturation time, the thicker the dressing will be and the better it will adhere to the roots.
- A water-soluble nematocide and/or fungicide may also be added to the preparation to protect plants against nematode and fungal attacks.

Recommended SNF product:

AQUASORB 3005S
Dosage: 1 kg in 150 to 200 liters of water

AQUASORB™ *Water retainers for Soils and Substrates*

SOIL MIXES

Mixed into a substrate, **AQUASORB** provides a reduction in water stress. It ensures that cuttings and transplants take root better and that seedlings grow faster. Irrigation frequencies are spread out. It is an ideal solution in substrates for containers, hanging plants, and houseplants.

Watering frequencies are commonly reduced by 30% to 50%, which likewise reduces labor costs and the amount of water used.

- Evenly mix **AQUASORB** into the substrate. The amount must be adapted to each type of substrate based on water requirements and characteristics of the plants and cultivation and weather conditions. As a general rule, the more permeable the substrate, the greater the need for **AQUASORB**.
- In permeable substrates made of bark, wood fiber or coconut-residue, the recommended amount is 2 - 3 kg/m³.
- In less permeable substrates, such as peat or composts, the recommended amount ranges from 1 to 2 kg/m³.

Recommended SNF product:

AQUASORB 3005KM
Dosage: 1 to 3 kg/m³

MIXING WITH FERTILIZERS

To reduce leaching of nutrients in the soil, **AQUASORB** may be mixed dry into fertilizer preparations. The behavior of plants fertilized with this mixture makes it possible to maintain or even increase yield while at the same time protecting the environment from leaching. Manufacturers' test results also show better root development of the plants.
Savings on the order of 15% to 30% are observed in the amount of fertilizers.
The polymer is added dry when the fertilizers are manufactured.

Recommended SNF product:

AQUASORB 3005KM
Dosage: 1 % to 5% by weight

ANIMAL LITTER

AQUASORB products can also be used as an additive in drying feed litters used in breeding farms to replace the old generation of phosphate based-litters.
This new generation of animal drying litter has many benefits:

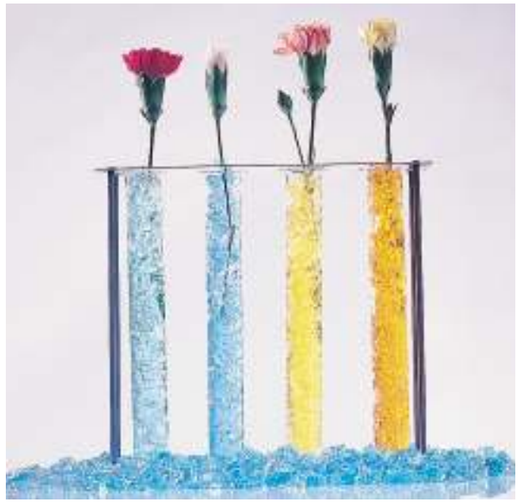
- A better comfort for the animals due to a dryer bedding environment.
- A reduction of the odors.
- An improvement of the fertilizing value of manure due to a better fixation of ammonia.
- A better respect of the environment as it is a phosphate-free product.

FLORAL DECORATION

AQUASORB is commonly used for coloring the water in glass containers. **AQUASORB** in granules is allowed to expand in colored solutions. The hydrogel is placed in glass containers in which cut flowers may be placed.

Recommended SNF products:

AQUASORB 3005KL or 3005K4
Dosage: 1 kg in 150 liters of water



AGRICULTURE

AQUASORB has also shown its effectiveness in large-scale farming, especially at the time of germination and development of the root network due to good aeration of the soil. The storage of rainwater or irrigation water by **AQUASORB** delays the wilting point and thus makes it possible for certain plants to begin to be well established while waiting for the water regime to become adequate. **AQUASORB** ensures a good population and an even growth of plants even in very permeable soils.

For example, in the farming of rain-fed sugar cane, significant increases in yield of approx. 25% are observed.

- When replanting a field, put **AQUASORB** in the furrows where the cane shoots are placed.
- **AQUASORB** may be applied at the same time as a fertilizer.
- Cover the shoots with soil by earthing up.

Recommended SNF products:

AQUASORB 3005KM in coarse soils
AQUASORB 3005KL in fine soils
Dosage: 10 - 15 kg / ha

TRANSPORTING CUT FLOWERS

AQUASORB in the form of hydrogel may be placed in sealed plastic pouches. Once frozen, the pouches are often used in the transport of heat-sensitive plant products such as cut flowers. The hydrogel has excellent resistance to heat shock and does not leak after thawing.

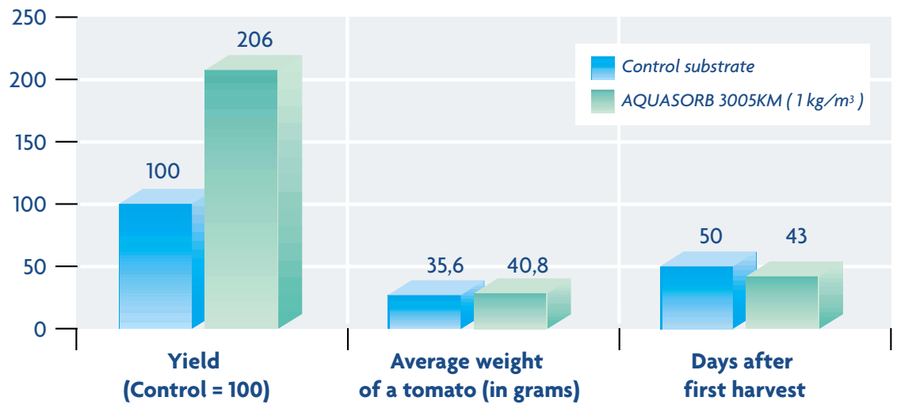
Recommended SNF products:

AQUASORB 3005KL or 3005KM

TEST RESULTS

AQUASORB improves horticultural crop yields due to better aeration of the substrate. The date of the first harvest is earlier, which allows for faster crop rotation.

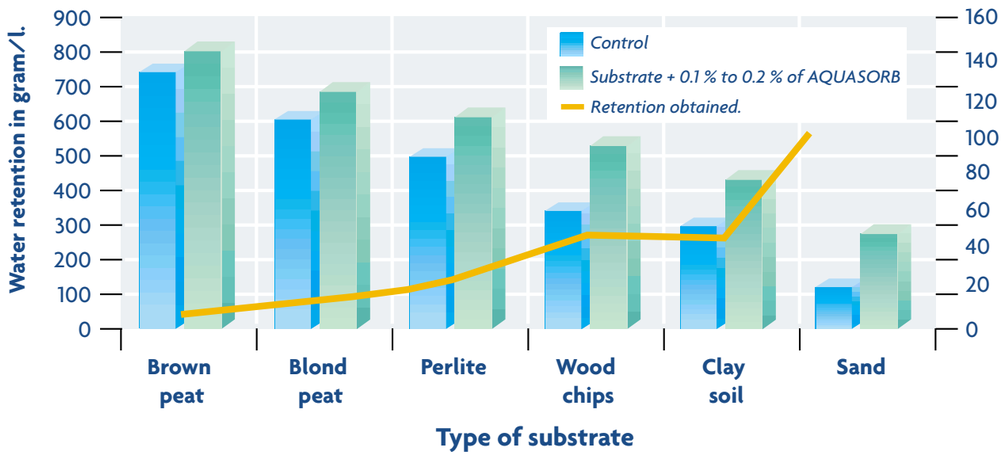
Effect of AQUASORB on the growing of tomatoes



Source: Horticulturist - France, 2000.

AQUASORB makes it possible to improve the water retention of substrates. Irrigation frequencies are spread out thereby reducing both water and labor costs.

Increase in the water retention of substrates

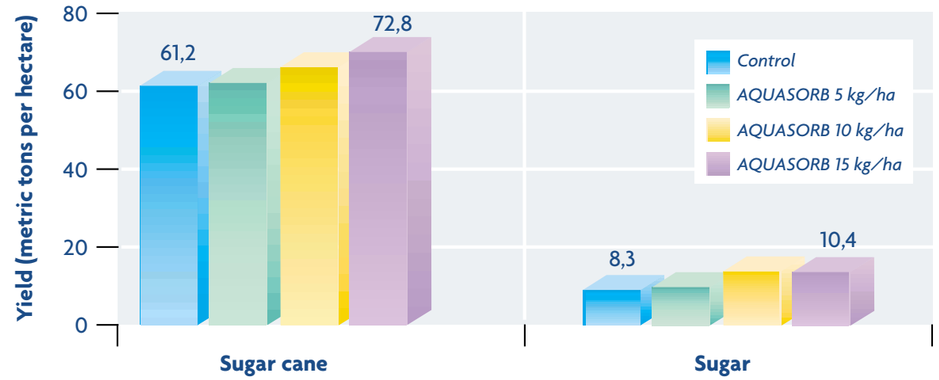


Source: Sodetra - France, 1990.

TEST RESULTS

In rain-fed sugar cane farming, **AQUASORB** improves the transplanting and growth rates of cane shoots during the dry season and has allowed for a significant increase in yields. The sugar yield of plots treated with 15 kg/ha increased by 25% over the control plots.
AQUASORB was applied locally in the crop furrow when the shoots were replanted.

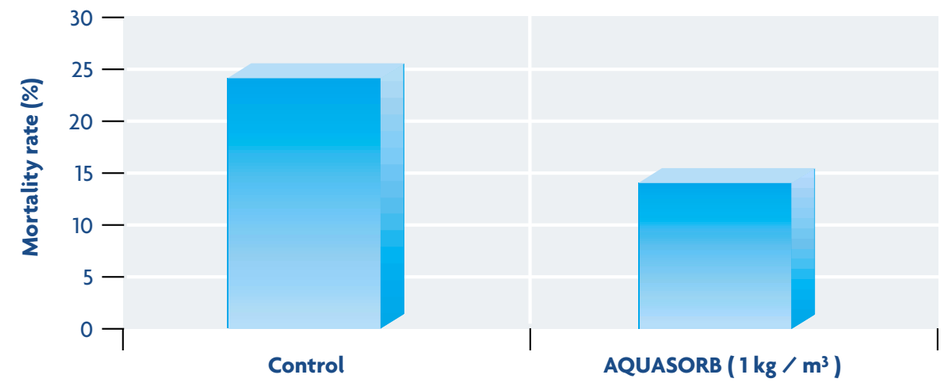
AQUASORB in rain-fed sugar cane farming



Source: MSIRI - Mauritius, 1997.

In arboriculture, **AQUASORB** reduces the summer mortality of young trees due to transplanting shock by 40% with respect to the control group.

Rate of mortality of young trees during first year after planting



Source: ONF - Corsica, 1988.

INFORMATION ON PRODUCT USE

Application of the dry or hydrated product:

- After hydration of the dry product, it becomes a transparent gel that is greatly expanded.
- When the product is mixed dry into a substrate, it is recommended that an empty space of a minimum of 15% be left in containers. During hydration, the substrate could overflow its container.
- Dry product must not be placed under plugs. The plant could be destabilized after **AQUASORB** hydration.
- It is preferable to mix the dry product in an irrigated soil or substrate.
- On the other hand, hydrating the product in a non irrigated soil is recommended so that it becomes active immediately.

Choice of particle size:

This is an important factor to consider based on the soil type.

- In general, the finer the particle size of the polymer, the greater its capacity and speed of absorption and vice-versa.
- When applying **AQUASORB** to very porous soils (e.g.: sand, compost) use a small particle size for more rapid water absorption.
- In heavy soils (for example, clay), granules are preferable. They improve the porosity of the soil due to their great expansion capacity.
- In the preparation of dressings, use a very fine product to achieve adequate protection of the root hairs.

Very fine products:

- Because of their volatility, wearing a dust mask is recommended.
- If the product is hydrated before use, slowly pour the product into water. Stirring lightly will prevent the fine particles from clumping.

Additional information:

- The higher the water temperature, the faster the absorption of water by **AQUASORB**.
- All the products in the **AQUASORB** line have a high absorption capacity. If the product is spilled, **be sure not to rinse it with water**. The ground would become extremely slippery. Shovel or vacuum it up.
- To clean equipment, blow off the powder traces with compressed air.
- Avoid contact with eyes and skin (use of gloves and goggles is recommended.)

ENVIRONMENT

Environmental consequences:

■ Biodegradation

The polymer is sensitive to the action of ultraviolet rays that, by breaking bonds, degrade the polymer into oligomers (molecules of much smaller size). It thus becomes much more sensitive to the aerobic and anaerobic processes of microbiological degradation.

AQUASORB therefore degrades naturally in soils (up to 10% - 15% per year) in CO_2, H_20 and nitrogen compounds.

■ Bioaccumulation

The polymer is much too voluminous to be absorbed into the tissues and cells of plants. Its potential to bioaccumulate is therefore nil. (SCPA study n° 97-78).

The period of effectiveness of **AQUASORB** in the field ranges from one to five years depending on particle size and agro-climatic conditions.

Toxicity:

- **AQUASORB** products demonstrate no systemic toxicity (oral LD50/rats › 5000 mg/kg).
- **AQUASORB** is approved by the French Ministry of Agriculture (APV N°8410030). Our US distributors' trade names are also approved by the US Department of Agriculture (USDA).
- Consult the safety data sheet for additional information.